A PROCEDURAL FRAMEWORK FOR REFLECTIVE PROBLEM SETTING IN POLICY RESEARCH:
THE CASE OF SCHOOLS

By

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ABSTRACT

This study was prompted by the currently troubled state of public schooling in Canada and the United States; and by the perceived need for an analytical technique that would enable policymakers to pay conscious attention to the task of problem setting—as a critically important precursor to the task of problem solving. Inquiry was, therefore, directed at developing, and applying to the case of schools, an approach to reflective problem setting proposed by Rein and Schön (1977).

Premised on the notion that the framing of problems depends upon metaphors that are often unwittingly, and consequently, uncritically used to make sense of troublesome social situations—this approach is concerned with subjecting to scrutiny the deep metaphors found to underlie the 'stories' told about problematic social situations. Accordingly, a procedural framework was developed for uncovering, and analysing such metaphors, and for examining their policy-related utility.

These procedures were applied—in the case of schools—to the analysis of a major policy-influencing document of our times, namely, the 1983 Report by the U.S. National Commission on Excellence in Education titled, "A Nation at Risk: The Imperative for Educational Reform."
findings of this analysis suggested that the Commission had (metaphorically) viewed the school as an industrial workplace with a mass production mode of technology: one whose level and standard of productivity had slipped, and whose need was for the implementation of more rigorous quality control measures.

In response to the critical appraisal of this metaphorical frame, the problem of schools was reframed as one involving the need for second-order system change; the school being seen (metaphorically) as a mass production workplace in need of gearing-up to a 'process' mode of technology (focussed on the continuous 'flow' of learning). The organizational characteristics found in workplaces having a 'process' mode of technology were projected to suggest the analogical implications for the school of tomorrow. Given the positive nature of these implications, it was concluded that this metaphor for change merited the attention of educational policymakers; and that the procedural framework used to frame it warranted further investigation by policy analysts.
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INTRODUCING THE STUDY

When we examine the problem-setting stories told by the analysts and practitioners of social policy, it becomes apparent that the framing of problems often depends upon metaphors underlying the stories which generate problem setting and set the direction of problem-solving...

...we ought to become critically aware of these generative metaphors, to increase the rigor and precision of our analysis of social policy problems...

(Schön, 1979:255-256)

This dissertation is concerned with the development of means by which policymakers might increase rigor and precision in the analysis of social policy problems and thereby improve the quality of their work. It was prompted by the currently troubled state of public schooling in Canada and the United States; and by the perceived need for an analytical technique that would help policy analysts (and others who contribute to the formulation of educational policies) pay conscious and reflective attention to the task of problem setting (as a precursor to their focus on problem solving). In response to this perceived need, inquiry was directed at operationalizing an approach to the analysis and practice of problem setting advanced by Rein and Schön (1977), and Schön (1979); and at assessing the utility of the proposed procedures by critically reflecting upon their trial application to the case of schools.
The first section of this introduction provides an overview of the situation that prompted the study, and explains the general perspectives from which the purpose of the inquiry may be viewed. Subsequent sections outline the purpose of the study, and the organization of the chapters in the thesis.

OVERVIEW

The 'Problem' of Schools

Whether or not we accept the claim that there is now a general 'crisis of confidence' in the public school systems of Canada and the United States, it is apparent that they have become the subject of increasingly widespread public concern, scrutiny, and disapprobation. While opinions concerning 'what is wrong' and 'what needs fixing' are as varied as the constituent interests they represent, there is one thing about which everyone does seem in agreement--public schooling is in trouble, and it is up to those responsible for developing educational policy to bring about the much-needed school reform.

How those so charged will accomplish this task remains to be seen; but, in the United states, where activity to this end has been particularly marked over the last few years (with some 30 national and more than 250 state-wide reports having been issued on the status of schooling), indications are that the policymakers may now be
finding themselves in trouble. It would seem that the capacity of their proposed policies to deliver fundamental school reform—as promised—is being viewed from a number of informed quarters with considerable skepticism. Shapiro (1984:12-13) for example, complains that the reform measures represent "little more than a set of proposals for schooling as usual." And, in like vein, Leonard (1984:48) observes that even if everything proposed in all the reports on school reform were put into effect, "the resulting school would be fundamentally no different from the school of today." Indeed, he points out how it would, in fact, be much like the school of a hundred years ago:

Teachers would still be standing or sitting in front of some twenty to thirty-five mostly passive students of the same age and giving out the same information at the same time to all these students, regardless of their individual abilities, cultural backgrounds, or learning styles.

(Leonard, 1984:48)

As Leonard sees it, the needs of our society in a "space age" will not be met by what he calls "horse and buggy" educational reforms. And, he is certainly not alone in suggesting that what will be required is a thorough restructuring of the schools. However, the persistence of the structural and organizational features that have characterized North American schooling for the past century (Cuban, 1982b; Hart, 1983; Goodlad, 1983) bespeaks a resistance to fundamental structural change that would appear to be a characteristic feature of social systems in general (Watzlawick, Weakland, and Fisch, 1974).
To date, concern with educational change might be seen as having focussed largely on the question of how to ensure the successful implementation of innovative practices (e.g. Fullan, 1982; Common, 1985). However, complaints in the U. S. about the ineffectiveness of recently announced reform measures to deliver "real" change are now being made well before the stage of policy implementation—in some cases, even before the policy has been completely formulated. They are, moreover, being made on the grounds that proposed solutions are directed at the problem of getting school performance "back on track", rather than of improving school performance in new and better ways.

Such criticisms suggest that the recent proposals for school reform are seen as addressing the wrong problem—a situation that would appear to be endemic in the field of social policy; for, as Ackoff (1974) points out, "we fail more often because we solve the wrong problem than because we get the wrong solution to the right problem."

'Getting the Problem Right' for Policymaking

It would, indeed, seem that the mechanisms whereby policymakers 'get' and 'set' (i.e. understand and define) the problems that their policies subsequently seek to solve is not at all well understood. As observed by Dunn:

Problem structuring, which is that phase in the process of inquiry where analysts grope toward possible definitions of a problematic situation, is no doubt the most crucial but least understood aspect of policy analysis.

(Dunn, 1981:98)
That the policymaking enterprise has—as suggested by Schö'n (1979)—for some twenty years been viewed almost entirely as a problem-solving activity, might account for the lack of attention to this crucial task of problem definition. A review of the literature related to policymaking would certainly bear out Schö'n's (1979) contention that the public policy field is dominated by a preoccupation with solution-seeking. As noted by Schö'n (1979:260-261), the problems themselves are generally assumed to be given. The assumption seems to be that "we know, or can easily voice, the problems of cities, the problems of the economy, the problems of population control, but that we cannot yet solve them." Accordingly, the role of the policymaker (and the policy analyst) is to be a problem-solver; the task—to find solutions to known problems¹.

However, as pointed out by Schö'n, problems are not given, "they are constructed by human beings in their attempts to make sense of complex and troubling situations."

¹ Schö'n (1979:261) goes on to suggest that if problems are assumed to be given, this is in part because they are always taken to have the same form—one marked by what he calls "an instrumentalist" position: "Problem-solving consists in the effort to find means for the achievement of our objectives, in the face of constraints that make such achievement difficult. According to this instrumentalist position, there are always objectives, goals or purposes; these are rooted in human values and are, in a sense, arbitrary, inasmuch as they depend on what we (or others) want to achieve. There are also constraints to the achievement of these objectives, always including the constraint of limited resources. And finally, there are the various available means, the optional courses of action from which we may select the best (or at least an acceptable) path to our objectives."
And, since the form that these constructions take will determine the range of solutions that are then possible, problem structuring can be seen to be central to the task of successful policy development.

Our attention is, thus, drawn to the need in policy-making for a much greater awareness of, and emphasis on, the processes by which the problems (for which the problem-solving policies are sought) become structured, or 'framed,' in the first place. In relation to the problem of schools, then, we might ask:

Given that problem structuring has been identified as the most crucial, but least understood aspect of policy analysis—how might the educational policymaker set about 'framing' the problem of schools for purposes of developing educational reform policies that are attuned to improving school performance in new and better ways?

**Problem Framing.**

For Rein and Schön (1977), problem framing is triggered by a problematic situation—this is a situation in which uncomfortable, worried, or irritated feelings are experienced. Judgment about what it is that is actually problematic requires a way of 'seeing' the situation that gives it meaning—that structures the situation in terms of an understandable problem; a problem being represented by the difference between one's perception of the situation as it is and one's conception of how it 'ought' to be.
According to Rein and Schön (1977), it is a generally accepted notion that we learn and 'know' by means of organizing our sensory perceptions into "meaningful aggregates"—i.e. into interpretive frameworks of concepts (perhaps what we sometimes refer to as "frames of reference") that are based on previous patterns of experience. This process of carrying over our frames of reference from one domain of experience to another—the process of 'seeing' something we don't know in terms of something we do—leads to what has been called by Schön (1979:254) a "generative metaphor."

As Schön sees it, generative metaphors provide our perspectives of the world; for they shape how we think about things, make sense of reality, and set the [social policy] problems we later try to solve. His concern in this context is not that we ought to think metaphorically about social policy problems, but that we already do; and that the metaphors we employ to frame and make sense of otherwise disaggregated worries and concerns are not always apparent to us. As a result, we neglect to check their appropriateness, and may find ourselves paying the price through inappropriately framed policies. The remedy, suggests Schön (1979:255), is to seek out the problem-setting frames that people have used to understand and describe a particular problematic situation, and to "spell out the metaphor, elaborate the assumptions which flow from it, and examine their appropriateness in the present situation."
The conduct of such analyses is viewed by Rein and Schöhn (1977) as a critically important aspect of policy research; and they make a strong case for its inclusion in the policymaking process. However, while their "methodology for problem setting" (Rein and Schöhn, 1977:237) appears to hold promise, it is—from an operational standpoint—only rough-hewn. It poses a number of procedural questions that beg putting to the test of practical application. To conduct such a test, and to see whether the approach to problem setting advanced by Rein and Schöhn might, thus, be successfully honed into a demonstratably applicable analytical 'tool'—one that could help educational policymakers better understand 'the problem of schools'—was the main objective of this study.

PURPOSE OF THE STUDY

Within the overarching purpose of seeking policy knowledge that might contribute to the discipline of policy science2, the purpose of the study was twofold. On the one hand it sought knowledge about a particular aspect of the policy-making process, namely, the process of problem setting; and, on the other hand it sought knowledge related to a particular social policy issue, namely, 'the problem of schools.' Specifically, it sought:

2 For Dror (1968:8), policy science can be partly described as "... the discipline that searches for policy knowledge, that seeks general policy-issue knowledge and policymaking knowledge, and integrates them into a distinct study."
Knowledge Related to the Policymaking Process

To see if a procedural framework for conducting problem-setting frame analysis could be developed (along the lines suggested by Rein and Schön) and shown, through practical application to the case of schools, to have sufficient clarity (and generalizeability) that it might be deemed of use to policy analysts in general.

Assumptions. Implicit in this purpose are the following assumptions:

- That the approach to problem setting advocated by Rein and Schön provides a promising and feasible foundation for the development of a 'practice' of conscious and reflective problem setting in policy analysis; and,

- That in order to operationalize such an approach, the key concepts expounded by Rein and Schön require further explication; and, their broadly conceived approaches to:
  -- uncovering the problem frame,
  -- making explicit the underlying metaphor,
  -- elaborating the assumptions and implications of the metaphor,
  -- examining the adequacy of the problem frame, and
  -- confirming/reframing the problem to be addressed, require refinement.
Policymaking process-related questions. Answers were sought to such policymaking process-related questions as:

* How can the researcher most usefully 'bound' the problematic situation—recognizing that any such delimitation must employ a researcher-imposed frame of reference?

* How can the inquirer go about:
  -- discovering the problem-setting frame used in a particular policy document?
  -- making explicit the generative metaphor underlying that frame?
  -- elaborating the assumptions of that metaphor?

* In relation to what criteria might the appropriateness of any given problem-setting frame be assessed?

* How might the utility to policymakers of a particular problem-setting frame be judged in practice? and,

* What principles might be used to guide efforts at reframing a social policy problem?

Policy-Issue Related Knowledge

To see what might be learned—by applying such analytical procedures to some (selected) policy-relevant document of our time—about 'the problem of schools.'

Assumptions. Implicit in this purpose is the following assumption:

o That the findings deriving from the application of the proposed procedures to the problem of schools will be of interest to those concerned with educational policymaking.
School policy-issue related questions. Answers were sought to the following policy-issue related questions:

* What does an analysis of the descriptions used in some (selected) policy-relevant document of our time reveal about the problem-setting frame(s) guiding the school reform proposals?

* Given an analysis of the assumptions carried by its underlying generative metaphor, how appropriate is this problem-setting frame as a base for the development of viable school reform policies?

* How might the currently experienced problem of schools be alternatively framed, or reframed?

* What would be the policy implications of such an alternative?

STRUCTURE AND ORGANIZATION OF THE STUDY

The explorations with which the study is concerned can be seen to be of two different orders of discourse, each with the potential for contributing to policy science with policy-related knowledge of a different kind (i.e. the policy issue of schools; and the policy process of problem setting). In turn, the framework of the dissertation--within which these two sets of explorations are integrated to form a distinct policy study--constitutes a third, overarching, order of discourse. It is useful to 'see' these three orders of discourse as being systemically nested (as diagrammatically represented in Figure 1.1); and, as providing a three-tier structure--rather like a set of Chinese boxes--for organizing the course of the study.
I: Framework for the Integrated Study

General perspective. Impetus for the study was lent by the currently troubled state of public schooling, and the perceived lack of consensus and clarity concerning what actually constitutes "the problem of schools." The stimulus to pursue problem setting, or problem framing/reframing, as policy relevant research stemmed from the work of Rein and Schön who note that:

When consensus has eroded and the nature of the problem is in doubt, then the exploration of problem setting becomes most urgent.

(Rein and Schön, 1977:237)
Accordingly, inquiry was directed at "trying out" an approach to problem setting (suggested by Rein and Schön, 1977) by refining it and applying it to the case of schools—thereby examining how the problem of schools has been framed (in the case under study), and how it might be reframed.

Organization. As illustrated in Figure 1.1, the framework for integrating inquiry concerning a policy issue and a policy process envelops the study as a whole. Discourse at this level includes discussion (in this chapter) of the rationale for the study; and reflection upon the implications of the findings of the study as they relate (in Chapter 10) to the reframed problem of schools, and (in Chapter 11) to an assessment of the utility of the procedures developed for problem-setting frame analysis.

II: An Approach to Reflective Problem Setting in Policy Research

General perspective. It is supposed that the way in which the interpretation of a problematic situation is configured is dependent upon the nature of the 'frame' that is employed for aggregating, and making sense of, the troublesome sensory data. And that, while from among the array of possible frames that might be selected for such a purpose none can be claimed as the 'true' or 'right' one—it is likely that some particular problem-setting frames possess greater interpretive power, and utility for policy purposes, than others.
Based on such suppositions, inquiry in this phase of the study was directed at developing a blueprint for (a) guiding the course of a conscious and reflective practice of problem framing/reframing, and (b) for assessing the appropriateness and policy-related utility of a given frame.

Organization. This phase of the study consists of two chapters (Chapters 2, and 3). The methodological problems of the study are framed in Chapter 2, which provides an interpretive overview of the approach to reflective problem setting suggested by Rein and Schön (1977) and Schön (1979), and identifies (in the form of preparatory research tasks and sub-problems) the operational questions it evokes. A procedural framework designed to address these operational requirements is developed in Chapter 3. Trial application of this procedural framework to the case of schools leads to a different level of analysis, as conducted in the 'core' phase of the study.

III: The Case of Schools

General perspective. It is supposed that if we examine the "stories" people tell about life in schools and classrooms, and about the things that they think there need "fixing," we may discern the generative metaphors that frame the problems to which their problem solving activities are subsequently directed.

As Bates (1982) notes, there exists in our everyday language about children and schooling a variety of powerful, and conflicting, metaphors:
Metaphors of the child as flower, nigger, enemy, cog, machine, chameleon, miniature adult, psychopath, gentleman, or reasoner, are common currency in staffrooms as are our metaphors of the school as factory, clinic, or bureaucracy. (Bates, 1982:8)

It is, then, with the uncovering of such metaphoric data from documentary sources—and with the analysis of the problem-setting frames that they generate—that this part of the study is concerned.

The blueprint developed (Chapter 3) for dealing with such an analysis is applied to the case of schools, as it is represented by the "stories" told about schooling in what is considered to be a major policy-influencing document of our time, namely, a (1983) report by the (U.S.) National Commission on Excellence in Education titled, "A Nation at Risk: The Imperative for Educational Reform."

Organization. The six chapters (Chapters 4, 5, 6, 7, 8, and 9) that make up this phase of the study advance the inquiry through the successive stages of reflective problem framing/reframing—according to the procedural framework proposed in Chapter 3. Accordingly, the preparatory research tasks of "bounding the problematic situation," and "selecting the documentation for analysis," are dealt with in Chapter 4, "Bounding the Problematic Situation in the Case of Schools."

Chapter 5 is concerned with "Uncovering and Spelling Out the Generative Metaphor(s) Used to Frame the Problem of Schools"—as it is 'seen' by this inquirer/interpreter in
the selected document, "A Nation at Risk". And Chapter 6, provides an in-depth exploration of this finding by "Elaborating the Assumptions of the Metaphor 'School as an Industrial Workplace'." The extent to which this metaphor might be considered to have provided educational policymakers with an appropriate and useful problem-setting frame is analysed and discussed in Chapter 7, "Examining the Problem Frame Used In The Case of Schools."

An alternative way of framing the problem of schools is proposed in Chapter 8, "Reframing The Problem Of Schools." This alternative frame is generated by restructuring the (what might be considered to be dominantly-held) metaphor, so that instead of simply viewing the school as a kind of mass production manufactory (intent upon turning out appropriately packaged and labelled graduates), the school can be seen as a system that is in need of 'gearing up' from a mass production to a 'process' mode of technology (focussed on the continuous flow of learning). The problem of schools is hereby reframed in such a way that the perceived need for very real (second-order) structural change—that is, change of rather than merely changes in the school system--can be addressed. The plausibility, appropriateness, and utility of this restructured metaphor is discussed in Chapter 9, "Examining the Reframed Problem of Schools"; and the its implications for policymaking are examined in Chapter 10.

Chapter 11 provides an overview of the study, and discusses the implications suggested by its findings.
Chapter 2

FRAMING THE METHODOLOGICAL PROBLEMS OF REFLECTIVE PROBLEM SETTING

What is to be resisted is the notion that the cultivation of methodology is either necessary or sufficient for successful scientific endeavour.

It is surely not necessary. Methodology, Weber (135:115) rightly says, "can only bring us reflective understanding of the means which have demonstrated their value in practice by raising them to the level of explicit consciousness; it is no more the precondition of fruitful intellectual work than the knowledge of anatomy is the precondition for correct walking." This is to say that methodology provides a reconstructed logic, from which the logic-in-use may be quite independent. Yet explicit consciousness can improve what is being done without full awareness.

(Kaplan, 1964:24)

Based on the conviction that our understanding of social policy issues is dependent upon the metaphors we unconsciously use to make sense of troublesome social situations, Rein and Schön (1977:237) propose that we "discover the tacit frames that organize our insights and then that we challenge them." The approach they suggest as a 'first step' toward a methodology for problem setting is laid out in what they call "a nonformalistic way." The development of their suggestions and ideas into a more formalized procedural framework is, here, envisaged--and attempted--as a necessary 'second step' for the actualization of such a "methodology."
The Approach to Problem Setting
Proposed by Rein and Schön

The "methodology for problem setting" proposed by Rein and Schön (1977:237) integrates a discussion of unconscious problem-setting processes with proposals concerning conscious strategies for translating worries into problems. Some of these strategies are retrospective in nature (e.g. examining existing stories, maps, theories, and models); others might be termed prospective (e.g. disaggregating worries, aggregating worries, thought experiments that work back from possible solutions to possible problems). In all, the ideas presented by Rein and Schön offer a stimulus and a guide rather than a definitive methodology.

However, while there are no 'steps' per se, a distillation of the ideas presented by Rein and Schön (1977) and Schön (1979), does suggest that the conduct of conscious, reflective, problem setting could be viewed as involving five procedural stages. These stages might be envisaged as:

1. discovering the problem frame that has been used to give meaning to a problematic situation;
2. spelling out the generative metaphor that underlies (i.e. generative of) this problem frame;
3. elaborating the assumptions of that metaphor; then,
4. judging the adequacy of the problem frame (in the light of the assumptions of the underlying generative metaphor, and in the context of the given situation); and
5. confirming or reframing the problem to be addressed.
The 'Methodological Problem'

How the policy analyst is to approach the question of problem setting, and to actually go about each of these procedural tasks constitutes the 'methodological problem' of this study. Accordingly, what is understood to be involved in approaching the task, and operationalizing each of these stages is, next, reviewed; preparatory research tasks are noted; and operational questions are identified as sub-problems. These preparatory research tasks and sub-problems are subsequently addressed, in the form of a procedural framework, in the following chapter.

APPROACHING THE QUESTION OF PROBLEM SETTING

Assumptions

The questions asked in this chapter are addressed to the operational aspects of Rein and Schön's proposed approach to reflective problem setting. They are not concerned with the articulatory style used by these authors; nor are they directed at questioning the epistemological bases upon which their proposal is seen to be predicated. This does, of course, raise the question as to whether the researcher's apperception of these epistemological bases truly reflects those intended by Rein and Schön. It would, therefore, seem only prudent that these perceptions, and other assumptions about their proposal be made as explicit as possible at the outset. To this end, the rest of this section is dedicated to an interpretive overview of what are seen to be the key concepts expounded by Rein and Schön.
The Problem-Setting Process

The problem-setting process described by Rein and Schön seems to encompass both that which occurs in the natural course of policy decision-making—the 'is,' as it were, of policy analysis; and that which they advocate as a deliberately structured problem-setting agenda for the policy research process—what might be thought of as the 'ought' of policy development. For purposes of this study, a distinction has been made between the 'is' and the 'ought' of problem setting. The naturally occurring process is thought of as "unconscious reasoning"; and the deliberately structured problem-setting agenda, as nonformalistically set out by Rein and Schön, is termed "reflective problem setting."

Problem Setting as Unconscious Reasoning

According to Rein and Schön, the problem-setting process begins with a problematic situation; one characterized by diffuse, intuited discomfort, concern, and irritation—i.e. worries that elude an orderly formulation of what the problem is all about.

Framing the problematic situation. The judgment about what it is that is actually problematic is seen as requiring the application of a frame to the field of experience. This frame will highlight certain worries as significant, and ignore others as trivial or irrelevant—it will "bind together the salient features of the situation, including the relevant worries, into a pattern that is
coherent and graspable" (Rein and Schön, 1977:239).

It might be helpful to conceptualize these stages of unconscious problem setting as, for example, depicted in Figure 2:1.

![Diagram of unconscious problem setting]

Figure 2:1
Unconscious Problem Setting

Figure 2.1 shows the undifferentiated phenomenological experience of a particular social setting (A) as diffuse concerns/worries that become translated into an articulated problem frame (B). What this picture of the unconscious process of problem setting fails to show, however, are the linkages between state (A) and state (B). It does not show what happened to those features in state (A) that are omitted in the problem frame (B); nor does it show why the features highlighted in the frame (B) are considered to be salient, and to fit together as they do.
To fill in the gaps left by an unconscious process requires both reflection and speculation; for there do not appear to be definitive answers to the epistemological questions thus posed. It does, however, seem (as noted by Rein and Schön) to be a generally accepted notion that we learn and 'know' by means of aggregating sensory perceptions into 'patterns' that have meaning for us; and, that we are able to accomplish this by virtue of 'seeing' something we don't know in terms of something we do—i.e. by means of a metaphor-making process (Wittgenstein, 1953; Nietzsche, 1968; von Bertalanffy, 1981; Bateson, 1977; Bates, 1982).

Conceptualizing the process of unconscious problem setting. One way of conceptualizing the problem-setting process is to imagine the 'unconscious (mind)' as a repository of memory 'tapes.' And, to imagine these 'tapes' as carrying experientially gathered information in the form of some isomorphic code. In this way, the unconscious mind might (metaphorically) be thought of as a memory bank of apprehended patterns that represent coded, categorized, and stored 'knowings' about the world—as shown in Figure 2:2.

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1 Von Bertalanffy (1981:104) postulates an isomorphism between constructs of psychology and neurophysiology. By isomorphism he does not mean a simple similarity between psychological and brain-physiological processes, but some kind of code "like a punched computer program tape, or the genetic code of protein synthesis contained in the nucleic acids of the chromosomes" whose program is isomorphic, without there having to be any direct similarity or resemblance (Clarke, 1982b:24).
Figure 2:2

Conceptualization of the Problem-Setting Process
As illustrated in Figure 2:2, it might be imagined that between state \([A]\) and state \([B]\) there is a "sub" conscious step in the problem-setting process—step "\(X\)." During step "\(X\)," the phenomenological experience of \([A]\) is recognized in terms of a past experience: one that has been coded as "pattern \(B\)." Metaphorically speaking, \([A]\) is seen as \([B]\). However, \([A]\) is not actually \([B]\), it is only like it in certain respects. Therefore, some of the features experienced in state \([A]\) do not have a counterpart in "pattern \(B\)." However, as Ronco and Schön (1977:49) note, "We learn to become selectively inattentive to error; we devise culturally accepted junk categories in order to explain anomaly away." Accordingly, it can be expected that such features will either be cast out as junk, or ignored as irrelevant.

It might, moreover, be imagined that the transition from state \([A]\) to state \([B]\) is signalled by a concomitant change in experienced feelings. The discomfort and irritation felt in state \([A]\) give way to the "ah-ha" of insight with the recognition of a meaningful pattern in step "\(X\); and this, in turn, becomes a confirmatory "mmh" as an acceptable frame puts closure around otherwise irritating uncertainty, in state \([B]\). A 'metaphor' has been born.

For Schön (1979:254), "'metaphor' refers both to a certain kind of product—a perspective or frame, a way of looking at things—and to a certain kind of process—a process by which new perspectives on the world come into existence." This process of SEEING-AS (the "meta-pherein"
or "carrying over" of frames or perspectives from one domain of experience to another) Schön calls "generative metaphor."

**Generative Metaphor**

A metaphor is "generative" (Rein and Schön, 1977:241) when it provides "a basis for making the normative leap [from findings to recommendations] by projecting onto unfamiliar situations familiar notions that are already evaluated." To illustrate, Rein and Schön cite the case of a housing official who, in talking about "decaying housing stock" as opposed to "healthy stock," can be seen to be framing his worries in terms of a metaphor of disease and pathology. In accordance with such a frame the official is likely to consider remedies in terms of "arresting decay," and "rehabilitating old stock" etc.

That we are dealing here with a metaphor becomes clear when we consider that houses are not literally either healthy or diseased. Indeed, one man's "decay" may be another man's old world charm. That we are dealing with an operational, rather than a decorative metaphor, becomes clear if we observe that the housing official pays attention to just those phenomena that fit his metaphor and ignores the rest, and if we observe that the remedies he espouses, and considers obvious, are those that flow from the metaphor and would not seem obvious (indeed, might seem wrong) if considered from the point of view of a different metaphor. That we are dealing with a generative metaphor becomes clear if we observe that the metaphor sets the direction of remedial action in the very process by which it selects out events and explains them. Once we have been able to see houses as diseased or healthy, a whole set of prescriptions present themselves for action. (emphasis added)

Because we believe that it is better to be healthy than diseased, the health metaphor is generative of directions of solution for the problem of housing. (Rein and Schön, 1977:241)
According to Schön (1979), the generative metaphors we employ to frame and make sense of otherwise disaggregated data are not always apparent to us. As a result, we neglect to check their appropriateness, and may find ourselves paying the price through inappropriately framed policies. Part of this neglect may be due to our reliance on some rather commonly used generative metaphors, suggest Rein and Schön (1977:241-243).

Some commonly used generative metaphors, like the HEALTH/DISEASE metaphor, are in such good currency in our culture that we can be blinded by the very "obviousness" of the solutions they suggest. There is, for example, the commonly found metaphor which frames the problematic situation in terms of "departures from a prototypical ideal." Here, problems are identified as FLAWS—abnormalities that need to be corrected in order for normality to be regained. Another variation of this theme sees the ideal in terms of the situation "as it used to be"; and the problem, as one of how best to return things to the way they once were. [The clamour for educational reform based on a 'back to the basics' rhetoric might be viewed as illustrative of such a metaphoric influence.]

Another commonly found metaphor is that which sees the situation as one in which essential NEEDS remain unmet; the remedy requiring a way to meet such needs. [Perhaps social welfare policies aimed at alleviating the hardships suffered by the poor and handicapped might be seen as
related to this particular problem-framing metaphor.]

And, finally, where it is possible to identify villains, victims or heroes, the situation may be seen in terms of BATTLE and VICTORY. [Such a metaphor would seem to underlie the problem-setting frames adopted by the "opposing" management/labour "sides" of industrial relations disputes; and, undoubtedly, it characterizes the adversarial approach to governance associated with party politics.]

In such ways, the generative metaphors contained in the frames we use to set problems can just as easily imprison us by their obviousness as they can free us for creative work. As Bates asserts:

Metaphors allow us to structure and create meaning out of experience. They may also act like fly bottles, to keep us trapped in invisible prisons. They can, moreover, mislead us when we apply inappropriate metaphors to situations better understood in other ways.

(Bates, 1982:7)

Bates' statement is referenced to Nietzsche (1968), who argued that the use of metaphor is basic to the intellectual processes we use to establish truth and meaning; and to Wittgenstein (1953) who (cited in Bates 1982:6) likened "the bewitchment of our intelligence by means of language" to the fly that is trapped in a bottle.

It is, suggests Schön (1979:266), the very sense of obviousness about what is wrong, and what it takes to fix it, that is "the hallmark of generative metaphor in the field of social policy." The way to dissolve this obviousness, of course, is to become aware of, and to focus
attention upon, the generative metaphors which underlie our problem-setting stories. However, since generative metaphors are ordinarily tacit, this is not as easy as it sounds.

In order to bring generative metaphors to reflective and critical awareness, Schön (1979:267) suggests that we construct them, "through a kind of policy-analytic literary criticism, from the givens of the problem-setting stories we tell. [For] it is through storytelling that we can best discover our frames and the generative metaphors implicit in our frames."

Interpreting Problem-Setting Stories

Schön cautions that in the process of policy-analytic literary criticism it is important to distinguish between what might be called "surface" and "deep" metaphors.

**Surface metaphors** may be found in the language in which the story is told; but these may or may not relate, or offer clues to the generative metaphor which 'sets' the problem of the story. In other words, the surface language of the story need not contain any obvious metaphoric clues to the underlying deep metaphor.

**Deep metaphors.** It is the deep metaphor which accounts for what is named, and what omitted in a problem-setting story. It is the deep metaphor that makes it understandable why certain assumptions are taken as true when evidence would suggest otherwise; and, in particular,
why the normative conclusions are found to follow so obviously from the facts, the way they do.

Schön (1979:267) suggests that we interpret a problem-setting story by constructing the deep metaphor which is generative of it—"we give it a 'reading,' in a sense very much like the one employed in literary criticism. And our interpretation is, to a very considerable extent, testable against the givens of the story."

It is important to recognize, however, that the story which we subject to policy-analytic inquiry represents only one of any number of ways in which the elements of a problematic situation might be framed; and the policy analyst will need to be alert to the fact that different frames will affect not only what is seen as the problem of a problematic situation, but the very elements that constitute the problematic situation itself.

Bounding the Problematic Situation

As Rein and Schön (1977:239) point out, "different frames, and their associated names, may be used to integrate experiences in different ways." Indeed, it is apparent that:

Frames differ in scope, in the number and variety of worries and other features of the situation they subsume, and in the degree to which they reduce collections of worries to a mode of understanding consistent with a single direction of action.

(Rein and Schön, 1977:240)

It would seem, therefore, that there is no definitive set of concerns and worries that go to make up a problematic
social situation. In which case, a label such as "urban housing situation," or "public schooling" can be seen to impose an *a priori* frame on the context and scope (i.e. the systemic boundaries) of a policy analyst's inquiry--for the problematic situation that is, today, referred to as one of "urban housing" may, tomorrow, be a question related to the "distribution of national income"; and, today's problematic "public schooling," become tomorrow's worry about the "delivery of educational services."

However, in recognition of the need for some way of delimiting the scope of a policy analytic inquiry, it is clear that some such parameter-defining labels are required. But, how the inquirer (mindful of the need to minimize the restrictive influence of a researcher-imposed frame of reference) is to so 'bound' the problematic situation, is a question that s/he will need to address.

Closely allied to the dilemma of "whose labelling of the problematic situation will be taken as 'given'?" is the question of "whose problem-setting story about that given situation will be selected for analysis?" Since the effect of both these decisions is to narrow the focus of the subsequent inquiry, the rationale upon which they are based will, clearly, need to be carefully thought through (as preparatory research tasks) in advance of the inquiry.

**Preparatory Research Tasks**

The following research tasks are seen, therefore, as precursors to the five stages of inquiry mooted for the
practice of problem setting in policy research:

(a) Bounding the problematic situation.

How is the inquirer to delimit what is to be considered as falling within the purview of a given problematic situation—recognizing that delimitation requires the imposition of some interpretive frame?

(b) Selecting the documentation to be analyzed.

Upon what bases should the selection of the documentation to be analyzed be made? (i.e. whose 'stories' should be analyzed, and why?)

DISCOVERING THE PROBLEM FRAME

Examining the Story

To discover, or uncover, a problem frame requires the examination of documentation—or, what Rein and Schön refer to as a "story"—that "tells about" what has been taken as the given problematic situation. According to Schön (1979:264), the clues for discovering a tacit problem frame are to be found in the words (and perhaps surface metaphors) used to name the "things" of a problem-setting story; for they have been used by the storyteller because they fit the frame that s/he has selected to make sense of the problematic situation. [The term "problem frame" is understood as meaning the framework provided by the deep metaphor that is analogically used to elucidate the problematic situation.]

To illustrate what he means by the "complementary process of naming and framing," Schön cites the following
'story' about the urban housing situation:

The experts concluded that if the community were to be healthy, if it were not to revert again to a blighted or slum area, as though possessed of a congenital disease, the area must be planned as a whole. It was not enough, they believed, to remove existing buildings that were unsanitary or unsightly. It was important to redesign the whole area so as to eliminate the conditions that cause slums—the overcrowding of dwellings, the lack of parks, the lack of adequate streets and alleys, the absence of recreational areas, the lack of light and air, the presence of outmoded street patterns. It was believed that the piecemeal approach, the removal of individual structures that were offensive, would be only a palliative.

(Schön, 1979:262)

Schön first maps the features that are named (e.g. "community," "slum area," "blighted," "congenital disease," etc.) (Rein and Schön [1977:245] describe mapping as "a first order attempt at the formalization of the story." As they see it, a map helps to pin-point the variables that are operative in a situation—organizing and locating them in context, as "an orderly arrangement of landmarks."). Within this map, the main characters of the story are identified as the "community" and the "experts (planners)." The once healthy community is seen by the experts as now "blighted" and "diseased." These 'named' features can be seen to fit the problem-setting frame selected to make sense of the problematic urban housing situation; for it is a frame based

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This account (from the nineteen-fifties) is drawn from Justice Douglas's opinion on the constitutionality of the (U.S.) Federal Urban Renewal Program in the District of Columbia—as quoted in, Urban Renewal: People, Politics and Planning, Jewel Bellush and Murray Hausknecht (eds.) (Garden City, New York: Doubleday. 1967:62)
on the commonly used generative metaphor of HEALTH/DISEASE -- in which the community as a whole is personified, and SEEN-AS having a diseased body.

Procedural Considerations

Now, clearly, recognition of the problem frame is facilitated where the 'named' features of the problem-setting story are as explicitly reflective of the deep metaphor as they are in this example of Schön's--where the terms "healthy," "blighted" and "congenital disease" provide such unambiguous (metaphoric) clues. It might, however, be supposed that, if we are generally unaware of the metaphors within which we tacitly frame social policy problems, it is because--more often than not--the terms used to describe the 'things' of our problem-setting story are taken as being 'literal.' If this is the case, it raises the question as to how the inquirer-interpreter is to identify (from a very wide range of potential candidates) in a problem-setting story, those words and (surface) metaphors that are to be taken as constituting relevant metaphoric data.

To facilitate discussion and procedural resolution of this concern (in the next chapter), it is, here, presented as Sub-problem [1]:

Guidelines for identifying relevant (metaphoric) data.

How is the inquirer to identify from all the potential (metaphoric) data in a given problem-setting story those which are indicative of the deep (generative) metaphor?
SPELLING OUT THE GENERATIVE METAPHOR

After recognizing the metaphor that is generative of a (problem-setting) story's problem frame, it is necessary to work through the elements of the analogy it suggests.

Seeking Analogical Structure

This is understood to mean making explicit the features, attributes, or 'predicate subschemata' (Ortony, 1979b) of the more familiarly understood metaphoric term (or 'vehicle') [B]—noting the correspondence between these and the named features and attributes of the subject term (or 'tenor') [A] that they are intended to elucidate. In the course of this process, the inquirer needs not only to pay attention to those features that appear salient because they are "named" in the description, but to be on the alert for those that are omitted, for they may tacitly carry an importance that renders the analogy inappropriate.

The inquirer will also need to be alert, suggests Schön (1979:265), to the possibility that amongst the unnamed features of the metaphor [B] that get tacitly carried-over as an explanatory description of the problematic situation [A], there may be a constellation of normative ideas associated with [B]. (It is, according to Rein and Schön, these tacitly held values and beliefs that render the solution to problematic situations "obvious," and in need of more critical evaluation.)

In reference, for example, to the story already mentioned concerning the problem of urban slums, he notes
that no matter whether we see slum areas in terms of disease, or (as in the view portrayed by another metaphor) of natural community, there is already, with these ideas, a [culturally conditioned] evaluation—"a sense of the good which is to be sought and the evil which is to be avoided. When we see \( \{A\} \) as \( \{B\} \), we carry over to \( \{A\} \) the evaluation implicit in \( \{B\} \)" (Schön, 1980:265). As he explains:

> Once we are able to see a slum as a blighted area, [for example] we know that blight must be removed ("unsanitary and unsightly buildings" must be torn down) and the area returned to its former state (redesigned and rebuilt). The metaphor is one of disease and cure. Moreover, the cure must not be a "mere palliative"; a particular, wholistic view of medicine is involved in this metaphor. It would not be enough, the experts said, to remove offensive structures piecemeal. . . . Effective prophylaxis requires an "integrated and balanced" plan. Just as in medicine one must treat the whole man, so one must "treat" the whole community.

(Schön, 1979:265)

Procedural Considerations

Clearly, the extent to which the structural characteristics, and normative evaluations implicit in \( \{B\} \) are appropriate in the case of \( \{A\} \) cannot be judged if they remain as unrecognized assumptions. Some kind of analytical template would, therefore, seem to be called for in order to facilitate the mapping of such analogical correspondence, as called for in Sub-problem [2]:

Framework for spelling out a generative metaphor.

How might an analytical framework for guiding the process of "spelling out a generative metaphor" be articulated?
ELABORATING THE ASSUMPTIONS OF THE METAPHOR

To accomplish this requires developing in detail the hitherto unrecognized logical and empirical relationships that might be seen to obtain between the elements of the analogy (that is suggested by the underlying generative metaphor). For such a purpose, Rein and Schön (1977:245-246) recommend the use of theories, and models.

Using Theories and Models

Theories and models, like maps, are constructed in an attempt to provide a simplified picture of reality, but, unlike maps, they not only identify strategic variables, but specify how these dynamically relate to each other. As Rein and Schön see it, stories, maps, theories and models are all means by which an inquirer might arrive at an understanding about the nature of a problematic situation; and, while they note that there is no sharp or rigid demarcation between these means, the developmental process of problem setting that Rein and Schön present as a "kind of ideal type [process]" does suggest a progression in application:

Then we may conceive of the problem-setting process as moving from the diffuse detection of a worry, to the telling of a story about the problematic situation, to the construction of a theory that makes explicit the causal linkages suggested in the story, to the formulation of a model that displays the hierarchical interrelationships of the essential elements of the theory.

(Rein and Schön, 1977:244-245)

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3 Rein and Schön do note [1979:245-246], however, that, "some models seek only to provide an accounting or description on how the variance of complex events can be partitioned. Here a model is like a map . . . ."
Defining theory. The term "theory" is here taken as meaning "a symbolic construction" (Kaplan, 1964:296) that is used in everyday, as well as in scientific, affairs as "a way of making sense of a disturbing situation" (Kaplan 1964:295). It is in essence (i.e. in an abstract sense), then, considered to be of the same stuff of which metaphors are made. Indeed, as observed by Scheffler:

The line, even in science, between serious theory and metaphor, is a thin one if it can be drawn at all . . . there is no obvious point at which we must say, "Here the metaphors stop and the theories begin." (Scheffler, 1960:47)

Now, although the phrase "construction of a theory" might be understood as meaning that we devise some hypothesis to account for the pattern of things and events that have been described in the story--it will be recalled that the pattern of things and events described by the storyteller is presumed to reflect the metaphoric frame s/he has already constructed to account for the problematic situation. Accordingly, the phrase "construction of a theory" is, here, taken to mean 'construing the elements, and the relationship between the elements, of the underlying generative metaphor'--where the metaphor implicitly (and metaphorically) serves AS DOES A THEORY to account for what has caused the problematic situation, and to predict/prescribe what should (therefore) be done to remedy it. It is to spell out the implications of the metaphor so as to make of it a theory.
Defining model. To move from the construction of a theory to the "formulation of a model" is understood as requiring a more elaborate spelling out of the implications of the metaphor/theory. [Indeed, as noted by Brown (1976:170) "a model may be thought of as a metaphor whose implications have been spelled out."]

The effect of this elaboration is to 'flesh out' what is known about the metaphoric term [B] so that it becomes an 'idealized' version against which the analogous features of a generic example of the problematic situation [A] can be mapped for correspondence. The relationship between these two abstractions is thus seen to display "the hierarchical interrelationships of the essential elements of the theory" (Rein and Schöp, 1977:245).

Procedural Problems

The task of elaborating the assumptions of the metaphor is seen as requiring a well articulated conceptual framework. The purpose of such a framework would be to illustrate what is understood to be meant by "the hierarchical interrelationships of the essential elements of the theory," and to facilitate the process of elaborating the assumptions of the metaphoric term [B]. This requirement is framed under the rubric of Sub-problem [3]:

Framework for elaborating the assumptions of the metaphor

How might an analytical framework for guiding the process of "elaborating the assumptions of the metaphor" be articulated?
JUDGING THE ADEQUACY OF THE PROBLEM FRAME

The Criteria for Defining Adequacy

In discussing the features of a frame that render it adequate for problem setting, Rein and Schöen (1977:248-251) suggest that, "The criteria for defining adequacy go deeply into the axioms on which social scientific inquiry rests." And they note that there are different weighting schemes for judging the adequacy of a problem frame:

We may judge such a frame by its plausibility and consistency, by its capacity to lead to action, by its value implications, by its "beauty," and finally, by its testability--its openness to learning through the correction of thought by experience. 4

(Rein and Schöen, 1977:250)

Procedural Considerations

Now, Rein and Schöen give no indication of whether they consider all named criteria to provide necessary and/or sufficient, and/or equal grounds for testing the adequacy of a problem frame for practical policymaking purposes. Nor do they offer any suggestions upon which a rather more systematic approach to this aspect of frame analysis might be based.

4 Rein and Schöen footnote (1977:251): "That truth is not the only way to evaluate the quality of speculation is, of course, not a new idea. Lave and March in an interesting discussion of the issue argue that one never fully resolves the conflict between truth, beauty, and justice as criteria for judging theories and ideas." Charles Lave and James C. March, The Social Science (New York: Harper and Row, 1975), Chapter 3, pp. 51-78.
Moreover, their advocacy of reflective examination of the interpretive accounts of problematic social situations rendered by various storytellers does not include any reference to the need for similar examination of (e.g. the validity/plausibility of) the interpretive account of these stories provided by the inquirer. As a consequence, much is left to be considered in the development of a framework for guiding reflective practice in this regard.

Given, for example, the pragmatic context of policymaking, it would seem important that the criteria used for making judgments about problem frames satisfy not only the rigor-driven axioms of the social scientific community in respect to frame adequacy, but, also, the relevance-driven dicta of the policy field in respect to frame utility.

To this end, it is proposed that the term "policy-related utility" be used as an umbrella label to cover an integration of the concepts associated with scientific adequacy and policy-related relevance. Furthermore, since the ultimate responsibility for making a judgment about the utility of a problem-setting frame rests with the policymakers concerned, it would seem only fitting that the analyst's contribution in this regard be in the form of an examination, rather than a "judgment."

The fourth procedural stage of reflective problem setting is, accordingly, seen in terms of examining the policy-related utility of the problem frame, and as giving rise to the following sub-problems:
Sub-problem [4]:

Bases for the selection of criteria for examining the policy-related utility of a problem frame.

On what criteria might the concept of policy-related utility be based?

Sub-problem [5]:

Criteria for judging the 'validity' of interpretive accounts.

On the basis of what kinds of evidence might the 'validity' of interpretive accounts (either of storytelling observers, or of analytical inquirers) be assessed?

Sub-problem [6]:

Criteria for examining the policy-related utility of a given problem frame

On what bases might the criteria for (scientifically) judging frame adequacy be integrated with those for judging utility in the policy field?

Sub-problem [7]:

Procedural framework for examining a problem frame.

How might the criteria selected for examining the policy-related utility of a problem frame be ordered to form a comprehensive procedural framework for guiding practice in this respect?

Now, whether or not the course of reflective problem setting is considered to be completed with the conduct of this "examination" will, no doubt, depend upon the role and mandate of the analyst, and the results of his/her analysis. It does, however, seem reasonable to suppose that inquiry
would continue until (at least) an 'adequate' problem frame had been discovered—either in already documented accounts of the problematic situation, or as a result of the analyst's efforts to re-frame the problem.

CONFIRMING/REFRAMING THE PROBLEM TO BE ADDRESSED

The Process of Reframing

To re-frame a problem is to find a new way of SEEING (i.e. of perceiving and evaluating) the problematic situation. The process of re-framing is thus—as Schön (1979:278) notes—similar to the making of a generative metaphor. It might, similarly, occur as the result of some spontaneous flash of insight, or of a conscious and deliberate attempt to better understand a complex and troubling situation.

Deliberate frame restructuring. The need for deliberate frame restructuring can be considered within the context of two different sets of circumstances. The first occurs when the participants concerned with a particular social policy bring to the debate "different and conflicting frames, [ones] generated by different and conflicting metaphors"; so that what is needed is a way of reframing the problem that will reconcile opposing views (Schön, 1979). The second circumstance arises when frames that have been in good currency go out of style.
According to Rein and Schön (1977:240), a good deal of ordinary discourse among people traffics in frames, so that our way of seeing things, and conceptualizing ideas, are drawn from a common reservoir of culturally developed frames. However, when old frames seem to have lost their utility (perhaps as a result of a shift in the standards of explanation, or of situational changes) so that they no longer provide a consensual basis for action, then it becomes necessary to select or construct new frames. But, this may be more easily said than done; for as Smith (1982) cautions,

One problem with how we think about phenomenon is that once we have chosen a set of metaphors and applied them to a particular context, they slowly become reified and it is hard to think of that phenomenon independent of the metaphors and metonymies [contexts] we have been using as the vehicle of our thinking. (Smith, 1982:331)

The persistence of old metaphors. Smith goes on to note that when we do manage to generate new metaphors, they are most likely to be mapped on to the old ones, rather than on to the original [experience of the] terrain--making them "second-level maps as opposed to a genuinely alternate map

5 B.E.F. Beck (1978) suggests that the culture within which individuals are reared will influence the development of their semantic codes towards certain highly valued, sense-based configurations (or "cultural root metaphors"). And, by way of illustrating how different environmental conditions may give rise to differing metaphor clusters, she cites (1982:11) a well known study by Segall, Campell, and Herskovits (1966) in which "they show that persons living in 'carpentered environments' have habits of visual perception that differ significantly from persons accustomed to 'uncarpentered, natural' environments."
of the terrain, although it is hoped that the second map will reflect the [experience of the] terrain better than the original." (p.331)

Procedural Considerations

Two other difficulties may be associated with an attempt to re-view some phenomenon by means of an alternative metaphor, suggests Smith. The first can happen when the original metaphor has become "a central part of a much larger reality structure [worldview] that could be fractured or disequilibrated if it were significantly altered." The second occurs when the phenomenon in question is going through changes. In such a case, warns Smith,

If a relationship is changing, the metaphor being used to capture that relationship must also have the capacity to [represent] change in ways similar to the dynamic properties of the phenomenon [in order to serve as a useful metaphor].

(Smith, 1982:333)

Clearly, such difficulties will need to be taken into consideration when it comes to developing guidelines for the reframing of the problem, as required in Sub-problem [8]:

Guidelines for problem reframing.

What guidelines might be developed for assisting the analyst in the task of problem reframing?
CHAPTER SUMMARY

With respect to the development of a procedural framework for the reflective practice of problem setting in policy research, the following preparatory research tasks and sub-problems were formulated (in this chapter) for developmental attention:

**Preparatory Research Tasks**

(a) Bounding the problematic situation.

(b) Selecting the documentation to be analyzed.

**Sub-Problems**


Chapter 3

FRAMING THE PROCEDURES FOR REFLECTIVE PROBLEM SETTING

As long as men must make hypotheses to solve their problems, they will seek analogies to stimulate their invention, and when these analogies generate explanatory categories, these immediately function as explanatory metaphors.

(Pepper, 1982:200)

... we explain by instituting or discovering relations. ... The particular relations that hold constitute a pattern, and an element is explained by being shown to occupy the place that it does occupy in the pattern.

(Kaplan, 1964:334)

Of the methodological issues identified in the last chapter, two preparatory research tasks were seen as requiring attention before the work of reflective problem setting could be advanced. The first section of this chapter deals, therefore, with the preparatory research tasks of:

(a) Bounding the Problematic Situation, and
(b) Selecting the Documentation to be Analysed.

Subsequent sections outline the procedures developed in this study for addressing the operational concerns (identified in the last chapter as sub-problems) associated with each of the five procedural stages of problem setting (as, here,
formulated on the basis of ideas gleaned from Rein and Schöen [1977], and Schöen [1979]), namely:

(1) UNCOVERING THE GENERATIVE METAPHOR UNDERLYING THE PROBLEM FRAME
(2) SPELLING OUT THE GENERATIVE METAPHOR
(3) ELABORATING THE ASSUMPTIONS OF THE METAPHOR
(4) EXAMINING THE POLICY-RELATED UTILITY OF THE PROBLEM FRAME
(5) CONFIRMING/REFRAMING THE PROBLEM.

PREPARATORY RESEARCH TASKS

Bounding the Problematic Situation

In order to impose order on the subject of a policy analytic inquiry, the policy analyst (like any other researcher) must delimit the scope of his/her inquiry. To delimit is to place an arbitrary boundary between what is, and what is not, to be included within the purview of the study. Such a boundary serves, in the same way as does a problem-setting frame, to circumscribe the particular perspective, or point-of-view of the inquirer. It, similarly, acts to limit what the inquirer may discover about the phenomenon under investigation—for the results we obtain are conditioned by the questions we ask.

Moreover, in addition to the constraining imperatives of sound research in this regard, it is supposed that our very apprehension of phenomena is dependent upon our adopting some perspective, some "point of view," (Brown, 1976:169).
It would seem, therefore, that the only way to minimize the influence of an inescapably subjective and limiting bounding of a problematic situation is to ensure that the researcher's frame of reference is (a) consciously chosen (for identifiable reasons); and (b) that it is articulated in the context of a systemic framework (which, at least, enables the simultaneous recognition of some alternative perspectives (as illustrated in the first section of Chapter 4, which deals with bounding the problematic situation in 'the case of schools').

Selecting the Documentation to be Analysed

The quantity and type of 'story' documentation that might be selected for analysis in problem setting are seen as being a function of (a) the availability of (what are deemed to be) relevant problem-setting 'stories', and (b) the research requirements of the particular case in question.

Availability of relevant problem-setting 'stories'.
The availability of relevant problem-setting stories is viewed as a product of such factors as (i) the 'age' of the problematic situation (i.e. whether it is so new that it awaits investigation, or has been around long enough to have been the subject of policy research, 'problem' formulation, and policy development/review), and (ii) the reason why such policy research is considered necessary. Three such reasons are considered, here, to be relevant in the case of research into problem setting. They are:
(1) the problematic situation is so new and unique that no relevant policy exists to deal with it,

(2) the existing policy, or associated policies are generally viewed as being in need of review, in order to meet changing environmental/societal conditions,

(3) the existing policy is the subject of strongly-felt conflicting (and divisive) views.

The relationship between these factors is seen as determining the quantity, and kind, of relevant material that will likely be available for selection by the researcher, as suggested in Figure 3.1.

<table>
<thead>
<tr>
<th>'AGE' OF PROBLEMATIC SITUATION</th>
<th>REASON WHY RESEARCH IS NEEDED</th>
<th>NEWLY EMERGING</th>
<th>BEEN FELT FOR SOME TIME</th>
<th>OF LONG STANDING DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 NO EXISTING POLICY</td>
<td></td>
<td>few (if any) 'stories'</td>
<td>5 10 15 years</td>
<td></td>
</tr>
<tr>
<td>#2 POLICY GENERALLY SEEN AS IN NEED OF UPDATING TO MEET CHANGING ENVIRONMENTAL CONDITIONS</td>
<td></td>
<td>few (if any) 'new' stories old accounts some new stories/cartoons</td>
<td>commissioned studies and research reports</td>
<td></td>
</tr>
<tr>
<td>#3 POLICY SUBJECT OF CONTROVERSIAL DEBATE</td>
<td></td>
<td>a few conflicting accounts/stories</td>
<td>many</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.1

Factors Affecting the Availability of Relevant Problem-Setting 'Stories'
In case #1, for example, of a newly emerging problematic situation, it is more than likely that no relevant social policy exists, and that few (if any) problem-setting 'stories' have been documented. Problem conceptualization might be seen in its infancy in such an instance; and the policy researcher may find it necessary to begin his/her inquiry with the collection of accounts by various stakeholders (and, where appropriate, technical experts).

Where (as in case #2) a problematic situation emerges as the result of a policy (or a set of policies) that is no longer effective (either because the social situation, or the environmental context, has changed), then 'old' (traditional) accounts may be found—ones that will (at least) reflect the dominant generative metaphor underlying the current policy. And, if the problematic situation has been emerging for some time, it is possible that 'new' stories have already been collected (and perhaps analyzed) by other researchers; or even, that large-scale studies have been commissioned that will provide secondary analyses of the situation, and some formulation (in the form of policy recommendations) of the problem. If the situation has more recently become problematic, the researcher, him/herself, may find it necessary to undertake the collection of stories that describe people's concerns and worries. Ideally, such documentation would take an ethnographic form, and not be guided/influenced by
researcher-chosen (problem) topics. Another fruitful source of relevant metaphoric material is, as suggested by Beck (1982:10), "the cartoons of a culture . . [for] They capture, in a succinct way, some of the paradox inherent in cultural values and imagery."

Where a problematic situation is occasioned by the fact that people have brought different, and conflicting, stories to the policy debate (as in case #3), the inquirer will need (for purposes of reframing the problem) to be able to locate a representative sampling of the stories told by the various protagonists. Since, for the conflict to be evident, such accounts must already exist, this should not prove difficult--although, clearly, the number and variety of such stories are likely to reflect the 'age' of the controversy.

Research requirements. The rationale upon which the selection of documentation for analysis might be based is seen as being driven by the unique requirements, and circumstances of each individual case 'study.' However, as a generalization, it might be assumed that under

1 A 1984-1985 study undertaken by the British Columbia Ministry of Education titled "Let's Talk About Schools," asked participants to respond to a discussion paper that had been developed by an Advisory Committee appointed for that task. Respondents' opinions and preferences were, therefore, sought on a number of rather specific predetermined problem issues--and were, clearly, oriented to problem solution (i.e. the problems were taken as 'given'). The resulting report does not provide the kind of data that is useful for research into problem setting. A transcript of the Advisory Committee's deliberations while it attempted to formulate the problem issues might, however, have provided a much more 'telling' tale!
circumstances where there is no existing policy, a thorough representation of viewpoints would be sought—with a view to framing the problem so that it can accommodate as wide a range of constituent worries and concerns as possible. (Thoroughness [of representation] might be judged as having been achieved when additional stories yield nothing that is new.)

In cases where existing policies, or proposed policies, are seen as requiring attention (e.g. as in cases #2 and #3, above), representative (and conflicting) views may be found to have been already expressed in the various 'stories' told by high profile 'opinion leaders' (e.g. politicians, writers, media personalities, researchers and institutional agents). Because such (opinion-influencing) stories about problematic social situations tend to be societally accepted as accounts of 'reality,' they provide important sources of tacit metaphoric data—i.e. widely-held, dominant, explanatory metaphors—that need, as noted by Rein and Schön, to be made explicit and subjected to critical scrutiny.

While some (particularly less well-known) accounts may embody explanatory metaphors that are generative of more promising problem-setting frames (and the policy analyst may be mandated to bring these to the attention of the policymakers), the chances are (as cautioned by Smith, 1982:331) that they will have little acceptability as alternatives if they do not easily map on to the current
way of viewing the problem (i.e. on to the dominant explanatory metaphor).

UNCOVERING THE GENERATIVE METAPHOR UNDERLYING THE PROBLEM FRAME

Having selected the document(s) to be analyzed, the first task is to locate the particular part(s) that describes the problem ('bounded' for the inquiry), and tells 'what is wrong' and 'what in need of fixing.' The next step is to identify, and 'surface,' the deep metaphor that the storyteller has used to makes sense of the problem: a task (as noted in sub-problem #1) requiring the identification of relevant metaphor data.

Sub-Problem [1]: Guidelines for Identifying Relevant (Metaphoric) Data

There are several ways in which the inquirer might be 'cued' to the deep metaphor which is generative of a given problem frame. A surface expression or metaphor(s) that has been used to highlight some 'thing' (as in the case of the "blighted" [slum] community) or action in the problem description, might, for example, serve as a clue. However, ultimately, the discernment of a deep metaphor is going to be dependent upon the schema (pattern) recognizing ability of the inquirer-interpreter.²

² Berliner (1986:11) notes that it is said that "experts have extraordinarily fast and accurate pattern recognition capabilities. These recognition skills appear to act like schema instantiations [concrete instances that represent abstracted patterns]. The recognition of patterns reduces the cognitive processing load of a person."
"Schema recognition." Rumelhart (1979) suggests that schema recognition accounts for our production and comprehension of speech utterances whether these utterances be intended by the storyteller to be taken as literal or metaphorical. As Rumelhart (1979:88) asserts, it is difficult in both cases to determine what is being conveyed simply from the meanings of the "individual lexical items of the utterance." And, he notes that in both cases, "the interpretation seems to depend on knowledge well beyond definitions of the terms involved." He, therefore, posits a very general account of what he sees as being involved in the comprehension process for both literal and figurative languages alike:

The process of comprehension is identical to the process of selecting and verifying conceptual schemata to account for the situation (including its linguistic components) to be understood. Having selected and verified that some configuration of schemata offers a sufficient account of the situation, it is said to be understood.

"a "schema" is taken to be an abstract representation of a generalized concept or situation, and a schema is said to "account for a situation" whenever that situation can be taken as an instance of the general class of concepts represented by the schema."

(Rumelhart, 1979:85)

According to Rumelhart (1979:83-84), schema recognition (whether in figurative or nonfigurative language) is completely dependent upon "knowledge of the world"; and "linguistic utterances are always interpreted in some context."

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3 According to Miller (1979:247-248), the process of straightforward literal comprehension subsumes the process of comprehending metaphors.
Schema recognition is, thus, viewed as a personal, holistic, experience. It is, for example, one in which the pieces of the puzzle (whether they be expressions in a 'story', or a paleontologist's findings of fragmented dinosaur bone fossils) are 'seen' in relationship to the context in which they are found (be it a story situation, or a mountain cave) and comprehended in the light of worldly knowledge (of similar 'story' situations, or dinosaur 'models')—at one and the same time. This is contrary, as Rumelhart notes, to the standard approach which assumes the 'bottom up' process of constructing meaning from smaller component meanings. According to that approach, "non linguistic knowledge comes into play only after the set of possible meanings has been selected" (p.85).

Rumelhart's position is consonant with that of Hanson who asserts:

One does not first soak up an optical pattern and then clasp an interpretation on it—-theories and interpretations are 'there' in the seeing from the outset.

(Hanson, 1965:9-10)

And it is on such epistemological grounds that the approach taken to problem setting is, in this study, predicated. Such an approach recognizes the subjectivity of the researcher's schema recognition and interpretation; and requires him/her to also undertake a reflective assessment of these effects.

Schema pattern-seeking. The process of schema pattern-seeking used in this study (to uncover the deep
metaphor generative of the problem-setting frame employed in the case of schools) would, in retrospect, seem to have been predicated on the following set of tacit 'understandings'/rationalizations:

1. Problems represent the difference between one's perception of the situation as it is and one's conception of how it 'ought' to be.

2. "Problems are defined by hypothetical solutions; [for] the problem's formulation and the proposed solution are part of the same hypothesis in which thought and action are fused" (Wildavsky, 1979:83).

3. The "solutions" provided in a problem-setting story will serve as data on the bases of which to postulate the storytellers's conception of how the situation 'ought' 'ideally' to be.

4. If the story does not include an explicit linguistic 'model' (e.g. in the form of an analogy or simile) to represent this 'ideal,' then the model must be implicit. For, without such a conception of how the situation 'ought' to be, there is no 'seeing' of the problem.

5. If the model is implicit, then it serves, as does a metaphor, to generate understanding. (In this sense all words are symbolic constructions that can be said to be metaphoric, for they carry meaning without signalling that they do so.)

6. It is this postulated (metaphorically used) conception that is sought—not something that looks like a linguistic metaphor.

7. Because the (tacitly used) conception is well understood (even if it is not recognized by the user to be acting as a model in the circumstances), the solutions it provides for remedying the problematic situation will seem to be obvious.

8. It is helpful, then, to ask, "to what problem—in some other context (that is familiar to the storyteller)—is this (recommended course of action) also an obvious solution?"

9. It is also helpful to ask, "in what other contexts (familiar to the storyteller) might the normative ideas underpinning these solutions be found?"
(10) "The perception of a pattern is what gives the 'click of relations' spoken of in connection with the norms of coherence for the validation of a theory. The explanation is sound when everything falls into place" (Kaplan, 1964:334-335).

(11) Failure to achieve this "click of relations" possibly signals a 'cultural' gap between the inquirer and the storyteller (i.e. a lack of working knowledge of the beliefs, customs, or social/linguistic forms of the storyteller's 'world').

SPELLING OUT THE UNDERLYING GENERATIVE METAPHOR

Having identified the most plausible deep metaphor of the problem setting story (i.e. having identified the vehicle [B] that has been used [metaphorically, as a model] to elucidate the subject of the problematic situation [A]), the next task is to plot the corresponding features of the analogy suggested by the metaphor--so that we might construe the "theory that makes explicit the causal linkages suggested in the story" (Rein and Schön, 1977:244-245). This task is seen as being facilitated by the provision of a 'template,' or framework, for guiding analogy construction (as identified in sub-problem #2).

Sub-Problem [2]: Framework For Spelling Out A Generative Metaphor

The framework that is, here, proposed for spelling out a generative metaphor is founded on the abstracted "metaphor-theme" (i.e. the metaphor of [A] as [B] [Black, 1979]) of the identified generative metaphor--as shown in Figure 3.2. According to this framework, [A] symbolizes our newly apprehended image of that which, formerly, we found
problematic; for \( A \) is now seen "as if" it were \( B \)—or rather, in terms of the image we have of the more familiarly known \( B \). However, \( A \) is not \( B \); it can only be like \( B \) in certain respects. Those ways in which \( A \) seems most like \( B \) are named in the story; and these named features serve as a bridge to link the high-salient attributes of \( B \) with what had been low-salient features of \( A \).

![Diagram](https://via.placeholder.com/150)

**Figure 3:2**

Framework for Spelling Out a Generative Metaphor

Examining Normative Assumptions

The framework (illustrated in Figure 3.2) also provides for an examination of the relationship between the expressed problem solutions for \( A \) and any normative ideas that may have tacitly been carried from what is 'known' about dealing with such problems in the context of \( B \). The purpose of such an analysis is to surface any normative
assumptions that might be tacitly undergirding the analogy suggested by the generative metaphor, so that they can be elaborated and examined for appropriateness in relation to [A].

ELABORATING THE ASSUMPTIONS OF THE METAPHOR

It will be recalled that Schön (1979:255) exhorts us to "spell out the metaphor, [and to] elaborate the assumptions which flow from it" [sic]. Elaboration of "the assumptions which flow from" a metaphor is understood as requiring us to make explicit those assumptions upon which the 'underlying assumption' of the metaphor is, itself, predicated. These assumptions are about the relationships that are believed to obtain among the concepts incorporated in the metaphor—concepts that are related at two hierarchically-ordered levels of the metaphoric construct, as illustrated in Figure 3.3.

At the level immediately below the metaphor of 'the pattern of [A] as the pattern of [B]' is the relationship of correspondence that is assumed between the concepts that form the constituent elements of pattern [A] and of pattern [B], when these are forced into an analogical relationship by the metaphor (e.g. [a1] is to [A] what [b1] is to [B]). And, at a level below this, are the assumptions that are held about the nature of the metaphoric term [B]—i.e. about the way its constituent elements (of [b1], [b2], and [b3]; of concepts, values, and beliefs) are ('in truth') related to each other.
pattern of \([A]\) is (seen as) pattern of \([B]\)

\[a_1\] is to \([A]\) what \[b_1\] is to \([B]\)

view of \([A]\) is dependent upon understanding of pattern of \([B]\)

THEREFORE WHEN THE PATTERN OF \([B]\) IS SEEN THUSLY:

\([A]\) IS SEEN THUSLY

IF \([B]\) WERE SEEN THUSLY:

THEN \([A]\) WILL BE SEEN THUSLY

Figure 3.3
Framework For Conceptualizing The Assumptions That Flow From A Metaphor
Because the assumptions that are held about the nature of a metaphoric term will affect the relationship of correspondence that can be assumed between the constituent elements of [A] and [B], the framework devised for (sub-problem #3) elaborating the assumptions of the metaphor is seen as needing, first, to provide for the development of a generalized (ideal type) model of the metaphoric term [B].

Sub-Problem [3]: Framework for Elaborating the Assumptions of The Metaphor

The primary focus in this framework is, accordingly, on the identification and articulation of the pattern of relationships that is assumed (from what we think we 'know') to obtain for [B]’s in general. From this generalized (ideal type) model of the metaphoric term [B], the implications of the metaphor (for its subject [A]) can, in an 'ideal' generalized sense, be subsequently drawn.

The steps conjectured as being involved in this stage of problem setting are shown in Figure 3.4. They might be viewed as flowing from the framework used for 'spelling out the underlying generative metaphor.'
A model that thus aims to show the configuration of the elements that go to make up our implicit, and explicit, understanding of the 'idealized' version of the metaphoric term (B) is likened here to Kaplan's "pattern model."

Kaplan's Pattern Model.

According to Kaplan (1964), there are two models which provide understanding, and thereby explanation. "Very roughly, we know the reason for something either when we can fit it into a known pattern [the 'pattern model'], or else when we can deduce it from other known truths [the 'deductive model']" (p.332). And it would seem that while some situations lend themselves more appropriately to one model, and some to the other, "both may serve a useful purpose in methodology" (p.333).

According to the pattern model, then, something is explained when it is so related to a set of other elements that together they constitute a unified system. We understand something by identifying it as a specific part in an organized whole. (Kaplan, 1964:333)

Kaplan goes on to illustrate his point by describing a drawing that consists of a "long vertical straight line with a short one branching upwards from it near the top, and a short curved line joining it on the same side near the bottom"—as might be pictured in Figure 3.5.

Figure 3.5
Picture of Part of An Organized Whole
As Kaplan says, the drawing is meaningless until it is explained. It represents "a soldier with fixed bayonet, accompanied by his dog, disappearing around the corner of a building (the curved line is the dog's tail). As Kaplan (1964:334) explains:

We understand the figure [drawing] by being brought to see the whole picture, of which what is to be explained is only a part. It is in this way that familiarity may come into play: the unknown is identified with something known, though not by way of its local properties but in terms of its place in a network of relations.

. . . . . . . . . . . . . . . . .

. . . . . . . . . . . . . . . . .

. . . . we explain by instituting or discovering relations. . . . These relations may be of various different sorts: causal, purposive, mathematical, and perhaps other basic types, as well as various combinations and derivatives of these. The particular relations that hold constitute a pattern, and an element is explained by being shown to occupy the place that it does occupy in the pattern.

(Kaplan, 1964:334)

Having developed a pattern model for purposes of clarifying our understanding of [B], the next step is to construct another, higher order, pattern model—for purposes of sharpening our appreciation of the (metaphoric) relationship between [B] and [A]. This involves the matching up of characteristic features and change properties of the ideal type model developed for [B], with analogous features, and change needs, that are described in the story about the problematic situation [A], and in other documented cases of (similar, or generic) [A]-type situations.

It is, then, from an examination of the analogical correspondence seen (or not seen, as the case may be) to
obtain between the patterns of relationships thus revealed for (B) and for (A) that a judgment might be made about the utility, for policymaking purposes, of the analogical model thus suggested by the (analysed) deep metaphor.

EXAMINING THE POLICY-RELATED UTILITY OF THE PROBLEM FRAME

Sub-Problem [4]: Bases for the Selection of Criteria for Examining the Utility of A Given Problem Frame

Given the pragmatic nature of policymaking, it was suggested (in Chapter 2) that the criteria for judging a problem-setting frame should, for policymaking purposes, incorporate not only the axioms identified by Rein and Schön as undergirding social science inquiry, but should also take into account the policymakers' penchant for practicality. To this end, it might be instructive to consider "the critical examination of a given problem frame" as serving a similar service for policymakers as that provided them by "an evaluation of a program"; and to note the criteria suggested by Wholey (1978) for governing the "usefulness" of that kind of an 'examination.'

Criteria for judging the policy-related utility of program evaluation. According to Wholey, for an evaluation of a program to be useful for policy purposes it needs to be relevant, reliable, valid, objective, understandable, and timely. By relevant he means that the evaluation is seen as both "applicable" and "acceptable." By reliable he means
that, given the same information, others would come to the same conclusion. By **valid** he means that supportive evidence is "solid," "strong" [many people would agree]—so that it is safe [in a political sense] for policymakers to pay attention to the findings. By **objective** he means free from evaluator bias. By **understandable** he means "free of jargon"—that is, written in plain language [and with deep metaphors] that can be understood by policy makers. And **timely** is used in two senses. The first requires that the evaluation be provided before decisions have to be made. The second refers to the provision of information that is timely because it reflects, capsulizes, or connects with wider societal concerns that are in good currency.

Now, juxtaposing these criteria with those noted by Rein and Schöon (for defining the adequacy of a problem-setting frame) does suggest a congruency and complementarity that would support their being considered (together) as bases for examining the policy-related utility of a given problem frame (as required for the resolution of sub-problem #4). This perceived relatedness is illustrated in Figure 3.6 by means of inter-connecting arrows between the utility-focussed criteria proposed by Wholey (on the right-hand side of the figure), and the adequacy-focussed criteria advanced by Rein and Schöon.

**Criteria for judging frame adequacy in the field of social science.** As shown (underlined) on the left-hand side of Figure 3.6, these criteria can be seen to relate to a
Figure 3.6

Bases For The Selection of Criteria For Examining
The Policy-Related Utility Of A Problem Frame
frame's PLAUDBILITY; CONSISTENCY (i.e. its capacity to draw together a large number of facts and "worries"—relating them in a network of plausible causation so that there is coherence both between the propositions contained within the frame, and between the frame and other sets of beliefs held by the inquirer); VALUE IMPLICATIONS (i.e. its capacity to lead to a morally acceptable position); and its CAPACITY TO LEAD TO ACTION (through implementable policies).

"Beauty" is omitted from this list on the grounds that beauty, like 'truth,' is 'in the eye of the beholder'—and is, consequently, more likely to be conceived, in the politically sensitive arena of policymaking, in terms of economic, than of theoretical, "parsimony"!

The criterion of "testability" is also omitted. It is so on the grounds that the purpose of reflective practice [as attempted in this study] is to seek, and confirm, useful/workable ways of resolving practical problems—not to seek a 'truth' that is 'out there to be found' and to be subjected to empirical tests aimed at disconfirmation. Rein and Schö n [1977:249] note, "by the criterion of testability, problems are gambles—risk-taking ventures in which we make an informed guess—but we must be prepared to be judged wrong by the evidence."

Now, while "wrong" is, here, taken to mean that the problem frame selected by the policymakers is found, in retrospect, to have not been the most useful way of 'seeing' [making sense of] the experienced problematic situation—Rein and Schö n's use of the term does raise questions
concerning the criteria upon which interpretive accounts are to be judged and tested as valid in the sense of 'correct'
[as identified in sub-problem #5].

Sub-Problem [5]: Criteria for Judging the 'Validity' of Interpretive Accounts

Criteria for judging the validity of interpretive accounts are seen, here, to pertain to two different orders (or levels) of interpretation. At one level they relate to questions about the match between a troublesome social situation—as it is experienced by the 'actors' involved—and a problem-setting story about that situation—as it is 'seen' by the storyteller. This set of questions is aimed at judging the 'correctness' of the problem-setting frame in the sense of the aptness, fit, or appropriateness of the analogy suggested by its underlying generative metaphor. It is this level of appropriateness that is of interest to Rein and Schön; and is the focus of attention in this section.

At another level of interpretation, however, questions of 'correctness' relate to the match between the conceptualization of the problematic situation—as framed by the storyteller(s)—and the interpretive conceptualization of that storyteller's conceptual frame—as 'seen' by the analytic inquirer. The question that is, here, asked is, "how can the 'correctness' of an interpretative account of a given text—that is itself an interpretive account of some problematic situation—be judged?" It is, therefore, a question concerning the validity of interpretive inquiry at
a meta level; and is, accordingly, seen here as the hallmark of reflective practice--both as it relates to the inquirer's own interpretation of textual material, and to his/her creative efforts in respect to problem reframing.

Now, according to Smith (1984:386), the basis of truth or trustworthiness in interpretive inquiry is "social agreement." It would, therefore, seem reasonable to suppose that verification of the inquirer's interpretation of a problem-setting story would be sought (at the outset)--if not from the source itself--from other, independent, storytellers. Similarly, it is supposed that the researcher would seek evidence (from the participants and stakeholders involved in the situation) to confirm his/her conclusions regarding frame adequacy/utility. Of course, such cross-referencing becomes more problematic if the analyst takes on a participant role, and engages in some independent problem framing/reframing. For, as noted by Smith (1984:387) and Smith and Heshusius (1986:9), there is a circularity to the interpretive (hermeneutical) process which Taylor puts thus:

Ultimately, a good explanation is one which makes sense of the behaviour; but then to appreciate a good explanation one has to agree on what makes good sense; what makes good sense is a function of one's readings [of the situation] and these in turn are based on the kind of sense one understands.

(Taylor, 1971:14)

Accordingly, it might be concluded that--in the final analysis--the "proof of the interpreter's pudding" is to be found in the taste experience of the policymaking diners for whom it was intended!
Sub-Problem [6]: Criteria for Examining the Utility of A Given Problem Frame

The criteria here proposed for examining the policy-related utility of a given problem frame are:

(a) based on an amalgam of the two sets of criteria shown in Figure 3.6; and

(b) defined in a purpose-specific way (i.e. they are tailored to relate specifically to the assessment of the generative metaphor that frames the problem of a problem-setting story).

The plausibility of a (metaphoric) frame. This is seen as the first, and most crucial criterion. It might be understood (as suggested in Figure 3.6) in terms of 'face validity'—i.e. in terms of the extent to which it is seen to be 'relevant'/ 'apply'/ 'make sense of'/ 'tell the truth about' a problematic situation, in a way that the recipient finds (intellectually and emotionally) acceptable.

As indicated by the connecting arrows, the plausibility of a given problem frame is seen as resting upon the extent to which the frame can satisfy all the other 'bases' identified in Figure 3.6. For, the extent to which a problem frame is found applicable is surely dependent upon the recipient's,

(i) understanding the analogical implications of the generative metaphor—which assumes his/her cultural familiarity with the metaphor;

(ii) 'seeing' the frame as appropriate to the circumstances—i.e. as metaphorically 'fitting' (or possessing constructual validity);

(iii) finding the frame sufficiently consistent with his/her larger belief system (worldview) that it is considered 'valid.' (As noted by Smith and Heshusius [1986:9] "Within the qualitative paradigm, valid is a label applied to an interpretation or description with which one agrees.")
Concomitantly, the extent to which a problem frame is found **acceptable** is seen as being dependent upon the recipient's,

(a) considering the value implications of the frame to be acceptable (i.e. morally defensible); and

(b) conceiving it to have the capacity to lead to action (because it can be relied upon to have/gain widespread acceptance and support, and/or is perceived to be politically timely).

(c) regarding the frame to be free of (adversarial) 'political' bias.

The **(metaphoric) appropriateness of a frame.** This is conceptualized as an all-encompassing criteria that incorporates all those conceptual bases shown in Figure 3.6 to support a frame's 'applicability' in terms of **consistency.** These include the notion of constructural validity as it relates (a) to the structural correspondence of the frame's **internal elements;** and (b) to its congruence with the larger belief system or worldview of which it is, seemingly, a cognitively systemic part.

Furthermore, since this understanding of constructural validity can, itself, be seen to rest on the metaphor of 'the problem frame as a **system** (of ideas nested in a cognitive suprasystem that is embedded in some environmental context)—the criterion of frame appropriateness also relates to "whether the internal aspects of the metaphor can change in concert with the internal changes in the phenomenon it is being applied to" (Smith, 1982:333).
The utility of a problem frame. This is regarded as the third and final criterion. It embraces, and focuses on, the practical considerations associated with (a) the value implications of the frame, and (b) its capacity to lead to action.


The procedural framework developed in this study (in response to sub-problem #7) for examining the policy-related utility of a problem frame takes the form of a yes/no directional flow-chart, as shown in Figure 3.7. It provides for a sequential assessment of the plausibility, appropriateness and utility of the problem frame—with an alternative directional sequence to accommodate a negative response at any stage in the process. Since the alternative to a negative response at any given stage is to reframe the problem, this framework can be seen to provide a set of guidelines for reframing the problem, (as called for in sub-problem #8.)

It should be noted that, in practice, the processes of interpreting and examining and analysing are integrative and ongoing. They are not discrete activities that lend themselves to being suspended until a certain point is reached in the proceedings. However, for purposes of exercising analytical rigor, and of being able to present the findings in some coherent manner, a lineal approach becomes necessary.
PROBLEM FRAME AS INTERPRETED

Is there support for the researcher's interpretation?  

YES → Confirm the utility of the problem frame for policy purposes.
NO → Reframe the problem of the inquiry.

Is there evidence that the frame might obtain general acceptance?  

YES → REFRAME THE PROBLEM OF THE PROBLEMATIC SITUATION:
NO → Find another way of framing the problem & repeat analysis.

Is there correspondence between the internal properties of the metaphor?  

YES → Can plausible correspondence be found if the metaphor is restructured to focus on the problem at a different level?  
NO → Reframe the problem of the inquiry.

Is there correspondence between the change properties of the metaphor?  

YES → Confirm the utility of the problem frame for policy purposes.
NO → Reframe the problem of the inquiry.

Are the value implications of the metaphor acceptable?  

YES → Confirm the utility of the problem frame for policy purposes.
NO → Reframe the problem of the inquiry.

Has the frame the capacity to lead to action?  

YES → Confirm the utility of the problem frame for policy purposes.
NO → Reframe the problem of the inquiry.

Figure 3.7

Procedural Framework for Examining a Problem Frame
As indicated in Figure 3.7, the assessment of plausibility is applied, first (and it is recommended, well ahead of any detailed analytical work), in respect to the 'constructural validity' of the researcher's pronouncement of what constitutes the problem frame of the 'story.' Such assessment is made by assembling (where possible) corroborating evidence from the interpretations of other researchers/commentators of the same story. (If there is no evidence to support the researcher's interpretation, s/he may chose to reframe the problem of the inquiry to focus on the question of why this might be so.)

Secondly, the plausibility of a given problem frame is assessed in respect to its perceived 'face validity' (i.e. the extent to which it is likely to make sense to, and be accepted by, the policymakers concerned). Since acceptability is considered to hinge upon familiarity, evidence is sought to show that the problem frame is 'in keeping' with, or easily 'maps onto' (Smith, 1982:331), other problem-setting frames that enjoy good currency within the culture. In the absence of evidence to suggest that the frame might be found acceptable by the policymakers concerned, it would seem sensible for the analyst to locate (or create) an alternative (more 'plausible') way of framing the problem--one that, perhaps, maps on to a frame that is more likely to be found acceptable.

Assessment of the frame's appropriateness is based on the question of whether or not appropriate correspondence can be found to obtain between the internal properties of
the metaphor—as previously spelled out, and elaborated; and, between the change properties (of the subject and the vehicle) of the metaphor. A negative assessment of correspondence between the internal properties of the metaphor would point to the need for an alternative way of framing the problem. But, a positive assessment of correspondence between the metaphor's internal properties, followed by a negative assessment of its change properties, would suggest that a restructuring of the metaphor—to focus on the problem at a different systemic level—might fruitfully be explored.

If each of the preceding assessments were found to have been positive to this stage, the utility of the frame would then be examined in respect to (a) the acceptability of the 'value' implications of the metaphor, and (b) the capacity of the frame to lead to action. Of course, the plausibility of the frame would have been negated at the outset if either of these factors had (at that time) been considered questionable. However, it is always possible that, in the course of spelling out, or elaborating the assumptions of the generative metaphor, some hitherto unknown characteristic might emerge that it is realized will cast a shadow over the value implications of the frame, or inhibit its capacity to lead to action.

On the basis of these considerations, then, the policy-related utility of the frame would be either confirmed or rejected.
CONFIRMING/REFRAMING THE PROBLEM

Because the process of problem framing is essentially a creative one (and therefore circular, rather than linear in nature [Hickling, 1976]), this step might just as well be viewed as a **beginning** one, as an **ending** one. Indeed, this point is brought home by Wildavsky (1979:83), who says, in the context of policy analysis, "Problems are not so much solved as superseded."

Consequently, it is to be expected that—in the final analysis—the end-product of this (or any other such) study will simply represent a stepping-off point for a new round of problem-setting activities. Concomitantly, Rein and Schö n's starting point of concerns and worries might be viewed as signalling the culmination of an earlier problem-setting period; one whereby particular feelings of discomfort were recognized as attendant upon particular phenomenological experiences, and were identified as belonging to some particular genre of concern or worry. But, since each such concern and worry had thus come into perceptual recognition by virtue of some metaphor (which had given it meaning), it is likely that each was identified as a whole problem in its own right, (rather than as a mini-problem in a larger problematic situation).

An overview of these ideas suggests that problem setting for policy purposes is an iterative process; one in which the worries and concerns of yesterday become aggregated and framed to form the problem of today; and
whereby these problems-of-the-day get to be recognized as merely mini-problems of a larger problematic situation—ones that require aggregating and re-framing in order to become the problem of tomorrow; and so on, ad infinitum.

CHAPTER SUMMARY

This chapter has been concerned with outlining, and discussing the rationale for, the procedures developed in this study for conducting problem-setting frame analysis. It was suggested that, as a preparatory research task, researchers pay reflective attention to the way they 'bound the problematic situation'—recognizing, and acknowledging the subjective "point of view" which must (unavoidably) serve to bias the questions they ask, and to delimit the discoveries they might make. In consideration of a second preparatory research task, a comprehensive rationale was provided for guiding the selection of documentation to be analysed.

The procedures outlined in respect to each of five stages of reflective problem setting described the experiential resolution of the sub-problems identified (in Chapter 2) in connection with each stage. The guidelines presented for "uncovering the generative metaphor underlying the problem frame," for example, describe the process of schema pattern recognition that, in retrospect, was considered to have been used to uncover the deep metaphor underlying the problem-setting frame found in the case of schools.
The framework for "spelling out the generative metaphor" was diagrammatically illustrated to form a 'template' for guiding analogy construction. This framework was extended—for purposes of "elaborating the assumptions of the metaphor"—to articulate the pattern of relationships obtaining among the elements that go to make up our implicit, as well as explicit, understanding of the 'idealized' form of the metaphoric term. It was shown, by reference to Kaplan's pattern model, how such a generalized (ideal type) model could serve to reveal the implications of the metaphor for its subject.

Two sets of criteria were proposed to serve as the bases for examining the policy-related utility of a problem frame. One set, suggested by Wholey (1978) for judging the policy-related utility of program evaluation, is focussed on considerations of practical utility and relevance to lay policymakers. The other set, identified by Rein and Schön (1977), represents the rigor-focussed axioms associated with social science inquiry. An amalgam of these considerations (of plausibility, appropriateness, and utility) was proposed to provide a comprehensive set of criteria for examining a given problem frame. These were set within the framework of a sequential yes/no directional flow chart so that a negative response at any stage of the chart would lead to a reframing of the problem, and a positive response throughout would culminate in confirmation of the utility (for policy purposes) of the problem frame in question.
Chapter 4

BOUNDING THE PROBLEMATIC SITUATION:
THE CASE OF SCHOOLS

We presuppose, in every inquiry, not only a set of data but also a set of generalizations, both about our materials and about the instruments by which they are to be transformed in the cognitive enterprise. We draw our presuppositions from earlier inquiries, from other sciences, from everyday knowledge, from the experiences of conflict and frustration which motivated our inquiry, from habit and tradition, from who knows where.......

Presuppositions are brought to the problematic situation. There are, besides, beliefs arising in and pertaining to the situation, as inquiry gets under way. We may call them suppositions. They are the beliefs that make the situation problematic, either because we cannot clearly articulate them in the conceptual frame already available, or because they are in conflict with one another, or because they contradict some of our presuppositions.

(Kaplan, 1964:87)

"I create reality by how I look at it." Caveat emptor.
(Allender, 1986:181)

Rein and Schön (1977) have drawn attention to the need for us to become aware of, and to scrutinize, the problem-setting frames that policymakers use to make sense of problematic social situations; for such frames delimit, or 'bound,' what the policymakers are then able to 'see' of that situation. A no less urgent need was identified, in Chapter 2, for us to become aware of, and to make explicit, the problem-setting frames that circumscribe the approach
we—as inquirers—take in the study of such matters. In other words, while we are reflecting upon, and speculating about, how others are thinking, it behoves us to remember Schön's caution, and to set about discovering the tacit frames that guide our own thinking. For, as noted by Kaplan:

... the scientist has values, and for the behavioral scientist the subject-matter gives his values an unavoidable relevance. The distortions of observation which may result are eliminated or canceled only with the greatest difficulty. Discounting them by making them explicit and by incorporating the scientist's values in the scope of his study is rather more promising.

(Kaplan, 1964:138-139)

Moreover, as Miles and Huberman comment:

Most researchers would agree that, to know what you're doing, you need to know how your model of knowing affects what you are doing.

(Miles and Huberman, 1984:20)

Accordingly, the first section of this chapter is concerned with making explicit the model of knowing—replete with suppositions and presuppositions (Kaplan, 1964:87)—that frames, and thereby tacitly imposes delimitations on, this researcher's perception of what is problematic about "the 'problem' of schools."

This is followed by a review of the limitations that such a frame can be expected to impose (in this study) upon:

* the selection of documentation to be analysed,
* the approach taken in the inquiry,
* the questions that will be asked, and
the nature of the findings that will result.

The final section of the chapter deals with the selection of documentation for analysis, and provides the rationale for the choice that was made.

BOUNDING THE PROBLEMATIC SITUATION

Suppositions Underlying the Framing of the Research Question of the Study

First, it is supposed that the approach discussed in Chapter 3 for uncovering a problem-setting frame can just as well be used to uncover the tacitly held suppositions underlying the framing of a problem in the field of research, as it can in the field of social policy. For, the inquirer—like the social policy analyst—has to have had some way of 'seeing' (i.e. of 'making sense') of the problematic situation that spawned his/her research question.

The way the problem of this study was framed (Chapter 1:6) can be seen, as follows, to have 'bound' the problematic situation with which the question of the study was to deal:

Given that problem structuring has been identified as the most crucial, but least understood aspect of policy analysis—how might the educational policymaker set about framing the problem of schools for purposes of developing educational reform policies that are attuned to meeting school performance in new and better ways?

Implicit in this problem-setting frame is the supposition that educational reform policies are failing to bring about
real change in the structure of schools/schooling because policymakers are 'getting the problem wrong'; and undergirding this supposition is the pre-supposition that educational policymakers are getting the problem of schools/schooling 'wrong' because of the way they have, traditionally, gone about (or not gone about) the task of problem framing.

Pre-Suppositions About Problem Framing for Policy Purposes

The traditional method of problem framing. In time-honoured fashion, problem framing has involved the collecting of data (very often by means of some form of needs assessment); the analysing and counting of findings according to some predetermined (or emergent) classification of issues; and the focussing of problem-solving attention to each in turn of the most commonly perceived of problem issues (e.g. school discipline; academic standards; streaming/tracking; class size). This approach appears to be based on a belief that problems exist as concrete objective states for which "a solution" can be found; and that, as such, they can be effectively dealt with in a piecemeal fashion.

That the solution to some of our most commonly held concerns in education apparently requires the institution of quite contradictory operational practices, has to be ignored by those who take this approach. There is, for example, considerable ambiguity about whether teachers should focus
on helping students meet curriculum expectations, and simply "fail" pupils who cannot "make the grade"; or whether teachers should work on modifying curriculum to meet individual student abilities, in an attempt to provide a positive and continuous learning experience for all their pupils (Clarke, 1982). Clearly, teaching practices that focus on attending to the learning needs of all students, and those that centre on the completion of curriculum requirements are premised on irreconcilably different frames of reference.

As pointed out by Husén (1983: 460), in his attempt to "diagnose" what he calls the malaise that besets formal education in highly industrialized societies, "the problems stem from goal conflicts that tend to be ignored or obfuscated by rhetoric." He points to the following examples:

Formal education in our technological society exists to impart competencies, and is, therefore, creating differences. The school--particularly in a technologically sophisticated society--cannot at once serve as an equalizer and as an instrument that establishes, reinforces, and legitimizes differences. Such goal conflicts make it extremely difficult for the school to pursue genuine educational goals conducive to self-fulfillment and social education, goals that traditionally play a prominent role in curricular rhetoric. On the one hand, the school is expected to pursue intrinsic goals, to foster "inquiring minds" that enjoy learning for its own sake. On the other hand, the rewards for pursuing learning are extrinsic to the learning process: grades, degrees, jobs. Again, on the one hand, the school is expected to foster a co-operative spirit, primarily through group work. On the other hand, the rewards almost always go to individual accomplishments.

(Husén, 1983:461)
It is, therefore, pre-supposed that the traditional approach to the framing of problems for public school system administration (i.e. as if problematic issues existed as discretely solvable entities) has been found wanting. And, that issues such as 'discipline' and 'standards' are (metaphorically speaking) effects of a problem—rather like the symptoms of a disease. As a consequence, what it is that is actually problematic about our public school systems is seen as yet to be framed in a whole, systemic, and satisfactorily explanatory way.

Accordingly, it is pre-supposed that what would help educational policymakers "get the problem (that their policies seek to solve) 'right'" is a systems approach to problem framing.

A systems approach to problem framing. This approach takes the position that, "problems exist only as abstract subjective constructs" (Ackoff, 1980:29). As such, they are viewed as abstract elements of a system of problems—a system that Ackoff fondly refers to as "a mess."

In these terms, the "solution" to a mess is not the simple sum of the solutions to the problems (or mini-messes) that can be extracted from it; for no singly conceptualized problem element will have an independent effect on the mess as a whole. As a consequence, messes have to be dealt with synthetically, as a system of problems, an approach which Ackoff points out is an essential property of planning, as opposed to problem solving.
Now, while Rein and Schön (1977) do not explicitly reference their position to a systems way of thinking, the congruency between their perspective and that of Ackoff is reflected throughout their writing. It is particularly evident in their criticism of the view that defines the task of policy research as "instrumental problem solving, where solutions entail discrete policy decisions" (Rein and Schön, 1977:235); and might be inferred from the criteria they present in respect to problem frames:

. . . all frames used to set problems must serve both explanatory and normative functions. They must enable the inquirer to group a distributed set of worries in terms of phenomena that are sequenced according to before-and-after, then-and-now. They must allow the inquirer to order events in the field of social experience so as to permit explanation of later events in terms of earlier ones -- that is, they must permit the location of events in a causal space so that questions of "Why?" and "What if . . . ?" can be addressed to actions in this space with the possibility of a determinate answer. Moreover, frames must contain a basis for action. They must permit the inquirer not only to explain the phenomena associated with his worries, but to set the directions of actions designed to reduce them. In this sense, frames must facilitate what we have called the normative leap from findings to recommendations. (Rein and Schön, 1977:240)

It would indeed seem arguable that the notion of aggregating "a distributed set of worries" into a "whole" problem frame--a frame that at once explains, diagnoses, and contains the prescription of direction for remedial action--is one with the holistic, systems, view of "problems," as expounded by Ackoff. It is certainly consonant with the view expressed by Immegart and Pilecki that:
Phenomena in the systems perspective are viewed not as isolated events but instead are assessed in totality, in context, and in a chronological sequence. Put another way, the systems perspective places import on the evolitional aspects of all events and problems, and is concerned with the totality of behaviour or function in an unfolding time sequence. It is concerned with linkages and patterns in time-space.

Immegart and Pilecki (1973:6)

Upon reflection, then, it can be recognized that the approach to this inquiry rests on an epistemological foundation that is characterized by the tenets of general systems theory. Since such a model of knowing will influence, not only the meanings that are attached to data and the way relationships between them are perceived, but the very way in which the research task is approached and conceptualized--some of the implications of this approach should be identified.

Some Implications of The Systems Approach

The systems approach to inquiry. According to Immegart and Pilecki (1973), "the systems approach" is not a theory but a mode of thought. This mode is characterized as being holistic and contextual in nature--meaning that it is preoccupied with a synthetic rather than an analytic way of thinking. For, as Ackoff (1980) reminds us, in the analytic mode, an explanation of the whole is derived from explanations of its parts--while, in synthetic thinking, that which is to be explained is viewed as part of a larger system and is explained in terms of its role in that larger whole. Katz and Kahn (1966) put it thus:
the first step [of research in the systems mode] should always be to go to the next higher level of system organization, to study the dependence of the system in question upon the supersystem [or suprasystem] of which it is a part, for the supersystem sets the limits of variance of behaviour of the dependent system. More analytic study can then explore the contributions of subsystems to this limited range of variance.

(Katz and Kahn, 1966:58)

In terms of the subject of investigation of this study, there is a distinct advantage in being able to apprehend the organization of schools and schooling from the systems perspective: for it permits the investigator to scan the organization of schooling from different vantage points—or levels of analysis.

The school as seen from a systems perspective. First, the school may be perceived as an entity that possesses the characteristics of a relatively autonomous "system", with subsystem functions of its own (e.g. with classroom activities serving as its production function; and school administrators serving the managerial function). From this perspective, the school—as a system—can be seen to be "nested" (along with other schools) within the (super-, or) suprasystem structure of the local School District.

From the perspective of an alternative systemic view, the school can be seen as a subsystem of the educational suprasystem (i.e. as fulfilling the production function of the larger educational system—either at the District, Provincial and/or State level of operations).

In other words, the school can be seen—from the perspective of any level of analysis—as a systemic part of
a system of schooling. And this system of schooling can, in turn, be seen as serving (part of) the maintenance sub-system function of the larger societal system.

What is to be understood by the term "school" is further defined under the rubric of the delimitations of the study.

The Delimitations of the Study

The study is delimited to a conceptual analysis of those factors that are seen as contributing to the problem setting (as opposed to problem solving) facet of policy-making; and to the operationalization of an approach to problem setting (suggested by Rein and Schön, 1977)---conducted in the context of public schooling.

In reference to the case of schools, the term "school" is understood as a generic term standing for an ideal-type model\footnote{As explained by Allison (1980;23-24), who devoted considerable attention to developing a model embodying the features characteristic of all different kinds of schools:} of the institutional organization of public educational programmes and services at the primary, elementary, and/or secondary levels—as found in Canada and the United States of America.

\footnote{As explained by Allison (1980;23-24), who devoted considerable attention to developing a model embodying the features characteristic of all different kinds of schools:}

... ideal-type models are abstractions from reality in which selected generic features are exaggerated to a logical extreme so as to make them clear and subject to subsequent analysis. It follows that these features appear in ideal-types in a manner which will rarely, if ever, be found in their empirical referents... Ideal-types are not intended to be exhaustive, nor are they meant to include all features of the subject, but they are intended to present a clear specification of features of interest.
Limitations Imposed by the Researcher's Frame of Reference

The documentation to be analysed. In selecting the documentation to be analysed, it can be recognized that the choice will be influenced by the researcher's need to put her (tacit) hypothesis—that educational policymakers have been getting the 'problem' of schools 'wrong' because of the way they have framed the problematic situation to be addressed—to the test. This is reflected in the following research question:

* What does an analysis of the descriptions used in some (selected) policy-influencing document of our time reveal about the problem-setting frame(s) guiding the school reform proposals?

Furthermore, the delimitation of the inquiry to the sphere of public education in the contexts of Canada and the United States can be seen to put limitations on the number, and source, of policy-influencing documents that might be considered for selection. (The framing of the study within the context of a dissertation imposed constraints of space and time that further limited the selection and analysis to one document.)

The approach taken to the inquiry. It can be expected (as already noted in the context of 'the systems approach') that data will, pre-dominantly, be ordered for the purpose of synthesis—into systemic conceptual frameworks—rather than for purposes of detailed (reductionist-type) analysis.
Indeed, this 'systems approach' to inquiry can be seen to characterize the underlying epistemological "organicismic² worldview" (Pepper, 1942) of the researcher—as evidenced in the conceptualization of the overall structure of this study as a set of nested Chinese boxes.

The questions asked. It can be expected that, in respect to the questions asked, there will be further evidence of the systems (or organicismic) approach. For, what will be sought in the analysis of (identified) generative metaphors will be the relational correspondence between the networks of elemental parts that constitute whole (metaphorically compared) patterns (as per Kaplan's pattern model of knowing).

² In describing the four basic systems of knowledge in Western thought that Pepper, in his (1942) "World Hypotheses," suggested had proved sufficiently fruitful to provide a relatively adequate interpretation of the full scope of the world's facts—Harrell (1982:224) notes:

Organicism—in which the basic operation is to compose a structure and the primary cognition is the relationship of parts to whole—is an hypothesis derived from the recognition that an organism is somehow more than the sum of its parts.

The other three categorial sets proposed by Pepper can be capsulized as:

Formism—basic operation, classification; cognition, the relationship of the particular to the general.

Mechanism—basic operation, correlation (especially in the sense of causal implications); cognition identifies the relationship between particulars.

Contextualism—basic operation, act of attention; cognition concerned with figure-ground relationships. The identity of a particular thing or event is altered by what is attended to in its context (thus—no stable, universal categories).
The nature of the findings. It can, likewise, be expected that the findings of the study will be framed in a way that is congruent with the systems perspective—i.e. with implications drawn for the attention of educational policymakers and administrators that largely focus on a higher level of system organization than the school.

SELECTING THE DOCUMENTATION TO BE ANALYSED

Bounding the Source

As already noted, the delimitation of the inquiry to the sphere of public education in the contexts of Canada and the United States puts a limitation on the number, and source, of policy-influencing documents that might be considered for selection. Furthermore, as no nation-wide study of schooling had been conducted in Canada since the 1975 O.E.C.D. External Examiners' Report on Educational Policy in Canada, and no provincial study of national repute since the 1969 Hall, Dennis Report of Ontario3— it seemed only reasonable that the field of candidates be narrowed to those that were American in origin.

Identifying the Research Requirements

In reference to Figure 3.1 (p. 49), the particular circumstances of this case 'study' can be identified with

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3 The Sullivan Report on the Royal Commission on Education in British Columbia titled "A Legacy for Learners" (1988)—which may well become a nationally-referenced study—was not commissioned until three years after the commencement of this study.
both situations #2 and #3. For, as in #2, existing educational policies (in both Canada and the United States) are generally seen as being in need of updating to meet changing environmental conditions; and, as in #3, major educational reform policies proposed for U.S. schools in recent times to address such needs have become the subject of some considerable debate.

To satisfy the requirements of both these sets of circumstances, it would seem clear that the documentation to be selected for analysis should:

(a) reflect the most widely-held view possible of what constitutes 'the problem' of schools/schooling in the context of what are seen to be changing environmental conditions, and

(b) include those proposed solutions that have been the subject of debate.

Making a Supportable Choice

Based on all of the above-mentioned considerations, the policy-influencing document to be selected for analysis in this study had, clearly, to be one of the high-profile studies of American schools/schooling that contained controversially-received proposals for school reform. Accordingly, the document so selected was the report by the (U.S.) National Commission on Excellence in Education titled, "A Nation at Risk: The Imperative for Educational Reform" (1983).
Chosen from amongst several research and commissioned studies on schooling in the United States, this report—which embodied numerous other commissioned studies and reports—was judged to have received the greatest amount of public attention, and to have stimulated the widest debate and legislative response in that country. According to Feinberg (1985:134), for example, "reform documents are not all equal. A Nation at Risk is a slim manuscript, but page for page it is clearly the most influential of the recent proposals." And, it heads the list of eight such reports and books selected by Tetreault and Schmuck (1985:45) on the grounds that:

...the rhetoric in which they are embedded is likely to shape educational debate for the next two decades. Prepared by influential policy groups and prominent educators, the proposals carry weight with the educational community and the public.

"Rhetoric" is, here, taken as meaning the embodiment of metaphoric utterances with which the authors of the report convey their understanding of "the problem of schools" and by which they make sense of "the problematic situation." Furthermore, it is supposed that the characteristics of the rhetoric used in the American report, "A Nation at Risk," is not dissimilar to that in which debate on the subject of schooling is conducted by Canadians; and, that there exists a socially constructed perception of "the school" that is fundamentally generalizable within the broad context of contemporary North American culture.
CHAPTER SUMMARY

The first section of this chapter was devoted to a reflexive examination of the problem-setting frame used by this inquirer to make sense of what is problematic about the way 'the problem of schools' has been framed for policy purposes. This examination revealed the underlying supposition that past efforts to bring about real (i.e. substantial structural/operational) change in schools have failed because proposals for school reform have not been addressing the 'right' problem. It was, further, conjectured that policymakers have been getting the problem 'wrong' because of the piecemeal approach that has traditionally been taken in the field of social policy to assessing what is wrong and what in need of fixing. Based on this pre-supposition, it was suggested that a (holistic) systems approach to problem setting/solving might be more fruitful. And, the congruence between a such an approach and that suggested by Rein and Schön for reflective problem setting was noted. It was, moreover, observed that the overall approach to inquiry taken in this study reflected the tenets of general systems theory—and what, in philosophical terms, was described by Pepper (1942) as an "organismic" worldview.

A second section dealt with the selection of documentation for analysis; and provided a rationale for supporting the choice of the 1983 (U.S.) Commission Study "A Nation at Risk" for purposes of this study.
Chapter 5

UNCOVERING AND SPELLING OUT THE GENERATIVE METAPHOR USED TO FRAME THE PROBLEM OF SCHOOLS

... the metaphorical statement does not actually state the analogy, even where a relevantly important one exists. It is rather in the nature of an invitation to search for one, and is in part judged by how well such a search is rewarded.

(Scheffler, 1960:48)

We conclude that declines in educational performance are in large part the result of disturbing inadequacies in the way the educational process itself is often conducted. ... 

(U.S. National Commission on Excellence, 1983:18)

The contents of this chapter were produced by applying to the document, "A Nation at Risk," the procedural framework (outlined in Chapter 3) for uncovering the generative metaphor underlying the problem frame of a problem-setting story, and for 'spelling out' that metaphor.

It should be noted that, while the reporting of these analyses is necessarily conducted in a linear (first this, then that) fashion, their content is experientially discerned in a much more (holistic) "all at once" way. As a consequence, the analogical implications suggested by the named features of the generative metaphor are more 'telling' when viewed, in retrospect, as a whole, than when assessed, en route, in piecemeal sequence.
The part of the Commission's 'story' that deals specifically with the problem of schools (i.e. what is seen as wrong, and in need of fixing in the school system) is found in the Report, "A Nation at Risk," under the rubric of "Findings" and "Recommendations." It is best summed up by the Commission's conclusion (page 18) that what is wrong is "declines in educational performance," and that what needs fixing is "the way the educational process itself is [often] conducted."

We conclude that declines in educational performance are in large part the result of disturbing inadequacies in the way the educational process itself is often conducted. The findings that follow, culled from a much more extensive list, reflect four important aspects of the educational process: content, expectations, time, and teaching.

(Commission Findings, para. 37:18)

This articulation of the problem is, clearly, devoid of any helpful surface metaphors; and the proposed 'solutions' are not referenced to any explicit model that exemplifies the 'ideal' state which is sought. This suggests that the model used by the Commissioners to make sense of their findings is such a familiar one to them (and, no doubt, to us) that it is not recognized as such, so that what is 'seen' to be the problem is taken to be a literal 'truth'--and the solutions, obvious.

Answers were, accordingly, sought to the following questions:
* "To what problem—in some other context (that is familiar to the storytellers)—are these recommended courses of action also obvious solutions?" and

* "In what other contexts (familiar to the storytellers) might the normative ideas underpinning these solutions also be found?"

Viewed in relation to the whole problem-setting story of the report, these questions elicited a "click of relations"—for the courses of action proposed by the Commission were seen as reminiscent of the traditional management consultant's call for tighter quality control to combat declining productivity in the workplace.

Finding documentary evidence to support the seeming plausibility of the researcher's interpretation (see Chapter 7:166-168), it was determined that a strong case could be made for assuming that the Commission had made sense of its findings by 'seeing' the educational system as if it were a business enterprise; and the "school as (if it were) an industrial workplace."

When the school is viewed as an industrial workplace, "declines in educational performance" can be interpreted as meaning, 'decreases in school productivity'; and the expression, "the conduct of the educational process," as meaning 'the way schooling is managed by administrators, and carried out by teachers.' Under such a view, the overall problem of schools is seen as having been framed, quite simply, as a problem of workplace management. The question to be answered thus becomes, "What changes have to be made to school system organization in order to improve productivity and the quality of system performance?"
Now, given that we 'know' how to correct the problem of poor productivity and standards of performance in other (product-oriented) workplaces, the solution to the problem of schools is obvious. Corrections need to be made to the key result areas of the educational process—just as they would in the manufacturing process of some industrial workplace. And, given this 'obviousness,' it is not surprising that the four key result areas of the educational process which are pinpointed by the Commissioners to be targeted for reform can be found to parallel key result areas that have, traditionally, been of concern in the industrial (manufacturing) sector, as illustrated in Figures 5.1, 5.2, 5.3, and 5.4.

SPELLING OUT THE UNDERLYING GENERATIVE METAPHOR

The framework devised for spelling out a generative metaphor (Chapter 3) provides a mechanism whereby the conceptual images conjured up (in the mind of the interpreter) by the "named" features of a problem-setting story—along with the normative ideas they evoke—can be made explicit; and whereby the influence these exert on the way we come to 'see' the subject of the metaphor can be traced. Its application is demonstrated in respect to the spelling out of the generative metaphor, "school as an industrial workplace," (as shown in Figures 5.1, 5.2, 5.3, and 5.4) which is presented as the generative metaphor used in the case of schools.
The Case of Schools

Four aspects of the educational process—"content," "expectations," "time," and "teaching"—were selected by the Commissioners to be targetted for reform. In applying our analytical framework to these four named features, the conceptual images conjured up (in the interpreter's mind) by each have, first, to be mapped. The purpose of such a map is to illustrate the analogous relationships that might be seen to obtain between them as elements of the organization of schools, and as elements of the organization of the traditionally operated industrial workplace. Secondly, what is 'known' about the operation of an efficient and effective industrial workplace, and what are recommended as 'solutions' to the problem [of declining educational performance/productivity] of schools have to be inserted, so as to illustrate the tacit relationship that can be seen to obtain between them.

Procedural Format.

In order to accommodate the display of all this material (within the limitations imposed by page size), each of the four process aspects named by the Commission is analysed separately (as shown in Figure 5.1 for "contents"; Figure 5.2 for "expectations"; Figure 5.3 for "time"; and Figure 5.4 for teaching). For each, the "Findings" and "Recommendations" of the Commission are presented (in boxed form) in the accompanying text, with the surface metaphors that are seen of relevance in the explication of the deep
metaphor identified in boldface print. An interpretation of these (boldfaced) surface metaphors (where found), and the analogical implications of the deep (generative) metaphor are then developed for each in turn.

Commission's Findings Regarding "Content"

Findings Regarding Content

By content we mean the very "stuff" of education, the curriculum. Because of our concern about the curriculum, the Commission examined patterns of courses high school students took in 1964-69 compared with course patterns in 1976-81. On the basis of these analyses we conclude:

- Secondary school curricula have been homogenized, diluted, and diffused to the point that they no longer have a central purpose. In effect, we have a cafeteria-style curriculum in which appetizers and desserts can easily be mistaken for the main courses. Students have migrated from vocational and college preparatory programs to "general track" courses in large numbers. The proportion of students taking a general program of study has increased from 12 percent in 1964 to 42 percent in 1979.

- This curricular smorgasbord, combined with extensive student choice, explains a great deal about where we find ourselves today. We offer intermediate algebra, but only 31 percent of our recent high school graduates complete it; we offer French I, but only 13 percent complete it; and we offer Geography, but only 16 percent complete it. Calculus is available in schools enrolling about 60 percent of all students, but only 6 percent of all students complete it.

- Twenty-five percent of the credits earned by general track high school students are in physical and health education, work experience outside the school, remedial English and mathematics, and personal service and development courses, such as training for adulthood and marriage.

(A Nation at Risk:para. 38:18-19)
Interpretation of surface metaphors. The "content" of the educational process is seen as being made up of "stuff" (i.e. informational matter) relating to particular subjects. In an educational setting these subjects constitute what is referred to as "curriculum." The subjects of a school's curriculum are metaphorically likened (by the Commission) to foods that are served at mealtimes to students.

Expanding on this analogy, the Commission reveals a normative bias in its beliefs about the relative value of various subjects; for it likens the curriculum offerings (and program expectations) of yesteryear to a traditional meal that is served in a (normatively 'proper') sequence—the (academically-oriented) main course being considered of greater nutritional value than the (non-academic) appetizers or desserts. The content and organization of today's educational process is, in contrast, likened to that of a (normatively inferior) cafeteria where the clients are free to choose from amongst a smorgasbord array of (curriculum) offerings that are unmarked and unordered in respect to their relative nutritional value.

Students are seen as having moved in droves (like migrating birds) from the more demanding college preparatory programs to the less demanding general tracks because of this freedom of choice; and because the system assigns equal rewards (in the form of credit points to be gained) to those choosing the easier (to digest), and perhaps more tasty, non-academic subjects as it does to those selecting the more
difficult (to digest), and perhaps more nutritious, academic courses—courses that are considered (by the Commission) to be educationally 'good' for them. They are, as a consequence, metaphorically seen as partaking of an homogenized educational meal whose nutritional value has been diffused and diluted.

**Analogical implications of the deep metaphor.** As shown in Figure 5.1, the element of educational process that the Commission labels as "content" is explicitly stated as meaning "curriculum" in the context of schools. (It is likened to foodstuff that is served 'ideally' as the prescribed 'courses' of a traditional meal, and 'non-ideally,' as a "help yourself" cafeteria-style smorgasbord.)

In the industrial context, the content of the production process would refer to 'what is done' (i.e. the process procedures that are 'laid on' or 'fed') to the raw material during the course of its transformation (or manufacture) into a finished product. By analogy, this would suggest that students are 'seen' as the raw material of the school's production process; and that by being 'fed' the 'stuff' of the process (curriculum), they are moved along the assembly-line (track/stream) to become transformed, stage by stage (e.g. course by course; grade by grade) into a finished (educated) product (graduate).
Figure 5.1

Spelling Out the Named Feature "Content" of the Generative Metaphor: School as an Industrial Workplace

Recommendations Regarding "Content"

We recommend that State and local high school graduation requirements be strengthened and that, at a minimum, all students seeking a diploma be required to lay the foundations in the Five New Basics by taking the following curriculum during their 4 years of high school: (a) 4 years of English; (b) 3 years of mathematics; (c) 3 years of science; (d) 3 years of social studies; and (e) one-half year of computer science. For the college-bound, 2 years of foreign language in high school are strongly recommended in addition to those taken earlier.

Whatever the student's educational or work objectives, knowledge of the New Basics is the foundation of success.
for the after-school years and, therefore, forms the core of the modern curriculum. A high level of shared education in these Basics, together with work in the fine and performing arts and foreign languages, constitutes the mind and spirit of our culture. [Italics in text.]

(A Nation at Risk: par. 47, 48:24)

Interpretation of surface metaphors. [None relevant.]

**Analogical implications of the deep metaphor.** As already noted, the process element of 'content' might be taken, in the context of the industrial workplace, to include all those things that are 'laid on' or 'fed' to the raw material to transform it into a standardized finished product. Now, we know that the development (over the past century) of highly rationalized manufacturing processes has gone 'hand-in-glove' with the accumulation of abstracted knowledge about what is considered to be 'the best way' to proceed for optimal production results (in the sense of obtaining the greatest economic return on investment of money, time, and effort). This knowledge might be seen as representing a set of normative ideas (prescriptions) that is applied in the industrial workplace (and often, perhaps unconsciously, in other organizational settings). If such prescriptions did not exist (or were ignored by workers) everyone would be free to do their jobs in any way they pleased. The variance in procedures (process content) that would be followed as a result could be expected to lead to variance in outcome, and an overall lowering of production standards and efficiency.
If, therefore, the problem of declining productivity is viewed as being the result of variance in the procedures used to process raw materials (as it would seem to be in the case of schools, where the standard of output is considered to have become mediocre/shoddy partly as a result of allowing choice in the curriculum [process content] to be 'laid on' the students) then the solution is to reformulate, and more tightly regulate, the process procedures to be followed—as illustrated by the Commission's recommendation to introduce a more prescribed curriculum around a core of New Basics.

**Commission's Findings Regarding "Expectations"**

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<th>Findings Regarding Expectations</th>
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<td>We define expectations in terms of the level of knowledge, abilities, and skills school and college graduates should possess. They also refer to the time, hard work, behaviour, self-discipline, and motivation that are essential for high student achievement. Such expectations are expressed to students in several different ways:</td>
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<td>o by grades, which reflect the degree to which students demonstrate their mastery of subject matter;</td>
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<td>o through high school and college graduation requirements, which tell students which subjects are most important;</td>
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<td>o by the presence or absence of rigorous examinations requiring students to demonstrate their mastery of content and skill before receiving a diploma or a degree;</td>
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<td>o by college admissions requirements which reinforce high school standards; and</td>
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<td>o by the difficulty of the subject matter students confront in their texts and assigned readings.</td>
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Our analyses in each of these areas indicate notable deficiencies:

- The amount of homework for high school seniors has decreased (two-thirds report less than 1 hour a night) and grades have risen as average student achievement has been declining.

- In many other industrialized nations, courses in mathematics (other than arithmetic or general mathematics), biology, chemistry, physics, and geography start in grade 6 and are required of all students. The time spent on these subjects, based on class hours, is about three times that spent by even the most science-oriented U.S. student, i.e., those who select 4 years of science and mathematics in secondary school.

- A 1980 State-by-State survey of high school diploma requirements reveals that only eight States require high schools to offer foreign language instruction, but none requires students to take the courses. Thirty-five States require only 1 year of mathematics, and 36 require only 1 year of science for a diploma.

- In 13 States, 50 percent or more of the units required for high school graduation may be electives chosen by the student. Given this freedom to choose the substance of half or more of their education, many students opt for less demanding personal service courses, such as bachelor living.

- "Minimum competency" examinations (now required in 37 States) fall short of what is needed, as the "minimum" tends to become the "maximum," thus lowering educational standards for all.

- One-fifth of all 4-year public colleges in the United States must accept every high school graduate within the State regardless of program followed or grades, thereby serving notice to high school students that they can expect to attend college even if they do not follow a demanding course of study in high school or perform well.

- About 23 percent of our more selective colleges and universities reported that their general level of selectivity declined during the 1970's, and 29 percent reported reducing the number of specific high school courses required for admission (usually by dropping foreign language requirements, which are now specified as a condition for admission by only one-fifth of our institutions of higher education.)
Too few experienced teachers and scholars are involved in writing textbooks. During the past decade or so a large number of texts have been "written down" by their publishers to ever-lower reading levels in response to perceived market demands.

A recent study by Education Products Information Exchange revealed that a majority of students were able to master 80 percent of the material in some of their subject-matter texts before they had even opened the books. Many books do not challenge the students to whom they are assigned.

(A Nation at Risk: pars., 39 + 40:19-21)

Interpretation of surface metaphors. In the context of education, "expectations" are seen quantitatively in terms of the degree of difficulty of knowledge, abilities, and skills students should possess (as finished products). There also appears to be a qualitative aspect to the notion of expectations. It refers to the behaviours and motivation required of students whilst in the process of acquiring the "stuff" of education. In a general, and somewhat normative, way, students are seen as contenders in a contest where success depends upon overcoming, conquering (i.e. showing mastery over) the challenges that are designed (whether in the form of subject matter, admission requirements, or examinations) to 'try' their mettle [sic].

Analogical implications of the deep metaphor. As noted in Figure 5.2, "expectations" might be taken in the industrial context to mean the expectations held by management in respect to (a) the observance by workers of the standards (code) of conduct established to control variances in the quality and quantity of their performance
outputs, and (b) the achievement by workers of high levels of quality-controlled output. In the school setting, this would translate into concern that students deport themselves (as quality raw materials/'good' workers) according to standards that are considered conducive to the achievement of high standards of graduate performance, and that the schools/colleges (and worker-teachers) establish high standards for such conduct and achievement.

Recommendations Regarding "Expectations"

Standards and Expectations

We recommend that schools, colleges, and universities adopt more rigorous and measurable standards, and higher expectations, for academic performance and student conduct, and that 4-year colleges and universities raise their requirements for admission. This will help students do their best educationally with challenging materials in an environment that supports learning and authentic accomplishment.

Implementing Recommendations

1. Grades should be indicators of academic achievement so they can be relied on as evidence of a student's readiness for further study.

2. Four-year colleges and universities should raise their admissions requirements and advise all potential applicants of the standards for admission in terms of specific courses required, performance in these areas, and levels of achievement on standardized achievement tests in each of the five Basics and, where applicable, foreign languages.

3. Standardized tests of achievement (not to be confused with aptitude tests) should be administered at major transition points from one level of schooling to another and particularly from high school to college or work. The purposes of these tests would be to: (a) certify the student's credentials; (b) identify the need for remedial intervention; and (c) identify the opportunity for
advanced or accelerated work. These tests should be administered as part of a nationwide (but not federal) system of State and local standardized tests. This system should include other diagnostic procedures that assist teachers and students evaluate student progress.

4. **Textbooks and other tools of learning and teaching** should be upgraded and updated to assure more rigorous content. . . .

6. Because no textbook in any subject can be geared to the needs of all students, funds should be made available to support text development in "thin-market" areas, such as those for disadvantaged students, the learning disabled, and the gifted and talented.

• • • (A Nation at Risk: pars. 59-63, & 65:27-28)

**Interpretation of surface metaphors.** The Commission recommends that schools, colleges and universities employ stricter, less flexible, and more precise methods of determining (through assessment of student achievement) the effectiveness of 'laying on the content.' Clearly, student performance is conceptualized as something to be rated in numerical terms and equated with a 'level' of attainment (as a rung reached on a hierarchical 'ladder'; or a volume amount of liquid signified by a mark on a graduated beaker). The amount of learning possessed by the student is seen as something that should be evidenced by his/her grade level—whether it be in the form of a letter grade, assigned by a teacher in assessment of student performance on a particular exercise, or to the class Grade level assigned by the school as a result of a student's aggregated marks for an annual program of scholastic achievement.
In keeping with the viewpoint that the student's engagement with learning is a contest designed to challenge (and thereby promote greater feats of performance), the schools, colleges and universities are called upon to establish more demanding criteria (standards) in their expectations for student performance and conduct; and the 4-year post-secondary institutions to raise their entry requirements.

**Analogical implications of the deep metaphor.** Further to the rationalization that declines in the amount of learning 'contained' by students result from deficiencies in what they have been 'fed', as are declines in the productivity of a manufacturing industry the result of deficiencies in the application of process content—the exhortation to employ standardized achievement tests at "major transition points from one level of schooling to another and particularly from high school to college or work" is analogous to a demand for quality control of product outputs at each critical transition stage in the manufacture of mass-produced goods.

The analogy between educational and manufacturing production processes is further reinforced by the consideration of textbooks and other learning/teaching media as tools; and by allusion to the fact that textbooks cannot be "geared" to accommodate variance in student populations as [say] can machine-tools that are able to handle variance in their processing of different types of raw materials.
The Commission's recommendation concerning the adoption of more rigorous and measurable standards for distinguishing between "top of the line" and lesser quality (graduate) products (through the awarding of letter grades, and Grade promotion) is advanced by the Commissioners as
supporting "learning and authentic accomplishments." It might be seen as stemming from the traditionally held belief that workers will be motivated to expend greater work effort on their allotted tasks if they are offered extrinsic rewards that are considered of value because they are in scarce supply (or, if they are threatened with the loss of such rewards—as when, for example, the number of "pieces" of work required to be done for a given rate of reward is increased). [This does suggest some ambiguity concerning the analogical role of the student who can be seen at some times to be considered as raw material, and at other times, as worker.]

Similarly, the call to institute the application of standardized tests of achievement at major transition points from one level of schooling to another, might be seen as stemming from the practice of tightening quality control measures at each stage of an industrial plant's production process in order to locate (and eliminate, through correction or rejection) output variance as close to its source as possible.

Commission's Findings Regarding "Time"

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<td>Evidence presented to the Commission demonstrates three disturbing facts about the use that American schools and students make of time: (1) compared to other nations, American students spend much less time on school work; (2) time spent in the classroom and on homework is often used ineffectively; and (3) schools are not doing enough to help develop either the study skills required to use time well or the willingness to spend more time on school work.</td>
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In England and other industrialized countries, it is not unusual for academic high school students to spend 8 hours a day at school, 220 days per year. In the United States, by contrast, the typical day lasts 6 hours and the school year is 180 days.

In many schools, the time spent learning how to cook and drive counts as much toward a high school diploma as the time spent studying mathematics, English, chemistry, U.S. history, or biology.

A study of the school week in the United States found that some schools provided students only 17 hours of academic instruction during the week, and the average school provided about 22.

A California study of individual classrooms found that because of poor management of classroom time, some elementary students received only one-fifth of the instruction others received in reading comprehension.

In most schools, the teaching of study skills is haphazard and unplanned. Consequently, many students complete high school and enter college without disciplined and systemic study habits.

(A Nation at Risk: para. 41:21-22)

Interpretation of surface metaphors. [None relevant.]

Analogical implications of the deep metaphor. Time, as a process element, is seen (Figure 5.3) in the school setting as a matter concerning the effective and efficient application of student time to academic work. It is considered in this context, as it is in the industrial milieu where worker time is factored as a production cost, to be so causally correlated with amounts of productivity that it requires 'management'—in much the same way as worker time is 'scientifically managed' for maximum output in an industrial or business workplace.
Recommendations Regarding "Time"

Recommendation C: Time

We recommend that significantly more time be devoted to learning the New Basics. This will require more effective use of the existing school day, a longer school day, or a lengthened school year.

Implementing Recommendations

1. Students in high schools should be assigned far more homework than is now the case.

2. Instruction in effective study and work skills, which are essential if school and independent time is to be used efficiently should be introduced in the early grades and continued throughout the student's schooling.

3. Schools districts and State legislatures should strongly consider 7-hour school days, as well as a 200- to 220-day school year.

4. The time available for learning be expanded through better classroom management and organization of the school day. If necessary, additional time should be found to meet the special needs of slow learners, the gifted, and others who need more instructional diversity than can be accommodated during a conventional school day or school year.

5. The burden on teachers for maintaining discipline should be reduced through the development of firm and fair codes of student conduct that are enforced consistently, and by considering alternative classrooms, programs, and schools to meet the needs of continually disruptive students.

6. Attendance policies with clear incentives and sanctions should be used to reduce the amount of time lost through student absenteeism and tardiness.

7. Administrative burdens on the teacher and related intrusions into the school day should be reduced to add time for teaching and learning.

8. Placement and grouping of students, as well as promotion and graduation policies, should be guided by the academic progress of students and their instructional needs, rather than by rigid adherence to age.

(A Nation at Risk: pars. 68, 70, & 72-76:29-38)
The level of productivity of an industrial plant can be raised by increasing the time spent by workers on the production line.

5.3

Spelling Out the Named Feature "Time" of the Generative Metaphor: School as an Industrial Workplace

Interpretation of surface metaphors. [None relevant.]

Analogical implications of the deep metaphor. The recommendations regarding "time" can be seen as natural extensions of the viewpoint that sees academic achievement as a correlate of the time spent on academic work; and the time spent by students in school as requiring 'management.'
For example, the perspective of time as a critical factor in cost-effective (i.e. efficient) productivity can be readily recognised as a feature that tends to preoccupy management in the workplace.

Similarly, concern for the maintainance of discipline, and the consistent enforcement of (normative) codes of conduct for students in schools can be seen as analogous to the preoccupation of management in other workplaces with the control of workers through the enforcement of discipline, and strict codes of expected conduct (as patterned on the military model). [It might, also be seen in terms of the handling of recalcitrant raw materials.]

In like vein, the Commission's recommendation for controlling student absenteeism and tardiness can be seen as a direct reflection of the approach that has, historically, been taken to control workers in the industrial sector. Those recommendations that would lengthen the school day, the school year, and the percentage of time to be spent on academic subjects can, likewise, be identified with an industrial sector demand for longer work hours in order to increase productivity. And, the call for students to be grouped, promoted and graduated according to their academic progress, and on the basis of their instructional (rather than on their social [age-related]) needs is analogous to the call for workers to be ranked for remuneration and promotion on the basis of merited performance rather than on years of service.
Commission's Findings Regarding "Teaching"

Findings Regarding Teaching

The Commission found that not enough of the academically able students are being attracted to teaching; that teacher preparation programs need substantial improvement; that the professional working life of teachers is on the whole unacceptable; and that a serious shortage of teachers exists in key fields.

- Too many teachers are being **drawn from the bottom quarter of graduating high school and college students.**

- The teacher preparation curriculum is weighted heavily with courses in "educational methods" at the expense of courses in subjects to be taught. A survey of 1,350 institutions training teachers indicated that 41 percent of the time of elementary school teacher candidates is spent in education courses, which reduces the amount of time available for subject matter courses.

- The average salary after 12 years of teaching is only $17,000 per year, and many teachers are required to supplement their income with part-time and summer employment. In addition, individual teachers have little influence in such critical professional decisions as, for example, textbook selection.

- Despite widespread publicity about an overpopulation of teachers, severe shortages of certain kinds of teachers exist: in the fields of mathematics, science, and foreign languages; and among specialists in education for the gifted and talented, language minority, and handicapped students.

- The shortage of teachers in mathematics and science is particularly severe. A 1981 survey of 45 States revealed shortages of mathematics teachers in 43 States, critical shortages of earth sciences teachers in 33 States, and physics teachers everywhere.

- Half of the newly employed mathematics, science, and English teachers are not qualified to teach these subjects; fewer than one-third of U.S. high schools offer physics taught by qualified teachers.

(A Nation at Risk: para. 42:22)
Interpretation of surface metaphor. Newly graduating high school and college students are seen as the major source of personnel for teacher recruitment. This source of personnel is conceptualized as a 'pool' from which teacher recruits are drawn—as is water from a well. The Commission found teachers to be drawn from the pool of graduating high school and college students as [sediment-laden, less 'good'] water drawn from the bottom of a well.

Analogical implications of the deep metaphor. As illustrated in Figure 5.4, such issues as teacher recruitment, selection, training, career advancement, and remuneration can easily be identified with the broad range of concerns that fall, in workplaces (other than schools), under the rubric of personnel (or, in more recent years, of human resource management). Such resources have, traditionally, not been managed in the school system in any integrated way. Recruitment and selection for training have come under the purview of colleges/universities; certification by some other state/provincial agency; and career advancement has tended to have been on an ad hoc basis.

Recommendations Regarding "Teaching"

Recommendation D: Teaching

This recommendation consists of seven parts. Each is intended to improve the preparation of teachers or to make teaching a more rewarding and respected profession. Each of the seven stands on its own and should not be considered solely as an implementing recommendation.
1. Persons preparing to teach should be required to meet high educational standards, to demonstrate an aptitude for teaching, and to demonstrate competence in an academic discipline. Colleges and universities offering teacher preparation programs should be judged by how well their graduates meet these criteria.

2. Salaries for the teaching profession should be increased and should be professionally competitive, market-sensitive, and performance-based. Salary, promotion, tenure, and retention decisions should be tied to an effective evaluation that includes peer review so that superior teachers can be rewarded, average ones encouraged, and poor ones either improved or terminated.

3. School boards should adopt an 11-month contract for teachers. This would ensure time for curriculum and professional development, programs for students with special needs, and a more adequate level of teacher compensation.

4. School boards, administrators, and teachers should cooperate to develop career ladders for teachers that distinguish among the beginning instructor, the experienced teacher, and the master teacher.

5. Incentives, such as grants and loans, should be made available to attract outstanding students to the teaching profession, particularly in those areas of critical shortage.

6. Master teachers should be involved in designing teacher preparation programs and in supervising teachers during their probationary years.

(A Nation at Risk: paras. 80, 81:31)

Interpretation of surface metaphors. [None relevant.]

Analogical implications of the deep metaphor. The professional status of teachers (as credentialed 'masters') is reconceptualized by the Commission so that it tacitly provides a better 'fit' with the pre-industrial model of the craftsman. For the career of teaching is reconceptualized as a ladder with hierarchically placed 'rungs' to mark
Spelling Out the Named Feature "Teaching" of the Generative Metaphor: School as an Industrial Workplace
graduated steps that can be climbed—as from apprentice (beginning teacher), to journeyman (experienced teacher), to master craftsman (master teacher).

In keeping with this metaphor, recommendations re higher starting salaries for teachers, grants and loans for outstanding recruits, merit pay, and promotional opportunities for 'master' teachers can all be seen to stem from the industrial/business model where (in contrast to service sector organizations) incentives—in the form of attractive pay scales and promotional opportunities—are used to help an organization recruit (and keep) more able staff.

OVERVIEW

The foregoing analyses serve to demonstrate the application of an analytical framework to the 'spelling out' of a generative metaphor; and to illustrate the extent to which the 'problem of schools' can be understood as being projected in the report, "A Nation at Risk," in terms of the industrial or factory model.

It also helps reveal how the normative ideas connected with what is 'known' about the running of an industrial workplace serve to tacitly influence the solutions that are recommended for 'fixing' what is 'wrong' with the schools. Those problem-solving policies that call for educational reform by way of "more discipline in the schools," "more standardized testing of students," and "more
rigorous grading/promoting practices" might, thus, be seen as representing tacitly transposed judgments about control requirements: requirements that are generally considered a necessary part of the 'good' management practices we have come to expect from a successfully operated industrial or business workplace.

No doubt this way of framing the problem of schools is as widely accepted as it is because it is viewed as literally 'true.' It would certainly seem to represent a classic example of a problem frame that has remained unchallenged because the analogical implications of the generative metaphor which undergird it have not been spelled out, nor the assumptions which flow from these implications subjected to critical scrutiny.

Whether or not it is useful for policymakers to frame what is problematic about schools in this way remains to be examined. But, before any problem frame is subjected to such assessment, it would seem only prudent that the images projected by its underlying generative metaphor—in this case, of the industrial workplace—be 'fleshed out' (i.e. elaborated); and, that the implications these suggest for its subject—here, the school—be made explicit. This task is undertaken in the next chapter.
Chapter 6

ELABORATING THE ASSUMPTIONS OF THE METAPHOR
"SCHOOL AS AN INDUSTRIAL WORKPLACE"

As illustrated in the last chapter, the authors of the Commission Report, "A Nation at Risk," appear to 'make sense' of what is problematic about the U.S. educational system by 'seeing' its component (subsystem) schools, colleges, and universities as if they were (metaphorically speaking) product-manufacturing plants whose standards and levels of productivity are in decline, and whose operational practices are, thereby, in need of reform.

The solution to the problem of schools is thus (by virtue of the frame's underlying generative metaphor) rendered 'obvious'—to wit, apply to schools the same 'good'
organizational practices that are found to obtain in the conduct of an effective, and efficiently run, manufacturing plant in the industrial sector.

The recommendations proposed by the Commission are, accordingly, seen as being directed at reforming certain administrative processes found in schools (rather than pedagogical ones, as might be inferred from the term "educational process"). And, as noted (in Chapter 5), the four process elements that are targetted by the Commission for reform can readily be identified with practices found in the industrial workplace (under the rubric of "procedural or process regulations," "quality control," "efficient use of time," and "human resource management").

Now the Commission's proposals seem to be predicated on an assumption. This assumption, which is inherent in the metaphor seen (tacitly) to have been used to frame the problem of schools, is that an appropriate (and insightful) correspondence exists between the pattern of features that characterizes a product-manufacturing industrial plant and the pattern of features that characterizes an educational institution such as a secondary school. And it is, of course, for the purpose of checking the 'validity' of such an underlying assumption that Schön (1979:255) exhorts us to "spell out the metaphor, elaborate the assumptions which flow from it [sic], and examine their appropriateness in the present situation."

Having spelled out the metaphor (in Chapter 5), we are now ready to elaborate the assumptions that flow from
it, using the procedural framework developed in Chapter 3 for that purpose. It is, then, with the task of applying this procedural framework to the elaboration of the assumptions of the metaphor "school as an industrial workplace" that the rest of this chapter is concerned. The next section deals, accordingly, with the development of a "pattern model" (Kaplan, 1964) of the (metaphoric term) 'industrial workplace.' It is followed by an overview of the model so developed; and a review of the implications such a conceptualization analogically suggests for our understanding of (the subject of the metaphor) 'the school.'

TOWARD A PATTERN MODEL OF THE INDUSTRIAL WORKPLACE

Before attempting to develop a model of the pattern of relationships obtaining among the salient elements of the setting termed 'the industrial workplace,' it would seem prudent to check out the generalizability of the image of the industrial workplace (as a mass production manufactory) that is suggested by the features of organizational process that are targetted for reform by the Commission.

The industrial-based research of Woodward (1958, 1965, 1970) is instructive in this regard. And, because it provides a promising base upon which to found a pattern model of the industrial workplace, an overview of the findings of the Woodward studies are, next, presented in some detail.
The Woodward Studies

Between 1953 and 1957, surveys were conducted in a wide variety of manufacturing firms in South Essex (England), to ascertain the extent to which the practice of "management theory"—as espoused and taught in business classes in the local colleges—might be correlated with business success. But, when the findings of the surveys were tabulated, a number of different patterns of management practice emerged: patterns which could be related neither to business success, the size of the firm, nor the type of industry concerned. However, when the firms were grouped according to similarity of objectives and techniques of production—and classified according to an order of technical complexity—each production system was found to be associated with a characteristic pattern of organization (Woodward, 1958).

Defining technological complexity as the extent (along a single continuum) to which control could be exercised over the physical limitations of production, the researchers finally collapsed the order of technological complexity (that they had observed in the firms studied) into three distinct stages. These were:

(1) unit or small batch (e.g. made-to-order goods such as custom suits, machine tools);

(2) large batch, assembly, and mass production (e.g. mass-produced clothing, automobiles); and

(3) "flow" or "process" production (e.g. oil, chemicals).
Findings. The Woodward findings suggested that the technical method used by a firm to produce the goods it manufactured was the single most important factor in determining organizational structure and in setting the tone of human relations inside the firm; and that an essential requirement for business success was a match between the organizational pattern used to manage the firm as a whole, and the technology (typed as 'unit,' 'mass,' 'process') employed in the production process.

Such findings put in doubt the validity of those college courses that had been espousing 'the principles' of business management on the (widely accepted) assumption that there was one set of principles for effective management which held for all types of production processes. The principles that were being taught were indeed valid—but only in the case of firms employing a mass production mode of technology. They did not hold for firms using small batch or flow technology, because the situational demands of these technologies were different. (The major features of organizational management that were seen as being influenced by the situational demands of these three different modes of production technology are displayed in annotated form, for comparative purposes, in Table 6.1.)

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1 For example, each technical situation was seen as requiring a different kind of cooperation between members of the management team. Therefore, the communication system used to link them needed to be different from one situation to another, depending on the nature of the production technology in use.
# Table 6.1

Features of Organized Management Influenced by Production Technology

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>UNIT PRODUCTION TECHNOLOGY</th>
<th>MASS PRODUCTION TECHNOLOGY</th>
<th>PRODUCTION THROUGH PROCESS TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>The chronological sequencing of basic managerial functions.</td>
<td>Marketing DEVELOPMENT Production</td>
<td>Development PRODUCTION Marketing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Development MARKETING Production</td>
</tr>
<tr>
<td>2)</td>
<td>The degree of coordination needed between the managerial functions on a day-to-day operational basis.</td>
<td>Daily coordination is necessary.</td>
<td>R &amp; D a high level activity; separate from other functions or may not exist.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development &amp; Production often indistinguishable.</td>
<td>Day-to-day integration of functions not necessary (seen as disruptive); but cooperation essential in exchange of info.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Development people work in conjunction with Marketing to create new products (together with new process) for which they have assured long-term, large volume markets. They are always well ahead (independent) of Production.</td>
</tr>
<tr>
<td>3)</td>
<td>The relative importance of managerial functions to the success and survival of the business.</td>
<td>DEVELOPMENT is central and most important.</td>
<td>PRODUCTION is central and most important.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The skill and ingenuity of those responsible for development is critical to the success of the firm.</td>
<td>Success depends upon the efficiency of administration &amp; production; &amp; on the progressive reduction of unit costs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Success is very dependant upon existence of a market waiting to absorb the product as storage difficult or impossible.</td>
</tr>
<tr>
<td>4)</td>
<td>The manner in which the tasks associated with each of the basic managerial functions is operationalized, e.g. 'inspection'</td>
<td>There is a high sense of responsibility &amp; satisfaction when producing individual units so craftsmen monitor their own standards.</td>
<td>INSPECTION is a critically important function of production management as unit costs have to be kept under CONTROL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inspection is less important as self-correcting devices become increasingly incorporated into the production process itself.</td>
</tr>
</tbody>
</table>
Perhaps the most surprising organizational difference the researchers found concerned the chronological sequencing of basic managerial functions. Management theory had identified "Development," "Production," and "Marketing" as managerial functions that were basic to any manufacturing enterprise; and since it had seemed logical to suppose that one first developed a product, then produced it, and finally marketed it, this sequencing of basic functions had been assumed as 'given.' However, as shown in Table 6.1, the logic of this sequencing held only in the case of firms using a mass production mode of technology.

It was found that the function to be attended to first by companies producing individual or small batch made-to-order goods was that of marketing; for they had, first, to 'sell' a prospective client on the idea that they could produce what was wanted. Accordingly, in this case, the function of development did not occur until after the order was secured, and until the individual requirements of the customer could be ascertained. Moreover, the design function was sometimes found to be indistinguishable from production itself (e.g. custom tailoring where the garment was designed as it was being fitted on the customer).

Companies employing 'process' technology were found, like mass production firms, to have begun first by developing the product they were now manufacturing. But, unlike their mass production counterparts, they had not at this stage embarked upon production. They had, instead, proceeded from the function of development to that of
marketing—for, only after securing the kind of long-term market (e.g. 20 years) that could ensure a profitable return on the enormous capital outlay involved in (the 'tooling-up' required for) process technology could they afford to contemplate the production function.

The second feature of organizational management that was found by the Woodward research team to be influenced by the situational demands of the different production technologies was (as shown in Table 6.1) the degree of co-ordination needed between the managerial functions on a day-to-day basis. For, the amount of co-ordination required between the managerial functions was found to decrease as the level of technological complexity increased.

In unit/small batch firms, for example, the managerial functions were highly inter-dependent, requiring operational co-ordination on a day-to-day basis; and, as already noted, the functions of development and production were often found to be indistinguishable. A greater degree of independence was found between the managerial functions in the mass production firms, particularly in respect to the development function in companies having their own Research and Development Division (which was often located right away from the production plant[s]). However, while the daily co-ordination of operations did not appear to be necessary, and was, indeed, felt to be disruptive, co-operation in exchanging information (e.g. from Marketing to Production about customers' concerns, and to R & D about market response to product design) was seen as essential.
An even greater degree of independence was found between the functions in firms using process technology. For, as already noted, the marketing was done, ahead of production, on a long-term basis; and, research was largely directed at the development of entirely new products that were independent of both existing production facilities and customer requirements.

The third feature of organizational management (shown in Table 6.1) that Woodward found correlated with the situational demands of the different production technologies was the relative importance of the managerial functions to the success and survival of the business. In the case of each of the three modes of technology, the most critical function was found to be that which was centrally located in the chronological sequencing of functions: i.e. 'development' in unit/small batch firms; 'production' in mass production enterprises; and 'marketing' in plants using process technology. Business success was, accordingly, found to rest almost entirely, in the case of unit/small batch technology, upon the skill and ingenuity of those responsible for development; in the case of mass production, upon the efficiency of the administration of production and the progressive reduction of unit production costs; and, in the case of process technology, upon the availability of a market that could absorb the proposed new product (for the volume of product that 'flows' from process technology can be difficult, or impossible, to hold in storage).
As shown in Table 6.1, the findings of the Woodward studies also suggested that the production technology used by a firm directly affected the manner in which tasks associated with each of the basic managerial functions (such as decision-making and inspection) were operationalized. For example, organizations having a mass production mode of technology were found to be singularly characterized by a managerial preoccupation with issues of "control" and "inspection." As Woodward describes them, the mass production workplaces were continuously working to push back limitations; there was, accordingly considerable pressure put on employees as production targets were set higher and higher. However, she notes that, although incentives were offered employees to increase their output, the pace—in the last resort—was actually set by the operators themselves.

This preoccupation with increasing managerial control was not seen to obtain where the technologically less complex unit/small batch mode of production was concerned; here, the responsibility for the quality of the product was largely in the hands of craftsmen-workers who were relatively well-skilled, autonomous, and self-motivated (no one, for example, attempted to "hustle" the engineers who were working on a complicated machinery design). Likewise, where the mode of production was characterized by the more complex process technology, there was little need for managerial concern about control issues. Here, the quality of the product, like the timing, and the testing, was built in to the highly automated (and self-regulated) processing.
Now, in addition to the features of organizational management that are noted in Table 6.1, a number of other organizational characteristics were measured and found by Woodward to be correlated with the kind of technology used by a firm to process its products. When plotted along the continuum of technological complexity, the measures associated with each of these organizational characteristics can be seen to fall into one or other of three directional 'trends.'

For example, the measures associated with some characteristics were found to increase, along with increased technological complexity--from 'unit' to 'mass' to 'process' production--as in the case of the following features:

--the number of levels of authority in the management hierarchy,
--the span of control of the chief executive officer,
--the ratio of managers and supervisory staff to total personnel,
--the ratio of indirect to direct labour, and of administrative and clerical staff to hourly paid workers, and,
--the proportion of graduates among supervisory staff engaged on production.

On the other hand, the measures associated with the following features were found to increase from 'unit' to 'mass' production, to peak with mass production, and then to decrease in the case of 'process' technology:

--the span of control of first-line supervisors,
organizational flexibility (i.e. the number of different permutations of arrangements that can be tried to increase productivity and lower costs)

amount of written as opposed to verbal communication,
specialization between functions of management,
separation of administration and the supervision of production,
negative tone of industrial relations, and of attitudes and behaviours of management and supervisory staff.

One organizational feature was found to decrease as the level of technological complexity increased from 'unit' to 'mass' to 'process' production—it was the percentage of the total budget that was spent on labour costs.

Conclusion. In view of the fact that the findings of the Woodward studies have proved seminal to the study of industrial organization, it would make sense to conclude that there is no single set of structural relationships that can, in a generalized way, be said to characterize the industrial workplace. Therefore, and in recognition of the three sets of organizational relationships found in the industrial workplace by Woodward (and identified by her as reflecting the situational demands of 'unit,' 'mass,' and 'process' technology), it is proposed that the pattern model of the industrial workplace be conceptualized as a general case with three special cases—or, as a framework that would (metaphorically speaking) serve as a suprasystem to incorporate, and systemically relate, the three sets of organizational relationships found in the Woodward schema.
Now, to 'see' a "model of Woodward's schema of the industrial workplace as [if it were] a general (supra) system" is to employ a metaphor. This metaphor is predicated on the underlying assumption that an appropriate (and insightful) correspondence exists between the pattern of industrial workplace features represented in the Woodward schema, and the pattern of systemic features associated with representations of open social systems in a general (supra) system framework. In turn, this "underlying assumption" is predicated on the assumption that corresponding relationships obtain between the constituent parts of these two patterns when they are forced into an analogical relationship by the metaphor. And, the insights that can be derived from the construction of a model that is premised on such an analogy will depend, in turn, upon the assumptions undergirding our understanding of open social systems.

Because this understanding underpins the metaphor on which our pattern model of the industrial workplace is to be constructed, it would seem important that the assumptions upon which it rests be made explicit. To this end, the common characteristics of open systems (as found in Katz and Kahn, 1966; Buckley, 1967; Immegart and Pilecki, 1973; Ackoff, 1974) are reviewed in the next section; and illustrated with examples of analogous features—as they might be 'seen' in industrial workplaces found in Woodward's schema.
Open Systems Characteristics
in the Industrial Workplace

According to Immegart and Pilecki (1973:31), systems are of two basic types, "open" and "closed." They continue:

Open systems are those which exchange matter and energy with their environment. Closed systems are self-contained, and are unaffected by other systems or their environment. All closed systems (best exemplified by certain chemical reactions or people in advanced stages of psychic disorder) move toward entropy, a "death-state" of inertia. Open systems, since they interact with and use their environment, combat entropy and thus exist in a dynamic "life state," typified by increasing order, differentiation, variation, and complexity.

Relationship with the environment. According to Katz and Kahn (1966), all social organizations are open systems\(^2\). They are, accordingly, affected by the environment in which they find themselves, and upon which they must depend for sustenance. They do, however, in turn, have effects on the environment of which they form a functioning part.

In the case, for example, of a social system engaged in the mass production of (say) woolen cloth, there are (at least) three kinds of environments upon which the manufacturing plant must depend, and upon which it has an effect. There is the physical environment from which the plant requires certain amounts of raw material, labour, and other power (that is cheap, relative to the market price of the finished product); and which, in turn, is affected by

\(^2\) It might be noted that this very 'literal' categorization of social organizations as open systems rests on the metaphoric use of a 'scientific model'; for it is the model provided by general systems theory that allows us to 'see' social organizations as if they were open systems.
the physical presence of the plant—either in beneficial ways (e.g. attractive and/or community-accessible buildings, gardens, wharves, playing areas, etc) or in deleterious (e.g. unattractive and/or dangerous areas, buildings, docks, cesspools, slag/waste heaps, etc) and/or polluting ways. There are, similarly, economic and social environments upon which the plant must depend for favourable financial and legislative support; and upon which it, in turn, has either favourable or unpopular effects.

It would seem safe to assume that the extent to which an industrial enterprise impacts on its environment is directly related to the scale of its operations; and that this might be seen to increase exponentially as one moves from 'unit,' to 'mass,' to 'process' technology.

Need to maintain a "steady state". Open systems have a tendency to limit their openness, so that the modifying influences of external forces may be prevented from changing the characteristic functioning of their organization in any radical way. This is a 'normal' reaction; for open systems which survive are characterized by a "steady state." This state is dynamic in nature rather than static. In other words, it is not a motionless or true equilibrium. There is a continuous inflow and outflow, but the ratio of energy exchanges, and relationship between parts remain the same so that—growth and expansion notwithstanding—the 'essence' of the system remains virtually unchanged.
Our woolen mill will, accordingly, remain recognizable as a cloth-producing organization, no matter how much it may grow in the size and scope of its cloth-making operations. And, our firm of custom tailors will, presumably, still continue to produce garments—even if it changes its *modus operandi* from small to large batch (mass) production.

**The work of a system.** A woolen mill works to transform, by some process (e.g. spinning and weaving), the matter and energy (e.g. bales of raw wool, dyes, etc) which it takes in as inputs from the environments, into some output, or product form (e.g. woven woolen cloth), which is characteristic of the system (e.g. Harris Tweed).

**Inputs.** Just as a biological organism can only assimilate certain things from the environment by way of nourishment, so can a social system only make use of energetic and informational inputs that are appropriate to its purpose. The mechanism by which a system selects, rejects, or translates potential inputs of energy and information into a usable form, is termed "coding." The form of this coding will be affected by the nature of the functions performed by the system; and, once established, the form which the coding takes will help perpetuate the type of functioning that characterizes the system.

The raw material inputs of a textile mill, for example, will be coded according to its production function—that is, according to whether it functions to produce cloth
characterized as, say, cotton, or linen, or wool. Furthermore, the cloth-making function may be limited to the processing of only certain qualities—requiring more specific coding of the raw materials. For instance, a particular woolen mill may function solely to produce low-grade cloth: e.g. cloth made from reclaimed wool that is 'coded' as either "mungo" (i.e. of poor quality and very short staple), or "shoddy" (i.e. reclaimed from materials that are not felted, and of better quality and longer staple than mungo). And, since other inputs—e.g. of storage containers, looms, spindles, bobbins, etc—will be selected on the basis of their being appropriately coded for the given production function, their selection will serve to perpetuate that mill's characteristic functioning (and product output of, say, "shoddy.")

In a broad sense, social system inputs might be classified as being either of a material, informational, or energetic nature. However, in the context of an industrial workplace, it is possible to sub-categorize these broad types of inputs as shown in Table 6.2.

Two different kinds of material inputs are necessary for the functioning of an industrial workplace. The first, labelled in Table 6.2 as "matériel inputs," requires an initial capital expenditure (or output); for it secures such basic (input) items as the plant (which houses the 'machinery') and the tools/machines themselves. It can be expected that, as the level of technological complexity increases, so will the output of capital by virtue of which
Table 6.2
Industrial Inputs

MATERIAL INPUTS

- Matériel Inputs
  - PLANT
  - TOOLS

INFORMATIONAL INPUTS

- Information Inputs
  - TECHNICAL ('know-how')
  - PROGRAM
  - FEEDBACK

ENERGIC INPUTS

- Personnel in Work Roles
- Administrative Inputs
  - ORGANIZATIONAL
  - MANAGEMENT

MATERIAL INPUTS

- Raw Material Inputs
  - SOMETHING CHANGED BY PRODUCTION PROCESS TO FORM OUTPUT
inputs are acquired, and the specificity of plant design required (e.g. the processing machinery of a [process technology] hydro-electric plant is an integral part of the dam structure which houses it).

Labelled in Table 6.2 as "raw material inputs," the second kind of material input needed by an industrial workplace is that which is 'put through' the transformation (or combinatorial, value-added) process to form the basis of the system's output. The nature of this ('thruput') material will affect the kind of technology that can be used to change it into an acceptably finished product. The more variable and unpredictable it is, for example, the less suitable it becomes for large batch, assembly-line, type processing (e.g. diamonds that require to be cut by hand). In some cases a plant may have to engage in the pre-processing of its raw materials, so that they can be brought to the standardized state required for ingestion by the processing machinery.

Moreover, it should be noted that there is a difference in type between the integral (discrete unit) type raw material used in unit/small batch and assembly-line technologies to produce integral products (such as cars and clothes), and the dimensional type raw material (experienced in terms of volume or capacity) that is--at least, currently--required for the use of 'flow' or 'process' technology, in the processing of such things as oil, electricity, and information. [It might be anticipated that
with advances in the development of artificial intelligence and robotics, highly automated processes will, in the future, also be available for the processing of integral-type products.

As shown in Table 6.2, "information inputs" are required by an industrial workplace in (at least) two forms. To start with, the system has need of some 'blueprint' or 'program' (like the D.N.A. of a biological organism) to guide its functioning. Such information might be considered as coming into a social system in the form of the technical 'know-how' possessed by skilled craftsmen/technicians (especially in custom production), and in the increasingly complex (computerized) processing programs associated with highly automated machine design. (Information might also be seen to come into the system in the form of a value system and normative order, e.g. authority.)

Secondly, because an industrial workplace is an open system, it needs information about environmental conditions, and about how it is doing in relation to its environment. Such informational input is known as "feedback." The simplest type of such input is negative feedback. (It is called negative because it represents the difference between actual output and what is required as output for the organization to maintain its 'steady state.' And it is by the 'putting in' (feeding back) of this difference that the system corrects for its deviations from course.)
Now, as can be recognized in the context of our woolen mill, the organization's continued survival in a 'steady state' will depend upon its receiving (and, of course, acting upon) timely information (feedback) about the market acceptability of the woolen goods it has produced (i.e. about the match between consumer expectations and the quality and quantity of what it has, and is still producing).

Whatever the mode of technology in use, the system will be run with the aim of minimizing costs (to a degree consistent with a given quality of product). This will include controlling for production errors as close to their source as possible. However, as has been noted, the problem of quality control is greatest with mass production. The problem of quantity control is, similarly, only really an issue with mass production; for in both custom and process technology the product is marketed ahead of production. However, since the central preoccupation in mass production organizations is with maximizing production (and, of course, with maintaining the steady state) the marketing arm has the unenviable task of reconciling output and market demand 'after the event.' If production falls short of market demand, it is the sales force that has to deal with irrate customers; if production exceeds market demand it is the Marketing Division that has to spend more of its budget on advertising and sales promotions (that it might otherwise spend on market creation and market research).
The **energetic inputs** required to accomplish the production function of an industrial workplace are provided, as shown in Table 6.2, by the activities of "personnel in work roles." While these roles are specific to the tasks involved with the production functions of that particular industry, they can be generalized across organizations to cover such tasks as, for example, maintenance (e.g. janitorial, and machine repair roles) and production (e.g. skilled and semi-skilled technical, and unskilled, labour).

However, since the energy of personnel in some work roles is directed toward a task that is allied to, but separate from, the production function--i.e. toward bringing order and coordination to the overall organization--a case can be made for considering these "**administrative inputs**" as a sub category of energetic input. Taken as a whole, these two kinds of input can be seen to provide the structure of an open system.

**Structure.** The structure of an open social system is a network of interrelated (and interdependent) role relationships; it is, according to Katz and Kahn (1966), a structure of events or functionings (such as 'development,' 'production,' and 'marketing) rather than of static role positions (such as Production Manager and Director of Sales and Marketing) as illustrated in most organizational charts.

**Process.** A social system may process materials to create new products, or train people to do something, or
provide a service. The processes it employs to fulfil its purpose can be seen to be those things it does to change something (it imports as an input) into an output.

The things that an industrial workplace does to transform its inputs of raw material into a finished product it does through the use of something called "technology."

**Process as technology.** Now, while the term "technology" is still sometimes used to mean merely the tools and machines—or the **hardware**—employed in the production process, it is becoming more and more frequently used to connote a systemic perspective that also includes the processes and procedures—or **software** involved. Moreover, as suggested by Roy and Cross (1975), the meaning of technology may also be extended to include **systems**:

> These are organized assemblies of technical and human elements such as the telephone network, a bus service, or a computer system that include both hardware and software components. (Roy and Cross, 1975:14)

They quote Schön's (1967:20) definition of technology as,

> . . . any tool or technique, any product or process, any physical equipment or method of doing or making by which human capability is extended.

In a similar vein, Toffler (1974:42) suggests that technology includes techniques as well as the machines necessary to apply them; it includes "ways to make chemical reactions occur, ways to breed fish, plant forests, light theatres, count votes, or teach history."
For Dobrov (1979), technological systems acquire the features of a special form of organization he calls "organized technology." An organized technology can be conceptualized in terms of its "hardware" (graded by Dobrov according to its degree of flexibility and capacity for change); its "software" (scaled, similarly to the Woodward "model", according to the degree of complexity of the processes involved); and what Dobrov refers to as its "orgware" (which he characterizes in terms of stability [in association with unit/small batch software], regulated flexibility [in relation to mass production software], and adaptability [in connection with highly automated process software]). Figure 6.1 illustrates the relationship between these concepts as a general trend in technological change.

The Relationship Between Hardware, Software, and Orgware in Organized Technology (From Dobrov, 1979:600)
Orgware. The notion of orgware is understood as intending to represent the pattern (or mode) of organizational operations that is designed to achieve the optimal combination of human, technical, and methodological resources required (and, presumably, available) to get the job done; and intended to ensure optimal interaction between the system and other systems of a different nature. It is expected that such optimization will take into account every conceivable contingency, including the frequency with which innovation is likely to be required.

Now, Dobrov's conceptualization of "organized technology" might be seen as analogous to 'process' in systems terms; and to encapsulate all the systemic inputs associated with industrial enterprise (as listed in Table 6.2) in the form of hardware, software, orgware, and thruput—as illustrated in Table 6.3.

Outputs. Whatever the process (or organized technology) used to produce the system's output, the final product is exported into the environment, and the system re-energized by renewed importation of energy. It is worth noting that there are sometimes social system outputs for which no re-energizing (input) role can be found. For, along with its intended end products (e.g. nuclear energy), a system (e.g. a nuclear power plant) will produce unintended—and sometimes, undesirable—'waste' products (e.g. radioactive materials). If no other system can find a use for such wastes (i.e. they cannot anywhere be successfully
Table 6.3
The Industrial Inputs of "Organized Technology"

<table>
<thead>
<tr>
<th>INDUSTRIAL INPUTS</th>
<th>ORGANIZED TECHNOLOGY</th>
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<tbody>
<tr>
<td>Matériel Inputs</td>
<td></td>
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<tr>
<td>PLANT</td>
<td>HARDWARE</td>
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<tr>
<td>TOOLS</td>
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<tr>
<td>Information Inputs</td>
<td>SOFTWARE</td>
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<tr>
<td>TECHNICAL</td>
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<tr>
<td>('know-how')</td>
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<tr>
<td>PROGRAM</td>
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<tr>
<td>FEEDBACK</td>
<td></td>
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<tr>
<td>Energic Inputs</td>
<td>ORGWARE</td>
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<tr>
<td>PERSONNEL IN</td>
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<tr>
<td>WORK ROLES</td>
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<td>Administrative Inputs</td>
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<tr>
<td>ORGANIZATIONAL</td>
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<tr>
<td>MANAGEMENT</td>
<td></td>
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<tr>
<td>Raw Material Inputs</td>
<td>THRUPUT</td>
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<td>SOMETHING CHANGED</td>
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<td>BY PRODUCTION</td>
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<td>PROCESS TO</td>
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<td>FORM OUTPUT</td>
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</table>
re-cycled as system inputs) they end up getting 'dumped' into the environment.

The products of industrial workplaces are exchanged in the marketplaces of the environment for money, which is used to purchase the inputs needed to continue the transformation process. Unless the cycle of activities is thus continued, the "chain of events" which constitutes the characteristic organization of systemic structure is broken, and the social system is no more.

Tendency toward differentiation and elaboration. In the course of the system's exchange process there is a tendency for the system to retain some of the energy (or order) which it has produced, so that it may have a buffer against 'rainy days.' As a consequence of this and certain internal dynamics, the open system tends toward a pattern of growth and expansion. This growth factor manifests itself in the development of increasingly differentiated parts.

The development of more and more highly specialized functions (such as Customer Services, Planning) represent examples of such differentiation in the industrial workplace. Again, it might be assumed that differentiation of functions increases in the industrial workplace in conjunction with increased technological (and environmental) complexity, and with an increased scale of economic operation. It might also be assumed that as a system expands and differentiates its functions into separate sub-system parts, it will experience certain systemic change.
'Change' in systems. In discussing the issue of change in systems, Watzlawick, Weakland, and Fisch (1974, 1980) call upon the theory of groups, and the theory of logical types (as drawn from the field of mathematical logic) to provide a conceptual framework that is most insightful.

Without going into the details of their argument, they present a case for the existence of two kinds of change. The first, relating to the theory of groups, refers to changes that can only occur within the group—where there may be changeability in process, but where there is invariance in outcome (as, for example, with the ongoing operational changes made by a manufacturing plant in its efforts to maintain an optimal [steady] state). This kind of change, where "plus ça change, plus c'est la même chose" ("the more things change, the more they remain the same") they label first-order change.

The second kind of change—which relates to the theory of logical types—signals a change in the kind of change that has characterized the system's previous efforts to maintain stability. Labelled second-order change, it is the kind of change that transcends a given system or frame of reference, for it "entails a shift, a jump, a discontinuity or transformation" (Watzlawick et al, 1974:9).

Watzlawick et al use the case of an automobile with a conventional gear shift as an analogy to illustrate the difference between first and second-order change:
The performance of the engine can be changed in two very different ways: either through the gas pedal (by increasing or decreasing the supply of fuel to the cylinders), or by shifting gears. Let us strain the analogy just a little and say that in each gear the car has a certain range of "behaviors" (i.e. of power output and consequently of speed, acceleration, climbing capacity, etc). Within that range (i.e. that class of behaviors), appropriate use of the gas pedal will produce the desired change in performance. But if the required performance falls outside this range, the driver must shift gears to obtain the desired change. Gear-shifting is thus a phenomenon of a higher logical type than giving gas, and it would be patently nonsensical to talk about the mechanics of complex gears in the language of the thermodynamics of fuel supply.

(Watzlawick, Weakland and Fisch, 1974:9)

This analogy of the gear-shift car might be stretched even further, and used—as follows—as a metaphor for illustrating the difference between first and second-order change in the industrial workplace. The performance of a manufacturing plant can be changed in two very different ways: either through the existing organized technology (by increasing or decreasing the supply of 'coded' inputs), or by shifting to a new level of organized technological complexity (i.e. by changing the whole system of production from unit/small batch to mass production, or from large batch/mass production to production through process technology).

To make organizational changes within the constraints imposed by a given organized technology is to re-formulate allowable orgware options\(^4\), and to engage in

\(^4\) It will be recalled that Woodward found a greater degree of organizational flexibility in firms using mass production than those engaged in either unit/small batch or process technology.
first-order change. Such reformulations do not, however, constitute real structural change; for the structure (or orgware) of a viable (systemic) business operation is required to match the mode of production technology involving the hardware and software in use.

To make organizational changes beyond the constraints imposed by a given organized technology is to re-design the system. This would involve the re-coding of hardware, software, and orgware inputs, and the throughput materials to be used; it is to engage in second-order change.

This double-layered conceptualization of systemic change provides an 'ideal' framework within which to

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5 According to Watzlawick, Weakland and Fisch (1974:11), "when we talk about change in connection with problem formation and problem resolution we always mean second-order change."

6 Buckley (1967) uses the terms morphostasis and morphogenesis in discussing such changes in the context of sociocultural systems:

[Morphostasis] refers to those processes in complex system-environment exchanges that tend to preserve or maintain a system's given form, organization, or state. Morphogenesis will refer to those processes which tend to elaborate or change a system's given form, structure, or state. Homeostatic processes in organisms, and ritual in sociocultural systems are examples of 'morphostasis'; biological evolution, learning, and societal development are examples of 'morphogenesis.'

(Buckley, in Lockett and Spear, 1980:39)

He notes that conserving, deviation-counterbalancing processes, such as negative feedback have come to be "emphasized in the literature at the expense of structure-elaborating, deviation-promoting processes that are central to an understanding of higher level systems such as the sociocultural" (p.39).
locate the three forms of organized technology found in the Woodward schema. For, the intra-organizational exchanges that Woodward found characterized each form of ('unit,' 'mass,' and 'process') technology can be seen as manifestations of the first-order (ex)changes required to maintain the structural status quo of that "system"; and the pattern of structural differences that Woodward found among the forms might be seen as manifestations of the second-order change that would be required to shift a social system from its status quo to a new and more complex form of organized technology.

Given, then, this understanding of the common characteristics of open systems—as they might relate to the organizational characteristics of industrial workplaces (found in the Woodward schema)—we can proceed to the task of projecting a systemic pattern model of the industrial workplace.

A Systemic Pattern Model of the Industrial Workplace

The proposed general (supra) system framework for illustrating the pattern of systemic relationships to be found within each of (Woodward's) three different forms of organized technology, and the pattern of systemic relationships to be found among them, is shown in Figures 6.2 and 6.3.

In order to illustrate the difference in logical type between these two sets of relationships, Figure 6.2
represents the model in a double-faceted form. The organizational elements of an industrial workplace (i.e. the systemic inputs that combine to form the ingredients of some particular form of organized technology) are shown on one facet; and the three forms of organized technology found in today's industrial workplace (and labelled by Woodward as 'unit,' 'mass,' and 'process' technology) are symbolized as discrete (i.e. discontinuous) stages along the continuum of technological complexity, which is represented by the other facet.

### Figure 6.2

**A Double-Faceted Pattern Model Of The Industrial Workplace**

In Figure 6.3, the model is projected onto a single plane in order to overcome the limitations imposed by page
Figure 6.4
Systemic Pattern Model of the Industrial Workplace
size. However, while this format allows for some of the relational aspects contained within each form of organized technology to be annotated by way of illustration, most of the relevant detail is noted in the preceding sections. The systemic pattern model of the industrial workplace illustrated in Figure 6.2 is to be taken, therefore, as providing merely a thumbnail sketch of the model as it is to be understood from the foregoing.

This model clearly demonstrates that the nature of the implications associated with 'seeing' the school as an industrial workplace is dependent upon the nature of the organized technology that the viewer associates with schooling. For, the viewer who 'sees' schooling as a unit/small batch enterprise will view both the problems, and the solutions to those problems, in quite a different way from the viewer who 'sees' schooling as either a mass production, or a continuous process, enterprise. However, since the viewpoint of interest, here, is that contained in the Report "A Nation at Risk," it is the type of organized technology that the Commissioners associate with schooling that is the subject of our examination.

From the evidence, a case can be made for considering each of the Commission's recommendations as being aimed at increasing quality control i.e. as aiming to gain more control over:

(a) the quality of plant management (more prescription for process content),
(b) the quality of operational-time management (more productive use of time in workplace, e.g. more time on task),

(c) the quality of staff (teachers to be recruited from the academically more able, and to be better trained, treated, and remunerated),

(d) the quality of output (higher standards for acceptance of output at each stage of production [i.e. at each grade level] as well as of end-product [i.e. of graduates]).

As has been seen, such managerial concern over issues of control is singularly characteristic of mass production enterprises. It would, therefore, seem reasonable to suppose that the Commission's framing of the problem of schools rests on a generative metaphor of "the school as an industrial workplace with a mass production mode of organized technology."

Now, the extent to which such a problem frame might be deemed appropriate, and as having utility for policy purposes, will be judged according to the degree of correspondence that can be found between the organized technology of mass production and the organization of schooling. In preparation for such examination (in the next chapter), the implications suggested by (the elaborated assumptions of) the metaphor are reviewed in the next section.
IMPLICATIONS OF THE METAPHOR

With the aid of the systemic pattern model of the industrial workplace, the analogical elements that are implied in the metaphor of an industrial workplace with a mass production mode of technology can be set out under the rubric of 'hardware,' 'software,' 'orgware,' and 'thruput,' as illustrated below, and in the annotated schema shown in Figure 6.4.

Mass Production Hardware: Plant and Tool Matériel.

It might be said that the industrial workplace classified by Woodward (1958) as having a mass production mode of technology will be characterized by a scale of economy that is aimed at maximizing return on a considerable capital investment in plant and (modifiable) automatic machine tools, and on substantial day-to-day operating costs. Return on investment will be maximized through increased rationalization of jobs, and plant use.

Mass Production Software

Operating procedures. Operating procedures will tend to reflect the residue of "scientific management" theory, as expounded by Frederick Taylor (1911). Accordingly, the work of transforming raw material into finished goods will be broken down into discrete activities, and a "one best way" adopted as the standard method for performing each. In this way, it will be possible for simpler tasks to be
Plant involves considerable capital investment.
Machine Tools—automatic and modifiable.

'Blueprint' for Operating Procedures
--jobs broken down to simplest possible tasks,
--workers require least necessary skill,
--'one best way' established for doing each job
--raw material 'treated' as it moves from worker to worker along an assembly line.

Feedback on Quality of Output
--performance closely monitored by supervisors,
--output tested and graded against standards,
--products failing tests recycled or thrown out.

Structure
--relatively independent managerial functions,
--high degree of job specialization,
--R&D function likely away from production plant (also Finance & Executive in large enterprises)
--Development precedes Production

Production central focus of organization
--always working to increase efficiency (i.e. to produce more goods for less time & lower costs)

Workers expected to:
--keep up with pace of assembly line work-flow,
--work diligently without pause (or talking),
--stop & start work at signal from bell/buzzer.

Workers rewarded for time spent on job, and/or for amount of work done against a standard.
Managers/supervisors rewarded for keeping control

Integral-Type Raw Material
--can't be too variable or unpredictable,
--graded and sorted into large homogeneous 'batches', ready for assembly line processing.

Figure 6.4
Implications of the Metaphor
repetitively performed by (relatively unskilled) workers having the least necessary skill requirements. Workers will be expected to manipulate, or apply some 'treatment' to the raw material that will likely be brought to them at their work station along an assembly line.

**Feedback mechanisms.** In order to control for variance in output, worker performance will be closely monitored by supervisors or managers who are responsible for the smooth flow of operations. And, tests for quality control will be administered at each critical stage in the production process, as well as at the end. Output failing to meet acceptable standards will either be recycled to correct for error, or branded as inferior standard "seconds", or scrapped (and dumped somewhere outside the system) as waste.

**Mass Production Orgware**

Operations will be organized according to what is believed will achieve the optimal combination of human, technical, and methodological resources for mass production. This mode of organization will be characterized by a high degree of differentiation between, and specialization within the basic managerial functions.

**The structure of inter-related functions.** There is considerable independent activity between functions in mass production. This is particularly marked where, for example in large organizations, such highly specialized functions as
"research and development," "finance," and "top management" are housed quite separately from the production plant(s). And, even within the purview of the production plant itself, specialized functions will likely be conducted in distinctly separate areas, and require little day-to-day communication between departments.

It will be recalled that in mass production the function of development precedes that of production, and that production is central to the success of the enterprise. Management will, accordingly, focus its attention on increasing the efficiency of the administration of production, and on progressively reducing unit costs. To this end, innumerable permutations of production arrangements are likely to be tried (e.g. experimenting with different batch and buffer sizes, working hours and length of shifts, means of motivating workers to increase their productivity, etc). The objective throughout will be to produce the maximum number of standardized unit goods, in the shortest time, and for the lowest unit cost, possible.

Expectations of workers. Workers will be expected to concentrate their undivided attention on the job in hand; this means not leaving their work stations unattended, and not slowing down their pace of work by engaging in any distracting activities—such as talking with neighbouring workers. The pace of assembly-line work will be set by the pace of the machinery—a pace over which the workers will likely have little or no control. Bells or buzzers will
signal starting, stopping and break times for workers.

**Worker remuneration.** Worker remuneration will be on the basis of an "hourly rate" for hours spent on the job, and/or on the basis of a "piece rate" for the number of batches of (acceptable) work done. Managerial and supervisory staff will be remunerated by a fixed salary, which may be made up with increments for special responsibilities. Such staff members will be contracted to manage (i.e. keep tight control over) certain areas of responsibility, and will be expected to put in extra (unpaid) hours in the fulfilment of their contractual obligations.

**Mass Production Thruput**

Before it is taken up into the (mass) production cycle, the raw material thruput will be pre-sorted and graded according to its nature and quality. It will then be sorted into large homogeneous "batches", and set along a sequenced path of cyclic transformation activity.

**CHAPTER SUMMARY**

This chapter has sought, through the development of a pattern model of the metaphoric term "industrial workplace," to elaborate the assumptions that analogically flow from it. The model so developed recognizes that the pattern of organizational relationships found in workplaces varies--as suggested by the findings of the Woodward studies (1958, 1965, 1970)--in accordance with the type of
technology used. Three sets of such organizational relationships were identified by Woodward (1958): sets associated with the changed situational demands of production technology as it increases in complexity from 'unit,' to 'mass,' to 'process' technology.

The pattern model of the industrial workplace was, accordingly, conceptualized in terms of Woodward's schema; and was (metaphorically) 'seen' as a general (supra) system comprising three special (case) systems associated with 'unit,' 'mass,' or 'process' production technology. Each of these patterns was, commonly, seen (in systemic terms) as possessing an 'organized technology' (Dobrov, 1979) comprised of hardware, software, orgware, and thruputs. Change from one type of organized technology to another was seen as an example of second-order (or real) system change, and as requiring concomitant changes in all its constituent (hardware, software, orgware, and thruput) parts.

It was noted that, according to such a model, the nature of the implications associated with 'seeing' the school as an industrial workplace was dependent upon the nature of the organized technology that the viewer associated with schooling (e.g. unit/small batch—private tutor/school; mass production—graded, lock-step, schooling; continuous flow/process—ungraded, continuous progress schooling). However, since the Commission findings connoted a graded, lock-step view of schools, analysis was focussed on elaborating the assumptions of a mass production workplace.
Chapter 7

EXAMINING THE POLICY-RELATED UTILITY OF THE PROBLEM FRAME USED IN THE CASE OF SCHOOLS

It is useful to perceive schools as workplaces. They provide the transition between the family and paid work. It is not surprising to find that the character of life in schools is affected significantly by the values and organizational features of the world of work.

(Wirth, 1980:1)

... policy makers and many school reformers ... continue to assume that schools are like factories. More input in the form of courses, rules and regulations, hours or even materials will result in greater output. If the output is not judged sufficient, more of the same will do the trick.

(Goodlad, 1984:7)

In this chapter, the generative metaphor assumed to have been used by the authors of the Report, "A Nation at Risk," to frame the problem of schools is subjected to examination. This examination follows the flow-chart-type (yes/no directional) format provided by the procedural framework devised in Chapter 3 for this purpose, and shown here as Figure 7.1. Such examination involves a sequential assessment of the plausibility, appropriateness, and utility of the problem frame—with an alternative directional sequence to accommodate a negative assessment at any stage in the process (as outlined in Chapter 3 under, "Examining the Policy-Related Utility of the Problem Frame").
Figure 7.1
Procedural Framework for Examining a Problem Frame
Application of this procedural framework is demonstrated here, and in the next chapter, in respect to the case of schools. It is used in this chapter to examine the problem frame that sees "the school as an industrial workplace with a mass production mode of technology"; and—since appropriate correspondence is not found to obtain in respect to the change properties of this metaphor—it is re-employed (in Chapter 8) in the service of examining a restructured version of the problem frame.

PLAUSIBILITY OF THE PROBLEM FRAME

Evidence to Support the Researcher's Interpretation

Critiques of the reforms proposed in the Commission Report, "A Nation at Risk," certainly contain sufficient evidence to support the researcher's interpretation that the problem of schools has been framed (in this, as well as in other studies) in such a way that the organization of the school is 'seen-as' the organization of a mass-production type workplace.

Goodlad (1983b:466), for instance, makes explicit reference to this underlying (generative) metaphor when he suggests that we have been "committed to the factory model without feeling the need to validate it"; he complains that,

... policy makers and many school reformers ... continue to assume that schools are like factories. More input in the form of courses, rules and regulations, hours or even materials will result in greater output. If the output is not judged sufficient, more of the same will do the trick.

(Goodlad, 1984:7)
In a similar vein, Ohanian (1985) prefers a teacher's response to the reform proposals by stating,

> We teachers must not be railroaded into pretending that we should be responsible for managing the timing and flow of education as efficiently and regularly as assembly-line workers produce toasters. We don't have to jump everytime someone else rings a bell.  
> (Ohanian, 1985:319)

And, the President of the American Federation of Teachers asserts that, "teachers are neither interchangeable workers on a factory assembly line nor flagpole climbers" (Shanker, 1985:314).

In noting the laws (stemming from the reform proposals) that have been devised to govern teacher selection, training, and evaluation; course content, time allotment, testing, and grade-level standards; Cuban observes that:

> Policy makers who draft such laws assume that teaching is like working in a factory. Once incentives are in place (e.g. $50 a head for each student in schools in which test scores rise), once sanctions are made explicit (e.g. removal of ineffective teachers), and once expected outcomes are made clear (e.g. gains on the [California] Assessment or on the Scholastic Aptitude Test), teachers will push buttons and pull levers to raise student achievement.  
> (Cuban, 1984:214)

And Cuban concludes (1984:213) that "State-level policy makers assume that teaching is closer to making cars than to carving marble."

Doyle and Hartle (1985) note that most of the proposed measures for school reform call for the action and
commitment of state officials—rather than of the teachers whose classroom activities are the ultimate object of reform. And they explain why they think this to be so by spelling out the analogy undergirding the model that they see as having, historically, shaped our way of reforming the organization of schooling. As can be seen, the analogy they construct in accordance with this model is 'in keeping' with that which is implicit in the metaphor of the school as a workplace with a mass production mode of technology:

The impulse to reform schools from the top down is understandable; it is consistent with the history of management science. The explicit model for such reform was the factory; Frederick Taylor's scientific management revolution did for the schools the same things that it did for business and industry—created an environment whose principal characteristics were pyramidal organization, specialization of function, and division of labour. The teacher was the worker on the assembly line of education; the student, the product [but first, the raw material]; the principal, the foreman; the superintendent, the chief executive officer; the school trustees, the board of directors; and the taxpayer, the shareholder.

(Doyle and Hartle, 1985:24)

**Evidence to Support the General Acceptability of the Frame**

*Its position as the dominant metaphor.* There is also evidence to suggest that the metaphor of the mass production workplace provides a generally acceptable way of framing the problem of schools because it would seem to enjoy good currency as a 'model' for the organization of schools. Indeed, it might well lay claim to being the dominant metaphor for the organization of education for the
world at large.

In 1975, for example, an O.E.C.D. External Examiners' Report on Educational Policy in Canada devoted an entire appendix (Appendix B) to a discussion of the ways, and the extent to which the Examiners felt Canadian schools had moved towards a traditional industrial concept of the organization of educational services. Particularly noted were similarities with respect to "traditional hierarchical organization, often with paternalistic features . . . division of labour and responsibilities combined with increased specialization" (p.19).

Nearly inevitably the milieu will be extremely competitive, even when the most obvious symbols of success or failure are absent . . . If we add to this the practical and human complexities of enormous school factories as seen through the eyes of the child, it provides a picture of a rather depressing social milieu . . . (emphasis added)

(O.E.C.D. Report, 1975, paragraph 8:19)

Literature references. Congruent with this image are numerous references in the literature on schools to the factory-like organization of schooling. The following observations of Ravitch (1983), Wallin (1978), and Fraley

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1 While the data of interest in this study focus on the organization of schooling from the North American (Canadian and United States) perspective, accounts (from such sources as the "Studies in Educational Administration" of the Commonwealth Council for Educational Administration; and the "Reviews of National Policies for Education" of the O.E.C.D. [1979]--in particular, that of the O.E.C.D. Secretariat [1977]) of the educational policies and practices of various other countries suggest that the metaphor of mass production provides a globally accepted 'model' by which educational administrators and national level policymakers conceptualize the organization of mass education.
and Vargas (1975) provide just a small sample of such:

. . . some present schools, which are as vast and impersonal as factories.
   (Ravitch, 1983:320)

. . . students, move in large groups in a manner much like ingots in a smelter or strawberries in a cannery. The conveyor belt for students is activated by the sounding of a bell or buzzer. Teachers are expected to be available at those instances to 'pour the molten aluminum' or to 'cull out damaged berries' (to borrow terms from other mass production enterprises), and to do so in the time frame allotted, and to stop when the next signal is given.
   (Wallin, 1978:15)

It should no longer be acceptable to batch-process students in large groups without regard to the complexities of their individual differences.
   (Fraley and Vargas, 1975:7)

It might also be noted that the idea of viewing the organization of education from a 'technological' stand-point is not a new one in the field of educational administration research in Canada. Allison (1980:151), for example, views the process of in-class teaching as akin to Woodward's unit or small batch technology; and suggests that "the tasks and techniques used to effect the serial progress of students [through the curriculum] appears to specify a continual process type of technology." And, interestingly, Allison conceptualizes the "raw material" of schools as the knowledge presented by teachers to the students in classes.

Kelsey's (1973) conceptualization of school technology, on the other hand, was based on Perrow's premise that "people" constitute the raw material of
people-processing organizations (such as hospitals and schools). And Perrow (1970), himself, used examples of different kinds of school organization to demonstrate his belief that the perception held about the nature of the raw material used by an enterprise will determine the kind of technology it will employ.

*New discoveries in systems theory.* In presenting the theory of dissipative structures (i.e. a radically new theory of self-organizing, self-regulating systems) as a new (systems-related) metaphor for illuminating long-standing problems and issues in education, Sawada and Caley spell out the analogy inherent in (what they see as) the dominantly-held metaphor for today's education:

The dominant metaphor for today's education is the Newtonian Machine: The school is a more or less well oiled machine that processes (educates?) children. In this sense, the education system (school) comes complete with production goals (desired end states); objectives (precise intermediate end states); raw material (children); a physical plant (school building); a 13-stage assembly line (grades K-12); directives for each stage (curriculum guides); processes for each stage (instruction); managers for each stage (teachers); plant supervisors (principals); trouble shooters (consultants, diagnosticians); quality control mechanisms (discipline, rules, lock-step progress through stages, conformity); interchangeability of parts (teacher-proof curriculum, 25 students per processing unit, equality of treatment); uniform criteria for all (standardized testing interpreted on the normal curve); and basic product available in several lines of trim (academic, vocational, business, general). Is this reminiscent of Fords, Apples, and Big Macs?

(Sawada and Caley, 1985:14-15)

**Conclusion**

Given, then, the foregoing documentary samples, it might be concluded that there is, indeed, sufficient
evidence to support a "YES" response to the (flow chart) question of the plausibility of the metaphor of "the school as a mass production type workplace" as a problem frame for 'making sense' of that which is troublesome about schools. Accordingly, the next question to be addressed is that concerning the appropriateness of the problem frame—as may be recalled in reference to that part of the flow chart reproduced in Figure 7.2.

**Figure 7.2**

*From Examining The Plausibility to Examining The Appropriateness of The Problem Frame*

**APPROPRIATENESS OF THE PROBLEM FRAME**

*Correspondence Between the Internal Properties of the Metaphor*

A format was developed in Chapter 6 for setting out the internal properties of the vehicle of the metaphor (in this case, an industrial workplace with an organized technology of mass production) as the implicitly held analogical elements of the metaphor (of school as such a
workplace). This framework (illustrated in Figure 6.5) is here reproduced (in the form shown in Figure 7.3) to provide a template for mapping what might be seen as the (analogically) corresponding internal properties of the subject of that metaphor (i.e. the school).

Because the internal properties associated with the vehicle of the metaphor were derived from a pattern model of industrial organization based on a technological imperative (after Woodward, 1958), they were spelled out under the rubric of 'hardware,' 'software,' 'orgware,' and 'thruput.' For an analogical correspondence to be found, therefore, between the internal properties of the vehicle of this metaphor and the internal properties of its subject, the salient features of "the school" are required to be 'seen' in terms of these dimensions of organized technology as they might apply in an educational context. The salient features of schools are, accordingly, categorized in terms of "hardware," "software," "orgware," and "thruput" as explicates below, and in Figure 7.3.

**Hardware.** In the educational setting, hardware might be seen—as in the industrial sector—as incorporating plant and tool matériel.

The trend over the past several decades to (increasingly) rationalize capital expenditures on educational plant/equipment by building fewer, but larger schools is well known. That the economic justification upon which such a policy is based stems from societal experience
### School System Organization

**School Plant** -- large, well-equipped complex.

'Automatic' (modifiable) Tools -- textbooks.

**Operating Procedures**
- Curriculum broken into sequential units (delivery paced)
- Teachers become subject and/or Grade level specialists,
- Teaching methods 'routinized' thru normative practice,
- Students 'treated' to curriculum instructions as they move from one subject teacher (& Grade) to another.

**Feedback on Quality of Output**
- Ongoing student progress monitored by teachers' tests,
- Class and school performance thru standardized tests;
- Failing students rejected entry to next level of system.

**Structure**
- Subsystem functions of system are "loosely coupled,"
- Highly specialized services at school & district levels
- Curriculum developed outside of school plant, at higher system level (also Administration, Finance, etc)
- (curriculum) Development precedes (course) Production.

**Production Function of School Central to Organization**
- System preoccupation with efficiency (i.e. to increase student performance in less time & for lower costs).

**Teachers Expected To:**
- Get through the curriculum within the specified time,
- Watch that they and their students spend 'time on task',
- Deliver "good" lessons within constraints of timetable.

**Teachers Remediated According to Qualifications and Years of Experience, and (as if they were managers or supervisors) for supervising and controlling students.**

**Whole Person of Student**
- Diagnostically tested for academic ability/"readiness"
- Graded and sorted into an appropriate class on basis of age and ability for 'streamed' progress thru the system.

### Organized Technology

**Mass Production Technology**

**HARDWARE**
- Plant involves considerable capital investment.

**SOFTWARE**
- 'Blueprint' for Operating Procedures
- Jobs broken down to simplest possible tasks,
- Workers require least necessary skill,
- "one best way" established for doing each job
- Raw material 'treated' as it moves from worker to worker along an assembly line.

**ORGWARE**
- Feedback on Quality of Output
- Performance closely monitored by supervisors,
- Output tested and graded against standards,
- Products failing tests recycled or thrown out.

**THRUPUT**
- Structure
  - Relatively independent managerial functions,
  - High degree of job specialization,
  - R&D function likely away from production plant (also Finance & Executive in large enterprises)
  - Development precedes Production

**Production Central Focus of Organization**
- Always working to increase efficiency (i.e. to produce more goods for less time & lower costs.

**Workers Expected To:**
- Keep up with pace of assembly line work-flow,
- Work diligently without pause (or talking),
- Stop & start work at signal from bell/buzzer.

**Workers Remunerated for Time spent on job, and/or for amount of work done against a standard.**

**Managers/Supervisors Remunerated for keeping control**

**Integral-Type Raw Material**
- Can't be too variable or unpredictable,
- Graded and sorted into large homogeneous 'batches', ready for assembly line processing.

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**Implications of the Metaphor "School as A Mass Production Workplace"**
with the principle of "economy of scale" in the realm of mass production manufacture has, perhaps, been less well appreciated. It would certainly seem, as noted by the OECD Examiners of the Canadian school system (in 1975), that its appropriateness as a model for the educational enterprise has (at least, until recently) gone un-questioned.

The conviction that the largest possible number of specialist "services" is necessary, and that children have to be grouped in accordance with specific treatment criteria calls for very large school units. If for various reasons such units cannot be achieved, most essential expert decisions are localised at a higher organizational level, for example, within the school district administration. The principle of "economy of scale" is applied, without any questioning of the validity of the underlying assumption about organisational "technology".

(OECD Examiners, 1975, paragraph 7:19)

Development from the one-room village schoolhouse to the very large secondary school complex of expensively equipped special function areas (for such things as industrial, business, home economics, drama, and physical education) might well be identified as a development in school plant design analogous to that which would be required in the industrial sector to house the new, highly specialized, machine tools (and job functions) associated with a shift from small batch to mass production technology. However, a closer examination of the way in which the new genre of machine tools housed within the 'labs' and 'shops' of our secondary school plants (e.g. microwave ovens, hoists for auto-body repairs, lathes, electronic word
processors and computers) are used in the teaching/learning situation suggests that they serve rather to further curriculum 'content' than pedagogical 'process'\(^2\).

Indeed, a closer look at what goes on in the 'labs,' 'shops,' and classrooms of our school plants suggests that the tool most commonly, and frequently used by teachers to apply their curriculum 'treatment' to students is not a piece of machinery—withstanding the promise offered by such technological innovations as radio, film, audio-tapes/records, television, and video. It is, in fact, the prescribed textbook.

Now, while it may be difficult to equate school textbooks with the (modifiable) automatic machines that characterize mass production hardware in the industrial sector, it is not so hard to 'see' how the (mass produced) textbook makes possible the delivery of a regulateable, standardized 'treatment' to large batches of (raw material)

\(^2\) The point here is that when new 'machines' are brought into the schools, it is largely for the purpose of having students learn about them, and how to use them, in preparation for their lives outside school. The machine in question thus becomes central to the content of the courses of instruction that are developed for this purpose—as, for example, in the case of computer-related courses designed to provide students with "computer literacy" and "computer programming" skills. In some (very few) instances—as in the case of electronic calculating machines and word processors—the machine might be used within the school as a tool to assist the students (as well as teachers) in the production of learned/learning materials. Neither of these uses equates with the application of technology to the means of production, itself, (i.e. the teaching/learning process) of schools—as would, say, the application of computers in the process of what has been labelled Computer Assisted Instruction (CAI), which would provide learning through the computer hardware and software.
students according to a scale the economy of which permits of mass education. Certainly, as observed by Goodlad in his (1983) large-scale study of schooling (in the U.S.), "the fit between the intended curriculum of textbooks and the taught curriculum of the classroom [is] rather neat" (p.468).

Software. The 'fit' between the theory of scientific management and the way it is manifested in the operating procedures of schools is described by the OECD Examiners:

The "ideal" school should have specialist services in such fields as various forms of diagnosis of children, test preparation and interpretation, psychological guidance and counselling, development of curriculum and curriculum materials, documentation and library services, use of audio-visual materials, health services, various forms of learning difficulties and special handicaps, social and recreational activities, etc. The list could easily be made longer. In principle, such functions are assumed to be a service to the teacher in performing his/her job. In practice, however, the authority relationship between the specialist and the ordinary teacher is such that the specialists take over most relevant decisions concerning both the children and the functions of the ordinary teacher. There is little left for a teacher to do except to be with the children and to deliver pre-programmed teacher behaviours. (OECD External Examiners' Report, 1975, paragraph 2:19)

In addition to the hierarchical layering of specialized services 'above' the decision-making level of the classroom teacher (as described by the OECD Examiners), it can be seen that the work assigned to a particular teacher tends also to become specialized (according to subject in the secondary school, and to Grade at the elementary level). Moreover, the delivery of curriculum to
students is further 'teacher-proofed' by means of detailed curriculum guides. These guides may dictate a 'one best way' methodology that requires the teacher to adhere to a certain set of procedures (which may drastically change over a period of time as theories of how to teach a certain subject or skill--e.g. reading--fall in and out of favour with the decision-making specialists). They may even attempt to 'pace' the delivery of curriculum, by providing benchmark dates by which certain aspects of a course (or textbook) should have been covered.

The work of teaching is further "routinized," as noted by Sykes (1987:20), by policies (such as those called for by the Commission) that increase the imposition of outside testing. [It is of interest to note, in this connection, that the reform proposals have called not only for the outside evaluation of student performance, but for the outside testing of teacher competence--a step that could be seen as analogous in the industrial sector to an admission that the job (of teaching) cannot be sufficiently reduced and routinized to render it as (teacher) worker proof as had been previously supposed.]

It certainly does not tax the imagination to see students, as raw material, being 'treated' by respective teacher-workers as they move [as if on a conveyor belt] from classroom to classroom during the course of weekly/semester/term/annual cycles of school (production) activity. For, as observed by the OECD Examiners:
The child is handled as a piece of raw material, the properties of which have to be identified by the proper experts, and the proper treatment to be measured out according to similar expert prescriptions.  

(OECD Examiners, 1975, paragraph 6:19)

Nor is it hard to see how the application of standardized tests for the measurement of student progress might be equated with the quality control measures used in the industrial workplace to provide feedback on the quality of output. For, as noted by Smith (1981):

... many people think of public education as a production-line process for turning out educated, productive citizens. Under this view it is easy to think of evaluation as quality control and to look to engineering for models of how to perform evaluation.  

(Smith, 1981:57)

An example of such thinking is provided by Resnick and Resnick in an article about the maintenance of educational standards:

The prevalence in some parts of the country of a "cafeteria" curriculum, in which short and optional mini-courses can be used to meet requirements in areas such as English and social studies, has created a situation in which there is very little quality control over the total package of a student's education-- . . . (emphasis added)  

(Resnick and Resnick, 1985:9)

According to Salganik (1985), when tests are used to determine whether students should receive diplomas or whether program quality is adequate, they are used as "output controls" in the school system. (And she explains [pp.607-610] why the recent move to use standardized test scores for this purpose has been accepted, if not acclaimed, by everyone concerned.)
That students who fail the quality (output) control tests might, like their industrial counterparts, be thought of as 'rejects' is evident in an observation made by Cross. She suggests (Cross, 1984:171) that the problem with improving the quality of our educational institutions by getting rid of problem learners (either by not accepting, or not certifying them—as would follow from implementation of the reform proposals) "is that the society that supports this superficially excellent educational institution now has on its hands the educational rejects" [emphasis added].

Orgware. As already noted, the school might be seen as (a branch-plant) fulfilling the production function of the (state or provincial) educational enterprise. In this view, pupils are treated (as is raw material) to the educational process applied by the teachers (as assembly line workers). What they are 'treated' with is a system-prescribed curriculum that has been developed independently of the teachers who are actually engaged in the production process going on in the schools' classrooms. Indeed, the basic managerial functions of Development and Production (as described by Woodward, 1958) can be identified in the context of (at least public) education as functions of quite separate jurisdictional responsibility.

Schools are held responsible for the production function of education (a term used by Murphy and Halinger [1984:10] to denote such aspects of "school technology" as "curricular coordination, use of student time, and student progress through school").
As far as Woodward's third basic managerial function of Marketing is concerned, it is quite evident—from the lack of positive publicity, public relations, and advertizing about the good things schools contribute to their communities—that this function is (or, at least, has been) missing from the structure of the public school system. There are, however, plenty of other inter-related and highly specialized task functions that go to make up the structure of the educational enterprise (from those concerned with overall administration, finance, policy and curriculum development; through those concerned with providing consultative services to special-need groups; to those concerned with providing delivery of specific curriculum at the classroom level). This structure has been described (Weick, 1976) as "loosely coupled"—a descriptor which might well be said to characterize the relatively independent sub-system functions associated with the structure of mass production organization.

The sequencing of the basic managerial functions of Development (of curriculum) before Production (of coursework) is also consonant with that found in organizations having a mass production mode of technology.

4 [Contd.] Some higher authority in the educational system (whether it be located at the district, regional, state, provincial, or national level) is held responsible for putting together curriculum development teams or committees, for obtaining 'political' acceptance of their work, and for conducting the administration necessary for implementation of the finalized curriculum 'packages.'
That the Production function (i.e. the course work done in the schools) is central to the success of the educational enterprise would seem to be self-evident. However, interest in discovering the characteristics of successful—i.e. effective—schools is a fairly recent phenomenon; and it would seem that, heretofore, concern for the 'productivity' of schools has rather tended to focus on achieving efficiency than success.

Analogical correspondence between the concept of productivity (as the most of a standardized product for the least expenditure of time, effort, money) in the industrial workplace and its application in the educational context is evident in a report found in a recent newsletter of Phi Delta Kappa about a new monograph titled, "Improving the Productivity of Teaching: 125 Exhibits":

Ellson summarizes the findings of research on a variety of techniques, including conventional instruction, content modification, and programmed learning, among others. The research reviewed in this monograph covers the entire range of subjects and levels of instruction in both technical training and general education. Each technique was found to at least double one or more aspects of productivity; for example, pupil performance, cost, instructional time, etc.

(News, Notes and Quotes, Spring 1987, 31:3)

There can be little doubt but that the plethora of so-called 'innovative' organizational arrangements that school administrators have tried over the years (e.g. "open area team teaching," "modular flexible timetabling," "semester/trimester/quarter timetabling," "extended day") reflects the flexibility characteristic of mass production orgware.
Concomitant with this focus on the "efficient administration of production" is, of course, concern for "unit costs"—which have, in the delivery of education, been seen to increase, rather than (as in successful mass production firms) to decrease over time.

The analogical correspondence between expectations of workers employed on factory assembly lines and of teachers employed in classrooms has already been noted—as referenced by Ohanian (1985), Shanker (1985), and Wallin (1978). It might, additionally, be observed that while the contractual obligations of teachers do (generally) oblige them to be on the school premises between certain daily working hours (and in certain cases, even to 'clock-in, and clock-out') like factory workers, there is also an unwritten, and unspecified expectation that teachers 'give' of their time beyond these stipulated hours—not only as required for lesson and test preparation, marking, and report writing, but also for the supervision of extra-curricular activities—as if teachers were, in fact, in a managerial or supervisory role.

Further ambiguity about the role of the teacher was noted by Goodlad (1983). This was in connection with the discrepancy between the student-centered pedagogical practices espoused by teachers (and their employers, alike) as desirable, and those teacher-controlling classroom practices that are in fact used by teachers. For, Goodlad observed that while the teachers studied were aware of,
the desirability of having students participate in setting their own goals, making choices, solving problems, working cooperatively with peers, and so on. . . these views were tempered by conflicting ones having to do with maintaining control. (emphasis added)  
(Goodlad, 1983:470)

Goodlad also noted that every statement of the goals of schooling (from sources as varied as legislatures, school boards, parent or teacher groups) was broad and comprehensive in its implications for classroom practice.

Yet pedagogy and curricula are geared, it appears, to only a fraction of these goals—to the lowest common denominator. Schools and those that work in them are not chastised for perpetuating this discrepancy. Rather they are reinforced for doing so and run a serious risk of censure if they try to do otherwise.  
(Goodlad, 1983:470)

This situation, as recounted by Goodlad, suggests that the teachers' preoccupation with maintaining control over the students in the classroom is both induced and sustained by a systemic need for control over the means of production. Such preoccupation with the issue of control is certainly reminiscent of that which characterizes the orgware of mass production in the industrial sector.

Thruput. If, as Perrow (1970:198) suggests "people are [as] raw materials in people-changing or people-processing organizations," then we might 'see' the whole person of the student as constituting the (integral-type) raw material of the school's production process. And, just as the raw material used in mass production processing has to be graded and sorted into homogeneous batches to accommodate the standardized requirements of the processing
machinery (i.e. to make it uniform and stable, so that it won't jam up the workflow), so might the grading and sorting of students into 'streams' (with labels such as "regular," "modified," "gifted," "E.S.L.," "T.M.R.," "vocational," "academic," etc.) be seen to accommodate the standardized requirements of the curriculum (for each of the labelled class streams).

Similarly, just as the separating of raw material by quality and texture (e.g. hardness, elasticity) might be seen as a pre-sort for differing end products—so might the identification of student quality and texture (through streaming, and letter-grades) serve, as observed by Marshall (1983:4), "as a social sorting function."

Conclusion. In light of the foregoing, it might be concluded that there is a remarkable similarity between the internal properties of the industrial mass production metaphor and the school system "terrain" it has, here, represented. This is, perhaps, not surprising—given the pervasive and long-standing use of this metaphor as a way of 'seeing', and of shaping, the organization of schooling.

Given a "YES" response to the first (flow chart) question respecting the appropriateness of the metaphor, we might, accordingly, move—as indicated in Figure 7.4—to examine the second question—that relating to the potential for correspondence in matters of "change" between the properties of the vehicle and the subject of the metaphor.
Is there correspondence between the internal properties of the metaphor?

Yes

Is there correspondence between the change properties of the metaphor?

Correspondence Between the Change Properties of the Metaphor

The change properties of an entity. To conceive of an entity (such as that represented by the subject or the vehicle of a metaphor) as having change properties is to metaphorically 'see' it as if it were an open system; i.e. a system with the capacity to adjust to turbulence (or in cybernetic terms, "noise") occurring either within itself (or its subsystem parts), or between itself and other entities in its ecosystem (Smith, 1982:362).

The change properties of an entity might, accordingly, be understood in terms of the situational dynamic obtaining between it and the environment in which it is embedded. For, it is assumed that there is 'normally' an ongoing state of environmental 'flux' which requires a system to make continuous operational adjustments so that it can maintain its 'normal' equilibrium, or steady state; and that the nature of such 'normal' adjustments fall within the range that would be considered to be of the homeostatic, deviation-counterbalancing, first-order change variety. Furthermore, it is assumed that when there is a change in
the nature of the environmental 'flux,' the embedded system will make concomitant changes in its response repertoire. In other words, it has to respond to a changed ordering of its environment with a changed order of response. It has to change gears (so to speak), and engage in second-order change—thereby achieving a new level of equilibrium, and a new lease on viability.

The change properties of the vehicle of the metaphor. The change properties of the vehicle of the metaphor (i.e. of the mass production workplace) were viewed, in Chapter 6, in the larger context of a systemic pattern model of the industrial workplace. This model was developed (in accordance with open systems theory) to systemically relate the three sets of organizational relationships (associated with 'unit,' 'mass,' and 'process' forms of production technology) found in the Woodward schema of the industrial workplace. It postulated the existence of two kinds of organizational change that might take place in the context of a workplace. The first, labelled first-order change, was seen to embrace all those permutations of organizational arrangements that would sustain system viability within a given mode of organized technology; the second, labelled second-order change, was seen to refer to those changes in organizational arrangements that have, necessarily, to take place when the form of technology used in the production process switches to a new level of (technological) complexity.
Now, the problem frame that views the school as a mass-production type workplace (whose productivity is in decline as a result of slippage in the standards and practices it has employed to manage quality control), 'sees' the requirement for change as resulting from some misalignment that is occurring (in the way things are relating with each other) within the system. The change properties of the vehicle of this metaphor are, accordingly, of the first-order, or morphostatic variety—as exemplified by the reform proposals; for these can be recognized as deviation-counterbalancing measures intended to bring school productivity back on course.

The question, then, is whether the (first-order) change properties of the vehicle of the metaphor (of mass production organization) analogically correspond with the change requirements of its subject (the school). Clearly, such a determination depends upon our assessment of the situational dynamic obtaining between the school and its societal environment.

In order, then, to help determine whether the environmental perturbations that gave rise to the recent (1980's) calls for school reform represent environmental flux 'as usual,' or a new order of environmental change, the next two sections look at the change dynamic of 'the school in its societal context'—first, from a retrospective view of the century just passed, and secondly, from a futuristic projection of the next.
Schools and change in the past century. The extent to which we might consider change to have taken place in the public school systems of Canada and the United States over the past century is moot. While there have certainly been what might be termed "change movements" in the field of learning theory over the past sixty years, recent observation of classroom practices and patterns of school organization suggest that there is, at the least, a lag between espoused theory and actual practice. A brief review of the changes that have taken place in learning theory, and an overview of recent studies of school organization may serve to illustrate this change/non change phenomenon.

According to Morris (1982:16) it is generally agreed that the process of education is strongly influenced by the "spirit of the times." And, he points to the clear interrelationship between society, the school, and the child that was manifest during the 1920's and 1930's with the advent of the behaviourist movement, and the "scientific" approach to the understanding of human behaviour.

... as the newly urban and industrialized society of the 1920's and 1930's emerged, education reflected the needs of this era. The child, more specifically, the behaviours of the child were considered to be of major importance. Appropriate behaviour was required, curriculum emphasized it, and the accepted view of the individual permitted it.

(Morris, 1982:17)

Congruent with the needs of this newly industrialized society were the virtues that became, as Morris notes, embedded within the curriculum. These virtues were
obedience, hard work, respect for authority, adult-like behaviour and respect for the social order.

Then, in the 1940's and 1950's, a post war Western society rejected utilitarian political ideologies. Accordingly, the school promoted a "democratic" orientation, and emphasized the "cognitive" part of the individual. This was followed, Morris suggests, by a self-searching society in the 1960's and 1970's; and a movement toward the "liberation of human potential" in which the "affective domain" was given priority.

Given, then, these examples of changing philosophical goals in education over the past six or seven decades, it would seem reasonable to suppose that concomitant changes would have been reflected in school operations and teaching practices. However, data from a number of recent school studies in the United States (Cuban, 1982b; Hart, 1983; Goodlad, 1983) suggest that there has been no essential change in either the structure, the organization, or the teaching methods found in American schools over the last century (see also Getzels, 1960).

Cuban, for example, who collected information on nearly 2,500 classrooms in three periods (turn of century, between two world wars, from mid 1960's to present), concluded that,

The American high school--ranging in size from 500 to more than 5,000 students, offering a program of 3 to 4 years duration, staffed by subject matter specialists who teach between 125 and 200 students (age 14 to 18) each day in five to six periods of less than an hour--has been structured in much the same manner since the turn of the century.  

(Cuban, 1982b:113)
According to Goodlad (1984:6), not only the structure and general workflow features, but also the instructional techniques employed by classroom teachers have been found "virtually unchanged over the past." And he concludes (1984:3) that, "schools conduct their business pretty much as they did when you and I went to school, and herein lies the trouble."

These features of persistent organization and pedagogical practice are described by Cuban as follows:

Large graded schools, self-contained classrooms, 50-minute periods, multiple curricula, Carnegie units, and standardized tests were structural innovations designed by earlier generations of reformers to make teaching both efficient and productive. These structural reforms became the organizational DNA to which subsequent generations of teachers adapted by inventing teacher-centered classroom tactics: lecturing, large-group instruction, reliance on a textbook and chalkboard, seatwork assignments, recitation, discussion, and the use of teacher-made quizzes and tests.

(Cuban, 1986:8)

Cuban found this "core repertoire" used by teachers even at the height of the reform movements (of the 1960's--70's) that were aimed at introducing student-centered classroom practices (e.g. small-group and independent work, less teacher talk, more student choice, etc.). So it is not surprising that the "innovative" school and classroom management practices of the sixties and seventies (e.g. "open classrooms", "continuous, non-graded, progress," "performance contracting", etc) did not actually represent, as they seemed then to promise, steps in an evolutionary educational change process. It would seem,
rather, that they provided a classic example of the old French adage, "plus ça change, plus c'est la même chose"—which, as suggested by Watzlawick, Weakland and Fisch (1974), is the hallmark of first-order change.

Given, then, this persistence in the organizational structure and teaching practices of our school systems over the past century, we might conclude that whatever changes may have moved the societal spirit of those times, they must have fallen within the range that characterized the prevailing dynamic of 'environmental flux as usual.'

Schools and change in the next century. If we were to speculate on the shape of society forty or fifty years from now, as did Bell in 1967, we might agree with him that the "old" industrial order is passing and that a "new society" is in the making—what Bell called a "post-industrial society." Whether, like Trist (1972), we would consider ourselves caught in "the drift to post-industrialization," or whether, like Galbraith (1972), we would concern ourselves with "the imperatives of technology," we would no doubt agree that our industrialized society has already, under the influence of technological development, entered a period of transition equal in importance to the transition from pre-industrial to industrial society (Cross, Elliott and Roy, 1974). Or, like Toffler (1970), we might consider the changes inherent in this transition to be of even greater magnitude:
For what is occurring now is, in all likelihood, bigger, deeper, and more important that the industrial revolution. Indeed, a growing body of reputable opinion asserts that the present moment represents nothing less that the second great divide in human history, comparable in magnitude only with that great break in historic continuity, the shift from barbarism to civilization.

. . . . John Diebold, the American automation expert, warns that "the effects of the technological revolution we are now living through will be deeper that any social change we have experienced before." Sir Leon Bagrit, the British computer manufacturer, insists that automation by itself represents "the greatest change in the whole history of mankind."

(Toffler, 1970:14)

Certainly, in consideration of the changes that have occurred as a result of technological advancement over the past decade alone, we would have to agree with Koberg (1986:139) that, "rapid changes are occurring in the environments of educational organizations." Furthermore, as observed by (the noted American educator) Shane:

So rapidly have innovations burst upon us that we are moving beyond what Alvin Toffler labelled "future shock" into a state of hyperturbulence, [a state] which Selsky and McCann define as "the condition that results when available resources and institutions prove inadequate to deal with the speed and diversity of change."6 . .

. . . . The acceleration of change has made the world of the 1980's significantly different from that of the 1920's. However, it is changes in the nature of change that have made the microelectronic milestone unique. For the first time we are confronted by incredible and unexpected technological input, which constitutes a system-break that has dramatically altered our lives.

(Shane, 1987:5)


6 Shane gives as examples of hyperturbulence: astronomical fiscal deficits, nuclear accidents, environmental pollution, widespread world hunger, international terrorism, and drug abuse.
Conclusion. In the light of the foregoing, it can be concluded that the societal contexts in which today's school systems are embedded have been engulfed by an environmental flux that is of a quite different order from that in which our school systems had managed to maintain their steady state in earlier times. System survival under such conditions of 'change of change', is (as noted earlier) contingent upon a system changing its repertoire of responses to environmental perturbations. It requires that (equilibrium-seeking) first-order change responses be replaced with second-order changes that are characterized (Buckley, 1967) as deviation-promoting, and structure-elaborating.

Since the change properties of the (vehicle of the) metaphor of "the mass production workplace" were found to be of the first-order, deviation-counterbalancing kind, it can be recognized that an appropriate correspondence does not obtain between these and the requirements for second-order change properties that now characterize the dynamic of the 'school in its societal context.' Such a finding carries serious implications for educational policymakers; for it suggests that the deviation-counterbalancing measures advocated in the recent (U.S.) reform proposals will not only fail to fix what is wrong with our school systems, but that they will serve to further resistance to the very (opposite, deviation-promoting) changes that will have to be made if our schools are to survive in this
increasingly hyperturbulent environment. For it seems clear that our school system terrain is indeed presently caught in the throes of a major transitional period.

In terms of the analogy of the gear-shift car, used by Watzlawick et al to illustrate the difference between first and second-order change, one might imagine the transitional stage (between orders of change) as being marked by the driver's being preoccupied with the question of how to increase or decrease the gas—and not being aware of the need to change gears!

In accordance with the procedural framework used for examining a problem frame (p.165), the question now to be asked is, "Does the metaphor (of the school as a workplace) possess the capacity to be restructured so that its change properties would permit it to adapt to those of the changing school terrain?"

"Change" potential in the metaphor of the workplace. In looking at the potential of the workplace metaphor to represent the elements of change required by the changing school terrain, it might be helpful to call upon the analogy of the gear-shift car.

First, let us regard what is known about regulating car speed by the application of more, or less gas as being analogous to what is known about regulating a mass production operation by application of more, or less, of some particular input (e.g. time). Within either of these regulatory systems there is a range of possible changes that
can be made. However, there are "technological" constraints upon the extent of this range. Consequently, when the limit of this technologically constrained range is reached (e.g. when the gas pedal reaches the floor; when the factory runs 24hrs every day), change can only be brought about by shifting to some new technological mode.

In the case of the car, this means learning about the regulatory system associated with the technology of gears. Accordingly, when the gas pedal is depressed "to the floor" and the car is still not meeting the pace of other highway traffic, the driver will realize that what is called for is a (system) change of gears—and "gear up." Similarly, the technological constraints associated with (the hardware/software of) a mass production enterprise will limit the range of operational (orgware) changes that can, fruitfully, be made by management to increase production results. Accordingly, when the upper limit of this range has been met (and the factory is running 'full tilt' 24hrs a day), management will realize that 'real' (i.e. profitable) change can only be brought about by "gearing up" with more advanced (i.e. more complex) production technology.

Beyond that of mass production, the next more technologically complex mode of production known to us is that which is generally referred to as "process" (or flow) technology. From the industrial-based research of Woodward, we can learn something of the workplace characteristics associated with process technology.
Whether what can be learned about process technology can be usefully transposed to the field of education, and there used for predictive purposes, remains to be seen. But, certainly, a reframing of the problem of schools that would 'see' "the school as a workplace gearing up for a second-order change from mass production to a process mode of organized technology" would seem to hold promise. Such promise would be realized if—as a way of framing and understanding the problem of schools—it enabled educational policymakers to "see" their way to the gear box, realizing that the troubles currently besetting schools are not going to be resolved by resort to the application of either more, or less, gas.

CHAPTER SUMMARY

The procedural framework shown in Fig. 7.1 (p.165) was used, in this chapter, to examine the plausibility, and appropriateness of the metaphor of 'school as a mass production workplace.' The utility of the metaphor (for policy problem-setting purposes) was not examined because, (in line with the flow chart format of this framework) a "NO" response was accorded to the question of whether the metaphor provided an appropriate analogical correspondence for looking at change in the organization of our school systems. However, the systemic pattern model of the industrial workplace does suggest a way in which the problem of schools might be reframed by restructuring the metaphor we have been examining--as demonstrated in the next chapter.
Chapter 8

REFRAMING THE PROBLEM OF SCHOOLS

It could be argued that most problems are solved by redefinition—substituting a puzzle that can be solved for a problem that cannot. Sir Geoffrey Vickers writes that changing the appreciative framework within which problems are perceived may do more than any other act to affect future events.

(Wildavsky, 1979:57)

... current reform movements such as A Nation at Risk do not give sufficient heed to the influence of high-tech developments. Redesign of U.S. education is advocated rather than "band-aid" reforms aimed at improving yesterday's schools.

(Shane, 1987:6)

Similarities between the characteristics of a mass production enterprise and the way we have tended to operationalize the educational task in our public school systems have been widely noted. What is less generally known, however, is the organizational nature of an enterprise using "process" technology; or how the technological imperatives associated with this more advanced (i.e. technologically more complex) stage of production might, "metaphorically," be translated when it comes to the management of a public school system in some more technologically advanced future.
That a more technologically advanced future is now already upon us is self-evident. That the "troubles" presently besetting our school systems are symptomatic of their being (metaphorically speaking) in a transitional period—from a stage of mass production to a second-order change level of process technology—seems, therefore, entirely plausible.

The rest of this chapter is, accordingly, devoted to uncovering and spelling out the generative metaphor used, here, to reframe the problem of schools; and to elaborating the assumptions of that metaphor in preparation for examining (in Chapter 9) the implications it suggests for the school of tomorrow.

UNCOVERING AND SPELLING OUT THE GENERATIVE METAPHOR USED TO REFRAME THE PROBLEM OF SCHOOLS

The 'story' from which the reframed problem of schools has been drawn is the researcher's own interpretive study (found in Chapters 5, 6, and 7) of the generative metaphor ('school as a mass production type workplace') that was deemed to have been used by the 1983 U.S. Commission Study on Excellence, "A Nation at Risk," to frame 'the problem of schools.' In this study, the assumptions that flowed from the mass production metaphor were—with the help of a specially developed pattern model of the industrial workplace—carefully elaborated; and the plausibility and appropriateness of the analogical implications they suggested for schools subjected to critical examination.
Evidence was found to suggest strong support for both the plausibility, and the structural appropriateness of the metaphor of the 'school as a mass production workplace' as a way of 'seeing,' and framing the problem of schools. However, analogical correspondence was not found that would support the appropriateness of the metaphor from the standpoint of its change properties. For, it seemed evident that our school systems are currently caught in the throes of an environmental flux which is unlike any that has gone before; and that, if our school systems are to survive, they will have to meet new environmental demands with new change responses—responses that lead to the development of new, adaptive, organizational structures.

In terms of our pattern model of the industrial workplace, such requirements were seen as going beyond the (first-order system) change properties of any one mode of production technology. They were seen as involving a (second-order system) change that would shift the organization of the workplace to a new level of organized technological complexity. Such a shift was seen as requiring appropriately balanced changes to be made in each of the hardware, software, orgware, and thruput aspects of the production process. In terms of our public school systems, it would mean 'gearing up' the whole system of producing education (the hardware, software, orgware, and thruput of the school system) so that it might shift from that of large batch/mass production to production through process technology.
Now, these conclusions flow from a reframing of the problem of schools that can be seen to rest on a restructured (complex) generative metaphor (illustrated in Figure 8.2).

**Spelling Out The Re-Structured Generative Metaphor**

Figure 8.2 attempts to illustrate the structure of this complex generative metaphor (c). It can be seen to be made up of two simple metaphors, namely:

(a) school of today as a mass production workplace and

(b) school of tomorrow as a process production workplace.

It might be helpful to conceptualize these two simple metaphors (as illustrated in Fig. 8.1) in terms of the procedural framework for spelling out a metaphor:

**Simple metaphor (b).**

\[ \begin{align*}
X_2 &\quad \text{as} \quad Y_2 \\
\text{school of tomorrow} &\quad \text{process production workplace}
\end{align*} \]

**Simple metaphor (a).**

\[ \begin{align*}
X_1 &\quad \text{as} \quad Y_1 \\
\text{school of today} &\quad \text{mass production workplace}
\end{align*} \]

*Figure 8.1*

Simple Metaphoric Elements of Complex Metaphor (c)
"The School of Today Gearing Up to Become the School of Tomorrow as a Mass Production Workplace Gearing Up to Become a Process Production Workplace"
Clearly, this restructured generative metaphor is predicated on the notion that since the metaphor of the industrial workplace with a mass production mode of organized technology was found to be a plausible and structurally appropriate way of 'seeing' the school of today, then the model of the industrial workplace with a process production mode of organized technology might provide a fruitful metaphor for 'seeing' the school of tomorrow. [It also implies that what is known about the strategic change processes undertaken to effect such change in the industrial sector might be transposable to the school setting. However, while this might be so, such analysis is considered to be beyond the scope of this study.]

It is, then, to the new (simple) metaphor (b) of the 'school of tomorrow as a process production workplace' that analytic attention will, next, need to be directed. For, it is intended that from it a pattern model of a 'typical' workplace of the future--one with an advanced 'process' form of production technology--be generated; one which
policymakers might consider using for analogically projecting possible 'futures' for our school systems.

Such a pattern model is seen as requiring a more detailed spelling out of the nature of the organizational elements (of hardware, software, orgware, and thruput) than was presented earlier, in Chapter 6 (e.g. in Table 6.1 and Fig. 6.3), and recapitulated, here, in Figure 8.4. However, before proceeding with this task, it would seem appropriate to spell out any normative ideas that might be associated with the vehicle of the metaphor.

Normative Ideas About Process Technology.

Since there is, on the whole, so little generally known about process technology, it would probably be true to say that, as yet, we possess few, if any, normative ideas about it. Nonetheless, there does seem to be a general abhorrence of increased automation in the workplace; and, certainly, considerable concern that computer-programmed instruction might have the effect of dehumanizing social relations in the school.

However, given that such fears are founded on our experience of the organizational structure (i.e. the network of interdependent, functional, role relationships) of workplaces (and perhaps schools) with a mass production mode of technology, it would seem important to recognize that a shift from mass production to process technology would represent a shift of worldview that could be expected to spawn an entirely different structural form.
Spelling Out the Organizational Elements of the Metaphor: School as a Workplace with a Process Mode of Technology
As illustrated by the number of question marks appearing in Figure 8.4, we have no ready image of a school with a mode of organized technology that is comparable with that of process production as it is experienced in the industrial workplace. And we have, from the description of process technology provided earlier (in Chapter 6), as yet only a broad view of the hardware, software, orgware, and throughput features to be found associated with process production in the industrial sector.

To develop a truly comprehensive idea of the form such a new structure might take would require research into the organizational life and management practices extant in workplaces that are now operating with a process mode of organized technology. To get a sense of whether such research might be worthwhile, we can start by:

a) elaborating the assumptions (of the vehicle) of the metaphor—"a process production workplace"; and

b) formulating the implications these suggest for change in the organization of the (subject of the metaphor) 'school.'
ELABORATING THE ASSUMPTIONS OF THE METAPHOR

Because the image of process industry that has, thus far, been presented in this study has come largely from the work of Woodward (whose study of process technology was limited to the petro-chemical industry), it would seem prudent—before embarking upon the development of a generalized model of process technology—to check out the generalizability of this image. To this end, a study by Burack (1967: of the implications of technological improvements on industrial management in advanced production systems) is instructive.

Refining The Concept of Process Technology

Burack's (1967) analysis, based on field-based studies as well as studies reported in the literature, focused on,

. . . industrial manufacturing systems in which organizational-management changes have been most pronounced; that is, production systems characterized by quasi-flow or flow types of processes, such as are commonly found in food processing, oil refining, electric power generation, meat processing, and high-speed automatic packaging. Some of these manufacturing procedures are mixtures of mechanically based and flow elements designated as quasi-process units in contrast to continuous-flow, integrated types of systems designated as process units.

(Burack, 1967:480)

Like Woodward, Burack views what he calls "industrial units" as falling along a technological continuum—spanning a range from low level, intermittent (batch) operations; through intermediate "mass production," high volume
assembling; to advanced units having quasi-process and process type systems that possess flow-like characteristics, high volume, and product standardization.

The relationship among these different forms of advanced operating systems is well illustrated by Burack (1967, Table 1, p.483) as shown, here, in Table 8.1.

Table 8.1

Comparison of Different Forms of Advanced Operating Systems

<table>
<thead>
<tr>
<th>Level of technology*</th>
<th>Designation</th>
<th>Example(s)†</th>
<th>Characteristics</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediates</td>
<td>Advanced mass production</td>
<td>Semi-automatic machinery lines</td>
<td>Semi-continuous or continuous production. Low level of worker interspersion. Largely based on mechanical arts. Characteristically an assembly procedure. Mechanization of material handling.</td>
<td>Specialization and division of effort.</td>
</tr>
<tr>
<td>Quasi-process systems (high)</td>
<td>Automatic filling lines. Plastic extrusion.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The more advanced portion of a technology continuum which spans a range from low level, intermittent (batch) operations to advanced managerial operating systems.
† Suggestive of manufacturing applications recognizing that wide variation exists in individual cases.
‡ Managerial innovation supporting advanced operational systems.
For purposes of this study, then, the term process technology (or process production) will be taken to mean an advanced form of automated production technology—including both quasi-continuous (quasi-process) and continuous process systems—that possesses flow-like characteristics and produces a high volume of standardized product.

The Hardware of Process Technology

As noted earlier, the 'tooling-up' required for advanced production systems involves considerable capital expenditure. The characteristics of the hardware will, obviously, vary depending upon whether it is a mixture of mechanical and continuous-flow systems (i.e. quasi-process), as used in automatic packaging and meat processing; or, an advanced form of heavy duty continuous-flow, as used in power generation and oil refining; or, an information-flow, as used for automated (main frame) data processing in management information systems.

What all of these forms of (technological) hardware have in common is that they are all highly automated, and if not already served by computerized control systems, likely to be moving in that direction. Given recent experience with the computer industry, it is also likely that a basic requirement of process hardware will be compatibility with existing forms, to allow for 'add-ons,' as new software comes 'on stream.' Furthermore, as suggested by Dobrov, we can expect the development of dynamic, self-improving, cybernetic systems (i.e. computerized systems that
automatically get better at automatically controlling production processes!). It might also be worth noting that, according to Burack (1967):

As technical complexity increases, [and] more complex organizational structures develop to regulate the multiplicity of variables, equipment and facilities often become more compact, counteracting the otherwise continued growth in size of production units that is associated with volume increases. (emphasis added) Burack (1967:482)

The Software of Process Technology

Software might be defined as the 'blueprint for operating procedures.' Since, with process technology, most of the operating is done by highly automated machinery, most of the software will be in the form of computerized programs. These provide direct 'feedback' to instruct the mechanisms that then automatically control the quality and quantity of machine output. Software might also be said to embrace the technical 'know-how' of those who design, modify, and operate these programs.

The Orgware of Process Technology

Orgware, it will be recalled, stands (as coined by Dobrov) for the pattern of organizational operations that is intended to achieve the optimal combination of human, technical, and methodological resources required (and, presumably, available) to get the job done. It will also be recalled that the significance of the Woodward studies lay in their finding that essential for business success was a
match between the organizational structure (or pattern of orgware) used to manage the firm as a whole, and the technology (in the sense of the hardware and software) employed in the production process.

Since organizational structure can be seen (in systems terms) as a network of interrelated, and interdependent relationships, the structure having been found to obtain in process production workplaces might be spelled out in terms of the nature of the relationships found:

1) among the (basic) systemwide managerial functions (e.g. of Development, Marketing, and Production);

2) among the managerial roles and functions within the (production) plant;

3) between the workers and their 'tools' of production;

4) between workers and supervisory staff.

The nature of each of these sets of relationships is, accordingly, elaborated in the following sections.

**Relationship among system-wide managerial functions.**

It will be recalled from Woodward's (1958) findings that in firms using process technology, the basic managerial functions of Development, Marketing, and Production were found to be (a) sequenced in that order, and (b) to function very independently of each other. Moreover, it was noted that Marketing (being centrally located in the sequence) was central to the success and survival of the
firm—both on account of the enormous cost involved in
developing the product and the technological process
required to produce it; and of storage problems if there
were not a market ready to absorb the great volume of output
associated with process production.

That Development (as a department) is, here, as
concerned with designing the processing system as it is
with creating a new product would, no doubt, account for the
"emergence and growing importance of administrative and
technical support groups, such as production control,
planning, and industrial engineering" (Burack, 1967:484)—
and, thereby, as Burack also notes, the development of
"more complex organizational structures."

The increased complexity of organizational structure
is manifested in process technology operations, as observed
by Woodward (1958), in an increase in the ratio of
supervisory staff to total personnel; the number of levels
of authority in the management hierarchy (giving rise to
what is sometimes termed a "tall" or vertical structure);
and in the span of control of the chief executive officer.

Relationship among managerial roles and functions
within the production plant. In keeping with the higher
ratio of supervisory staff to total personnel, Woodward
(1958) found that increased automation led to a decrease in
the span of control of the first line supervisors (i.e. to
there being smaller-sized basic work groups).
Moreover, in his study of organizations with advanced forms of technology, Burack (1967:484) found "a shift in the role of supervision (and historically important functions such as direction) to patrol on a process-wide basis." In this connection, he makes the following observations (from the field of quasi-process production, in meat processing and baking):

Human variability and ineptitude were bridged by mechanical and electrical elements in the process. Slowly, the basis for managerial expertise shifted from one based on experience to that of technical education. Here, concern was evidenced with overall system performance as opposed to responsibilities within functional units of the process. (emphasis added)

(Burack, 1967:493)

This observation would support that of Woodward (1958) who found that—moving from mass production to process technology—there was a decrease in the amount of specialization between functions of management, including a decrease in the separation of administration and the supervision of production.

Subsequent to the early (1958) conclusions of the Woodward studies, a number of in-depth case studies were conducted to investigate the longer-term effects of technological change on organizational structure. From her investigations in a particular company having a process mode of technology (company "C"), Woodward (1965) noted that the highly automated/formalized system of control facilitated an objective assessment of managerial performance. For she found that every manager interviewed
said that his success would be judged by his ability to keep the plant operating as near to maximum capacity as possible. (This finding would also serve to corroborate Burack's observation that managerial concern in process plants was for "overall system performance.")

Investigation in company "C" also led Woodward to the discovery of a new pattern of managerial interaction. For, managers from different departments (responsible for different functions) were found to spend far more time together than in any other firm studied. ( Nearly 70% of the contacts recorded were with other managers at the same level, and 30% with superiors and subordinates.) The highly rationalized production process in this process firm had led to a set routine, and the interaction among managers was found to be linked more with this routine than with pressure arising from the job itself. It was, similarly, found that contacts with superiors and with subordinates were brought about more by work routines than by problems.

The general effect was an atmosphere of calm, with an absence of pressure—except for the occasional crisis (generally of a technical nature). However, crisis was found to serve the important function of generating energy—providing the stimulus needed to keep management alert. Crisis also served to increase job satisfaction; for when things were going smoothly, managers had only a limited area of discretion to exercise, but when there was some operational glitch, their discretionary powers were greatly
enlarged. Indeed, it was recognized that because problems could escalate (with horrendous ramifications) in a fast flowing continuous process situation, problem-solving had to be done as near as possible to the point of crisis—giving rise to another unique feature of organizational structure in process production.

Responsibility for problem-solving decisions was found by Woodward to be delegated DOWN the hierarchy. Not only was this necessary from the technological standpoint just noted, it was facilitated by the fact that most of the managers above the level of first-line supervisors had similar qualifications and background training (i.e. a science/engineering degree\(^1\), and a formal training period with the firm). Therefore, given the same facts, all managers could be generally counted on to make the same decisions; so, when delegated [down] decision-making was necessitated by a crisis, it was achieved without anxiety. Indeed, it was noted that the junior managers (in the process plant in question) seemed to find it easier to subscribe to the decisions made by their superiors than their counterparts elsewhere; and that this homogeneity facilitated upward identification as well as downward delegation.

\(^{1}\) This observation supported an earlier (Woodward, 1958) finding that in a shift from mass production to process technology there was an increase in the proportion of graduates among supervisory staff engaged on production.
It was noted that decisions rarely got revised (as had been found at every stage up the hierarchy in the unit and mass production firms studied). As a consequence, there was a greater feeling of satisfaction and independence associated with lower management responsibilities. Moreover, joint policy decisions at the Board level were more easily reached, and tended to be those of which junior management approved (they would have made themselves in similar circumstances). There was a marked trend towards the Executive Board consisting of a high proportion of technically qualified directors; and management by committee appeared to work better.

On the basis of her findings, Woodward concluded that, with process technology, joint decision-making was a practical possibility. This was not only because decision-making seemed, in such a highly rationalized setting, to become an increasingly rational process, but because as a result of their being freed up from monitoring responsibilities, supervisory staff had the time to attend meetings.

Woodward (1965:204) noted that the various management committees in other firms studied (whether they were executive, policy, or production committees), were not joint decision-making bodies in the same sense—for their main function seemed to be to allow an opportunity for the operation of the political factor in the decision-making process.

Whether the finding [Woodward, 1958] that there was 'a decrease in the amount of written as opposed to verbal communications' contributed to the increased time for meetings, or whether the holding of such meetings obviated the need for some written materials would seem to be moot!
Relationship between workers and their 'tools'.

Perhaps one of the biggest changes wrought by the advent of automated machine tools in the workplace is to be found in the relationship between the workers and the tools used to get the work done. To start with, a shift from mass production to process technology was found (Woodward, 1958) to bring about a significant decrease in the percentage of the total budget spent on labour costs (e.g. a shift from unit to mass production was found to be accompanied by a decrease on average of 36% to 34%; but, from mass production to process technology, the decline was from 34% to 14%).

Further to this, it might be observed that in unit/small batch technology, the tools with which the workers relate are extensions of the 'craftsman'; in mass production, the workers are 'labourers' who serve as extensions of the assembly-line machinery; and, in process technology, the workers can be viewed as 'technicians' who manage the highly automated and self-regulating machinery. Such a viewpoint would certainly support Burack's (1967:484) observation that advanced automation brings "a shift in the role of the workers to stand-by functions, with an emphasis on mental skills." And, he goes on to note:

The personnel classified as "operator" in the new plants differed considerably from their predecessors in the old plants. The traditional concept of skill associated with worker job experience or manipulative abilities was no longer appropriate in these stand-by functions. The necessary set of experiences and abilities in this work system needed to be redefined.

(Burack, 1967:495-496)
Relationship between workers and supervisory staff.

Advanced automation was also found (Woodward 1958, 1965) to lead to a shift from the negative industrial relations found in mass production enterprises to one of harmonious social relationships in process production plants.

Harmonious social relationships in the process firms studied by Woodward were seen to result from the following factors:

- Objectives had to be very clearly and precisely defined before the plant was even built, because the market had to be assured for at least 20 years, and, once established, the production facilities would be quite inflexible. Therefore:

- There were few imponderables in plant operations. The consequences of taking a particular course of action could be predicted with a reasonable degree of certainty.

- There was a rigid and highly formalized control system. These controls were so mechanical and exact that pressure on people was at a minimum. Production was related only indirectly to human effort, so that any demands on operators were made by the process, rather than by supervisors. In general, people were only hard pressed when something in the plant went wrong (e.g. mechanical or computer system break down).
As summed up by Woodward:

As technology advances, the entire concept of authority in industry may have to change. In process firms, the relationship between superior and subordinate was much more like that between a travel agent and his clients than that between a foreman and operators in mass production. The process foreman's job was to arrange things within limits, set by the plant, which both he and operators understood and accepted. This common understanding and appreciation of the demands of the job is much the same as that found in unit production.

(Woodward, 1958:30)

And, by Burack:

. . . with personnel increasingly on a stand-by basis, the role of supervisory and managerial personnel with respect to worker was closer and more supportive.

(Burack, 1967:499)

The Thruputs of Process Production

Thruputs are the raw material inputs that become changed, (i.e. they have 'value' added to them) by the production process, to form (product) outputs. Woodward notes a difference in type between the integral (discrete unit) type raw material used in unit/small batch and assembly-line technologies to produce integral products (such as cars and clothes), and the dimensional type raw material (experienced in terms of volume or capacity) that—in continuous process technology—provides vast quantities of standard quality items such as oil, electricity and information.

Summary

The foregoing data are presented in annotated form in Figure 8.5 to represent the implications of the metaphor.
Plant involves very large capital investment.
Machinery—highly automated, single purpose.

'Blueprint' for Operating Procedures
--provided by computerized programs that automatically control the quality of output.
--raw material 'processed' along fast flowing quasi-continuous or continuous process systems.

Feedback on Quality of Output
--provided by dynamic cybernetic systems that automatically regulate production variables.

Structure
--highly independent D, M, P managerial functions.
--organizational complexity increases with advent of new admin. & technical support groups.
--increase in levels of authority—tall structure.
--1st line supervisors have smaller work groups.
--decrease in supervisory specialization in plant.
--everyone focused on maintaining operational flow.

Marketing central to survival of organization
--always working to increase market so vast volume of fast flowing product can be absorbed.

Operators & supervisory staff expected to:
--stand-by to monitor machines & interpret signals from the control systems.
--take responsibility for 'managing' machines, especially when breakdown threatens.

Operators and supervisory staff rewarded for:
--rational joint decision-making that keeps plant operating as near maximum capacity as possible.

Dimensional-Type Raw Material
--measured in terms of volume or capacity.
--large volume of standardized (ungraded) product.

Figure 8.5
Implications of the Metaphor of the Process Production Workplace
The following notation is of Galbraith's (1974) assessment of the six most important consequences of increasing technological complexity. It serves both to substantiate the image of process technology presented in this chapter, and to provide a longer-term perspective.

**Increasing technological complexity brings:**

1) **Increase in time span** between beginning and end of production as technology increases in complexity.

2) **Increase in capital required** to cover cost of long production process; specialized knowledge needed; research and development to overcome new problems; expensive capital outlay in new machinery and equipment etc.

3) **Increase in inflexibility of means of performance** of a particular task as production lay-out geared to special purpose.

4) **Increase in manpower specialization** both technical and organizational (planning).

5) **Increase in coordination required.** As more and more specialists used, organizational specialists are needed to organize them.

6) **Careful and long-term planning** necessitated by all of the above. As Galbraith (1974:52) comments:

   . . . conditions at the time of completion of the whole task must be foreseen as must developments along the way. And steps must be taken to prevent, offset or otherwise neutralize the effect of adverse developments, and to insure that what is ultimately foreseen eventuates in fact.

**Conclusion**

Combined with the framed data found in Figure 8.5, this list of consequences of increasing technological complexity is seen as providing a (metaphorical) template against which the analogical implications for schools can be drawn, and examined, in the next chapter.
Chapter 9

EXAMINING THE REFRAMED PROBLEM OF SCHOOLS

We have talked for years about individual progress. We do very little about it. Kids are pretty well lock-stepped. They are graded. They don't get out of a grade until they have spent so much time there.

This has got to be pretty sad in a technological age. . . . We are going to have to use electronic teaching aids, and reorganize the schools to accommodate individual differences.

(Stables, quoted by Brown, 1982:21)

We stand at the threshold of the development of a learning service . . so powerful and effective that we're looking at (the advent of) an entirely different education system.

(Bork, quoted by van Raalte, 1983:24)

It has been suggested (in Chapters 7 & 8) that what is currently problematic about our school systems is that the societal contexts in which they are embedded are experiencing an acceleration of change that represents a change in the nature of change, i.e. second-order system change; so that, to survive such conditions of environmental flux, schools, too, will have to engage in second-order change.

As a way of apprehending what such second-order system change might entail in the context of schooling, it has been proposed that educational policymakers consider
'seeing' the school of today as (if it were) a mass production workplace 'gearing-up' to become a technologically more advanced process production workplace of tomorrow. To facilitate this consideration, the organizational elements (of hardware, software, orgware, and thruput) of the process production workplace were spelled out and elaborated; and the implications these might suggest for change in the organization of tomorrow's schools were formulated (as annotated in Figure 8.5).

The intent in this chapter is to examine the plausibility, appropriateness, and utility (for policy purposes) of this restructured metaphor. To accomplish this, the flow-chart-type (yes/no directional) format provided by the procedural framework used in Chapter 7 (illustrated in Figure 7.1) for examining a problem frame will, again, be used. The next section deals, accordingly, with the plausibility of the reframed problem, and begins with a review of evidence to support the researcher's interpretation of what it is that is problematic about schools.

PLAUSIBILITY OF THE REFRAMED PROBLEM

Evidence to Support the Researcher's Interpretation

Evidence was sought to support the researcher's perception that:

(a) the generative metaphor thought to be tacitly used to frame the problem of schools in, "A Nation at Risk," (i.e. the 'school as a mass production workplace')
limited the changes that could be proposed for school reform to those which, in systems terms, represent deviation-counterbalancing (morphostatic) first-order change;

(b) the societal context in which the school is nested is in the throes of a technological revolution of such magnitude that the school will only be able to survive if it is able to adapt to changing environmental conditions by undergoing deviation-promoting, (morphogenic) second-order change.

The reform proposals as manifestation of first-order change. Critiques of the reform proposals abound; and a number suggest, in one way or another, that such recommendations will do little, if anything, to actually alter the form of schooling that has (so stubbornly) persisted for over a hundred years. Shapiro (1984), Leonard (1984), and Sizer (1986) for example, all comment to the effect that the recommendations represent little other than "more of the same," and Cunningham (1985:20), that they have "turned out to be barren in terms of large-scale influence." An even greater indictment comes from Cohn and DiStefano (1984) who, after examining the recommendations in light of the realities observed in a particular mid-American high school they had studied, found them to be "seriously wanting":

The failure of the report to go beyond a superficial understanding of what is wrong and what is needed, and to consider on a more complex level why we face the problems we do and how we can bring about change, renders it at best useless and at worst a dangerous instrument for change.

(Cohn and DiStefano, 1984:216)

However, while these, and many other of the criticisms, do suggest that the reform proposals are lacking in the kind of depth needed for second-order change, they do not serve to illustrate as clearly as does the following observation, the 'plus ça change, plus c'est la même chose' hallmark of first-order change:

Much has changed as a result of the educational reform movement of the past 3 years. States and local school boards have raised standards for students and teachers alike, substantially raised teacher salaries in many locals, created career ladders, and instituted merit pay plans. But little has changed in the way schools operate--how time is spent, how decisions are made, how professional educators relate to each other, and to their charges [i.e. organizational structure]. (emphasis added)

(Tucker and Mandel, 1986:24)

That the reform proposals emanating from the Commission (and task force reports and research studies of 1983 and 1984) generally evaded "organizational issues" is also noted by Clark (1985:472). Suggesting that nothing was learned from efforts to reform U.S. education after the Russians put Sputnik I into space in 1957, Clark comments:

Those earlier attempts at reform did not change the basic structures of schooling, and the school agenda had a momentum of its own. Therefore, appeals to school boards and administrators, to teachers, and to university administrators and faculties to move in the direction of "excellence" affected their motivation and behaviour only briefly. Then the ongoing situational imperatives took over again. (emphasis added)
From the perspective of examining calls for reform in teacher education, Cornbleth (1986:10) claims that the rhetoric of reform can be seen as part of a legitimating "ritual": one that establishes consensus and creates an image that something is being done, so that reform "becomes the orchestration of ritual, and motion is taken as change." She goes on to suggest that:

As they have in the past, most teacher education institutions will likely respond to the recent and forthcoming calls for reform by adopting proposals for change that are congruent with their pre-existing norms, interests, and structural arrangements while resisting others . . . . Existing organizational arrangements are thus preserved under the banner of reform. The social function of ritual and technical rationality is primarily a conservative one of system maintenance and public reassurance. (emphasis added)

(Cornbleth, 1986:10)

The environmental imperative for second-order change.

In an article titled, "On Technological Relevance and the Survival of U.S. Public Schools," Pogrow (1982) observed that in order to remain competitive, U.S. industry was being forced to modernize its technology. Accordingly,

As economic pragmatism fuels the adoption of new production methods, the cumulative impact of these changes will be to alter the nature of work. Specifically, routine and predictable forms of white- and blue-collar work (such as clerical and welding jobs) will be replaced by the relatively technical work of performing logical and creative operations with electronic forms of data. Most workers, be they artists or machinists, will increasingly have to perform tasks that are science-related.

(Pogrow, 1982:610)

As Pogrow sees it, these developments will impose a requirement upon schools to adopt a curriculum that is
technologically relevant. Such a curriculum, he suggests, must not only provide the specific skills necessary for effective uses of particular technologies, but it must prepare all students to engage in sophisticated forms of reasoning.

So radical are the economic changes presently being experienced, it is unlikely, cautions Pogrow, that even the largest corporations--leave alone our educational institutions--will be able to resist change, without falling prey to a phenomenon he dubs "environmental collapse":

Environmental collapse occurs when dissatisfied constituents and clients do not try to change an organization; instead they abandon it for an economically compelling alternative made possible by a fundamentally new technology. History provides numerous examples of victims of environmental collapse. These include scribes, artisans, ocean liners, the Pony Express, and--quite possibly--the Chrysler Corporation, newspapers, and the U.S. Postal Service.  

(Pogrow, 1982:611)

In similar vein, Toffler (1983, cited Shane, 1984:572) sees present-day problems in terms of an economic upheaval: one in which powerful new industries are rising up, while mass manufacturing industries such as auto, steel, textiles, and the like are in "terminal agony." He suggests that what we are witnessing is "a restructuring of the entire technoeconomic base of our society," and that our images of work and jobs are obsolete. For, while the new-style worker in the high tech, post-industrial information society will need to be more independent, more resourceful, and no longer an appendage of the machine, "today's schools
are turning out still more factory-style workers for jobs that won't exist."

And, as far back as 1977, Prof. William Westley of McGill University made the following observation in an O.E.C.D. Report on Inter-Sectoral Educational Planning:

People living in modern industrial societies, characterized by their turbulence, need to be able to develop special capacities to work. These are capacities to appreciate the context of the work they do and the decisions they make, to co-ordinate their own work with that of others in reaching collective decisions, and to work autonomously and learn what is necessary to adapt themselves to a changing work world. . . . The transformation of the work world calling for these new skills requires transformation in the schools, in the structures of the organizations in which students learn, and the goals of learning. In other words, the restructuring of the work world will require the restructuring of the educational world. (emphasis added)

(Westley, 1977:150)

Evidence to Support the General Acceptability of the Reframed Problem

Evidence was sought to indicate that the constituents and clients of our educational systems would be favourably disposed to a view that (metaphorically) sees the school as an industrial-type workplace: one possessing an organized technology that is in dire need of a change—-from mass production to process technology—-if it is to survive by adapting to a restructured technoeconomic environment.

Perhaps the most 'telling' piece of evidence in this regard is found in the following excerpt of an interview with a Canadian School District Superintendent (reported in the Victoria, B.C. Times-Colonist newspaper, January 31, 1982):
My judgment would be that if public education is to survive, the teaching force will have to be reduced drastically over the next 10 years. Teachers will have to become specialists and will have to use aides and technology much more extensively.

Education research indicates that students can learn a significant amount on their own without supervision and certainly without teacher supervision. We are going to have to remove custodial babysitting duties from people who have specialist qualifications. We have to use fewer teachers, more technology and different styles of organization to really decrease the public education bill.

...Something has to be done by the total community of parents and educators to come to grips with this very, expensive institution--and it doesn't mean fiddling with salary negotiations. It means working some fundamental changes in the system.

We are still teaching as we did in the 30's, 40's and 50's.

Diagnosis of what a child needs to know is little part of the average teacher's modus operandi.

We have talked for years about individual progress. We do very little about it. Kids are pretty well lockstepped. They are graded. They don't get out of a grade until they have spent so much time there.

This has got to be pretty sad in a technological age.

...We are going to have to use electronic teaching aids, and reorganize the schools to accommodate individual differences.

(Stables; quoted by Brown, 1982:21)

In consideration of the schools' proven record of resistance to radical change, Pedersen and Fleming (1977) projected the impact of emerging social trends on the roles of teachers and educational administrators over the following two-decade period as, "evolutionary." Within this purview, they predicted:

Technology . . . will do much to increase educational availability. Coupled with the greater sharing of information will be the impulse toward the centering of this learning on the specific needs of the student user. A wider range of programme offerings will cater to individual differences and tastes, perhaps, ultimately replacing the traditional grade progression with the concept of continuous progress. (emphasis added)

(Pedersen and Fleming, 1977:161)
While, a decade later, we might note, as did Hart in 1983, that "apparently it is still too soon to approach education as a continuous process" (p. 304), there has certainly been a marked increase over that time in the number of program offerings that cater to the needs of--at least, post-secondary--students for courses that are, from a vocational standpoint, 'technologically-relevant.' Moreover, as suggested by the large number (40%) of course categories offered by the British Columbia Institute of Technology (in 1987-88) that include the term 'technology' in their title (see Table 9.1 for examples in the field of business alone), it would seem evident that the concept of technology is now more broadly understood as meaning 'the techniques of applying organized knowledge'--rather than simply the 'hardware' required--for the accomplishment of a task.

Table 9.1
'Technology'-Titled Categories of Business Courses

Offered by B.C.I.T. in the Fall, 1987

<table>
<thead>
<tr>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADMINISTRATIVE MANAGEMENT TECHNOLOGY</td>
</tr>
<tr>
<td>BROADCAST COMMUNICATIONS TECHNOLOGY</td>
</tr>
<tr>
<td>FINANCIAL MANAGEMENT TECHNOLOGY</td>
</tr>
<tr>
<td>HOSPITALITY AND TOURISM TECHNOLOGY</td>
</tr>
<tr>
<td>MARKETING MANAGEMENT TECHNOLOGY</td>
</tr>
<tr>
<td>OPERATIONS MANAGEMENT TECHNOLOGY</td>
</tr>
<tr>
<td>TRANSPORTATION AND DISTRIBUTION TECHNOLOGY</td>
</tr>
</tbody>
</table>
That the nature of work has changed over historical times as a result of the development of increasingly sophisticated 'tools' and 'know-how' would seem to be generally appreciated, as demonstrated by the series of cartoon illustrations found on the front page of a magazine supplement to a (1983) Canadian Sunday newspaper. As reproduced for Figure 9.1, these illustrations depict changes in the techniques and tools used from the stone-age to modern times in the production of a wheel; and would suggest that the findings of the Woodward studies (with respect to the causal relationship between the technology in use and the structuring of role relationships in the workplace) would 'make sense' to most people.

It is also probable that most constituents and clients of our education systems are as aware as Shavelson and Salomon (1985:21) that, "computers are the heart of the technological revolution." However, the question, "how will we use this new technology, and what is the best use of it?" is probably still as germane today as it was when posed in 1983 by Tom Rich (of the Dept. of Education of Prince Edward Island) at a symposium on "Computers in Education" (van Raalte, 1983). For, while computers have certainly found their way into our schools over the past few years, it would seem that their introduction has not—-at least, as yet—imposed any technological imperative for structural change. That the educational effectiveness of computers has been seen, at least in some quarters, as dependent upon such a restructuring, is evident from the following comment by
Figure 9.1

"The Changing Nature of Work"

(Reproduced, with permission, from The Magazine, a Sunday supplement to the [B.C.] Province newspaper, July 3, 1983)
Oettinger (1969) was probably right in saying that a whole restructuring of the education system is necessary in order to derive maximum benefit from the use of computers. Weizenbaum (1979) puts it even more strongly in stating that schools are rapidly becoming minimum security prisons, and that until this problem is dealt with, the effect of computers will be minimal.

(Ragsdale, 1982:9)

Conclusion.

Considerable evidence has been presented in this section to support both the researcher's contention that the proposals for reform advanced by the Commission called (only) for first-order changes to the schools; and that there does indeed exist an environmental imperative for second-order change in our institutions. Added to this, substantial evidence was mounted to support the face validity of the restructured metaphor; and to warrant a "YES" response to the (Figure 7.1 directional flow chart) question regarding the PLAUSIBILITY of the restructured problem frame.

Accordingly, the next section takes us beyond this "YES" response. It moves us (as per Fig.7.1) to address the next question in the flow chart. This question is concerned with the analogical APPROPRIATENESS of the restructured complex metaphor, which, in turn, can be seen to rest upon the correspondence found to obtain between the internal properties of the simple nested metaphor of 'the school of tomorrow as a process production workplace.'
Correspondence Between the Internal Properties of the Metaphor

Since the reason for attempting to 'see' the school as a process production workplace is to generate a new analogy (so that a new systemic structure might be envisaged for schools), determination of correspondence between the internal properties of the metaphor becomes problematic. For, there is no existing 'model' (of a school having a process mode of organized technology) against which to base such a judgment. Under such circumstances--where, presumably, "anything goes"--'common sense' suggests that the perception of appropriateness is contingent upon:

(a) the creation of an imaginable pattern of related features for the subject of the metaphor (here, the school) that would seem to bear structural correspondence to the pattern of relationships seen to obtain among the salient features of the vehicle of the metaphor (here, the workplace with a process mode of production technology);

(b) the extent to which the imagined structure for the subject is deemed desirable (from the standpoint of serving its role and function in a morally acceptable way) and possible (in the sense of instrumentally obtainable).
However, the creation of an imaginable pattern of related features by which we may 'see' the school in a new way is also problematic. For, inasmuch as we already possess a conception of what schools are like, what they do, and what they are for, we are—as Wittgenstein's fly—trapped in the bottle of our own metaphorically generated 'knowings' about the school. Escape from such a trap is only possible, it would seem (Wittengenstein, 1951; Bateson, 1972; Watzlawick, Weakland and Fisch, 1974), if we are prepared to abandon the premises upon which these 'knowings' are based, i.e. to shift to another (meta) level of thinking.

Now, the metaphor of 'the school as a mass production workplace in need of gearing up to become a process production workplace' provides a framework within which such a shift in thinking can take place. But, ultimately, the shift can only occur if we are aware of, and are able to give up, the assumptions which flow from, and bind us to, the view of schooling as a mass production enterprise\(^1\).

With this caveat, then, we might proceed with the task of projecting, as outlined in Figure 9.2, an image of the school as a process production workplace.

---

\(^1\) This is not to say that, having let go of such assumptions, we cannot—if we do not care for any available alternatives—chose to return to our old way of thinking. It is, simply, that it gives us a choice not otherwise possible.
SCHOOL SYSTEM ORGANIZATION

<table>
<thead>
<tr>
<th>SCHOOL SYSTEM ORGANIZATION</th>
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<tbody>
<tr>
<td><strong>School Plant</strong></td>
</tr>
<tr>
<td>-- community-centre type complex.</td>
</tr>
<tr>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td>-- microelectronic systems/networks, video etc.</td>
</tr>
<tr>
<td><strong>Operating Procedures</strong></td>
</tr>
<tr>
<td>-- programmed instructional SERVICES provided by multimedia technology to client/worker students of all ages.</td>
</tr>
<tr>
<td>-- teachers serve as tutor/consultants to coordinate group (student-student) joint learning ventures, and assist individuals to progress along a continuum of non-graded self-paced, criterion-referenced, mastery learning of process skills (e.g. thinking, abstract reasoning, etc.)</td>
</tr>
<tr>
<td><strong>Feedback on Progress</strong></td>
</tr>
<tr>
<td>-- testing for credentialling when student ready.</td>
</tr>
<tr>
<td><strong>Marketing</strong></td>
</tr>
<tr>
<td>-- have to compete with private enterprise for market share of student-citizen 'education vouchers.'</td>
</tr>
<tr>
<td><strong>Students, teachers &amp; ancillary staff expected to:</strong></td>
</tr>
<tr>
<td>-- work as a joint-venture team in the learning process helping each other understand and improve the programs.</td>
</tr>
<tr>
<td>-- take responsibility for 'managing' the learning tools, &amp; improvising in the event of system breakdown.</td>
</tr>
<tr>
<td><strong>Staff remunerated according to qualifications &amp; level of system responsibility; &amp; perhaps with a group bonus if their standard of service increases market share.</strong></td>
</tr>
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<table>
<thead>
<tr>
<th>ORGANIZED TECHNOLOGY</th>
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<tbody>
<tr>
<td><strong>HARDWARE</strong></td>
</tr>
<tr>
<td>-- Plant involves very large capital investment.</td>
</tr>
<tr>
<td><strong>Machinery</strong></td>
</tr>
<tr>
<td>-- highly automated, single purpose.</td>
</tr>
<tr>
<td><strong>Software</strong></td>
</tr>
<tr>
<td>-- 'Blueprint' for Operating Procedures</td>
</tr>
<tr>
<td>-- provided by computerized programs that automatically control the quality of output.</td>
</tr>
<tr>
<td>-- raw material 'processed' along fast flowing quasi-continuous or continuous process systems.</td>
</tr>
<tr>
<td><strong>Feedback on Quality of Output</strong></td>
</tr>
<tr>
<td>-- provided by dynamic cybernetic systems that automatically regulate production variables.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PROCESS PRODUCTION TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant in involves very large capital investment.</strong></td>
</tr>
<tr>
<td><strong>Machinery</strong> ~ highly automated, single purpose.</td>
</tr>
<tr>
<td><strong>Software</strong> ~ 'Blueprint' for Operating Procedures</td>
</tr>
<tr>
<td>-- provided by computerized programs that automatically control the quality of output.</td>
</tr>
<tr>
<td>-- raw material 'processed' along fast flowing quasi-continuous or continuous process systems.</td>
</tr>
<tr>
<td><strong>Feedback on Quality of Output</strong></td>
</tr>
<tr>
<td>-- provided by dynamic cybernetic systems that automatically regulate production variables.</td>
</tr>
<tr>
<td><strong>Structure</strong> ~ highly independent D, M, P managerial functions.</td>
</tr>
<tr>
<td>-- organizational complexity increases with advent of new admin. &amp; technical support groups.</td>
</tr>
<tr>
<td>-- increase in levels of authority -- tall structure.</td>
</tr>
<tr>
<td>-- 1st line supervisors have smaller work groups.</td>
</tr>
<tr>
<td>-- decrease in supervisory specialization in plant.</td>
</tr>
<tr>
<td>-- everyone focused on maintaining operational flow.</td>
</tr>
<tr>
<td><strong>Marketing central to survival of organization</strong></td>
</tr>
<tr>
<td>-- always working to increase market so vast volume of fast flowing product can be absorbed.</td>
</tr>
<tr>
<td><strong>Operators &amp; supervisory staff expected to:</strong></td>
</tr>
<tr>
<td>-- stand-by to monitor machines &amp; interpret signals from the control systems.</td>
</tr>
<tr>
<td>-- take responsibility for 'managing' machines, especially when breakdown threatens.</td>
</tr>
<tr>
<td><strong>Operators and supervisory staff rewarded for:</strong></td>
</tr>
<tr>
<td>-- rational joint decision-making that keeps plant operating as near maximum capacity as possible.</td>
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<table>
<thead>
<tr>
<th>ORGWARE</th>
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</thead>
<tbody>
<tr>
<td><strong>INTELLECTUAL, PHYSICAL, SOCIAL, EMOTIONAL &amp; PSYCHOLOGICAL</strong></td>
</tr>
<tr>
<td><strong>GROWTH POTENTIAL OF STUDENTS</strong></td>
</tr>
<tr>
<td>(ungraded, unlimited volume)</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>THRUPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensional-Type Raw Material</strong></td>
</tr>
<tr>
<td>-- measured in terms of volume or capacity.</td>
</tr>
<tr>
<td>-- large volume of standardized (ungraded) product.</td>
</tr>
</tbody>
</table>

**Figure 9.2**

Implications of the Metaphor "School as a Process Production Workplace"
An overview. An overview of the implications suggested by the metaphor, 'school as a process production workplace' serves to highlight (as shown in boldface print in Figure 9.2) the changes in underlying assumptions attendant upon a (metaphoric) shift from a mass production to a process mode of instructional technology by schools. These assumptions pertain to our conceptualization of what constitutes the raw material 'thruput,' and the overall mission of the school enterprise.

The thruput of process production schools. This cannot be conceptualized as consisting of the person of the student; for the student as a person cannot be processed—as if s/he were dimensional-type raw material—along fast flowing quasi-continuous or continuous process systems (channels). The person of the student can, however, be 'treated' as an integral-type piece of raw material that is (metaphorically) sorted, graded, and batch-processed along an assembly-line (as in the cartoon introducing Chapter 6), to be 'manufactured' as an educated person, and 'turned out' in the form of a labelled (credentialed) package—as a finished graduate product.

It would, accordingly, seem that a process technology school is not best suited to the purpose of turning out graduates. It seems likely that the answer to the question "what purpose might best be served by a process production school?" would also answer the question "what might be thought of as constituting the thruput of such a school?"
Indeed, a closer look at the relationship between the raw material input and the finished product output of workplaces having mass production and process production modes of technology does suggest a basic difference in purpose, or mission between the two. Moreover, this distinction can be conjectured as flowing from two rather different worldview root metaphors for 'seeing' how something new might be 'wrought.'

The first of these metaphors—in the tradition of Democritus—perceives the 'stuff' of the universe in terms of 'things' (which are ultimately reducible to atoms). From the perspective of this worldview, new forms are produced by assembling certain component pieces according to some externally created design. The thruput of an assembly-line system, for example, is, like its finished end-product, content focussed—as we have seen in mass production manufacturing.

The second metaphor—in the tradition of Heraclitus—sees the 'stuff' of the universe in terms of 'process.' According to this worldview, all 'matter' (which is ultimately reducible to energy/ light) is constantly in the process of 'becoming' something new. In this case, the thruput is change focussed—ever flowing along an evolutionary path. There is, as a consequence, never a finished end product—only 'matter' at some evolutionary stage of 'refinement'—as we are now seeing in the process production of atomic energy, hydro-electric power, petro-chemicals, information services, etc.
With the help of these metaphors, then, we might recognize the finite product-oriented mission of the mass production school, and project for the process production school, an infinite process-oriented mission. Similarly, we can identify the mass production school as focussed on teaching (i.e. 'feeding') the right assemblage of course contents to its students so that—like containers\(^2\)—they can acquire (i.e. learn) the curriculum contents that will transform them from (integral-type) raw material to finished graduate products. Concomitantly, we might see the process production school as focussed on providing learning processes through which its students can work to bring about change in the intellectual, physical, social, emotional, and psychological dimensions of themselves (as evolving beings who are at various stages of 'becoming'). Implicit in this image is a change in the role of the student—from that of passive raw material (in the mass production school), to active (and probably voluntary) client/worker (in the process production school)—and, a corresponding change in the role of the school—from provider of credentialled graduate products, to provider of change process services.

\(^2\) One of the most pervasive metaphors to be found in education is that which likens the student to some kind of container into which information or knowledge should be poured. As observed by Freire (1970:58): "The more completely [the teacher] fills the recepticles, the better a teacher he is. The more meekly the recepticles permit themselves to be filled, the better the students they are. Education thus becomes an act of depositing, in which the students are the depositories and the teacher is the depositor . . . this is the "banking" concept of education."
The hardware of process production schools. Because the burden of finding the enormous capital outlay required by a (public) process production school falls on the public taxpurse, it might be anticipated that such plants would be expected to serve the lifelong learning needs of the community as a whole—and, be integrated with a wide range of service and recreational facilities to form a comprehensive community-centre type complex.

A broad range of (ever developing) microelectronic 'tools' and multi-media teaching aides would be housed in the school plant. And it is conceivable that students would have ready (networking) access—through their own portable computers—to more sophisticated machines located elsewhere (including home and school)\(^3\).

The software of the process production school. This might be conceptualized in terms of nested layers of programs, systems of programs, and systems of systems (of programs), designed to facilitate the storage and retrieval of information (for administrative as well as data-base

\[^3\] An Editorial Opinion found in "Educational Technology," (February 1984:6) states: "We have no doubt that one computer per child is a viable long-term goal. And we believe it will come to pass, in time. . . .

. . . . by no conceivable criteria can the schools of the United States or of any other country be considered prepared to operate under a scheme of a computer-for-each-pupil. The teachers are not prepared. And, while there is more good software than most seem to believe, still it is hardly adequate for the type of program envisioned by anyone calling for a computer-for-each-pupil. Finally, the schools themselves—the entire complex of physical and social arrangements—are not ready."
purposes), and the delivery of subject-, and of process-related instructions.

As suggested by the advertisement for the "SOCRATES EDUCATIONAL VIDEO SYSTEM" (reproduced for Figure 9.3), microelectronic software already exists for, "helping children [ages 5 and up] learn one-to-one." So, it is not hard to imagine the general nature of the increasingly sophisticated, and pedagogically effective, programs and systems that will, undoubtedly, continue to be developed along these lines. Nor—in the light of the numerous "innovative" programs of the 60's and 70's in which students (some even at the primary-school level) successfully contracted their own "continuous progress" learning schedules—is it hard to picture the kind of change in pedagogic practice that the availability of such hardware and software could facilitate.

According to this picture, students are helped by teachers to acquire the skills necessary for them to engage interactively with learning machines. Then, with the help of carefully designed computer software—that will teach, test, and give diagnostic (non judgmental) feedback directly

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4 The researcher, herself, initiated and helped develop one such experimental program (1969—1971)—"Learning Through Involvement." A 2-teacher team handled all subjects for 60 grade 8 students on an individualized, continuous-progress basis (with hand-developed tools!); with emphasis on the active involvement of students and parents in the development of the program (as detailed in The B.C. Teacher, November 1970).
Children don’t get private lessons in public schools.

In today’s classrooms, there’s just not much room for individual attention. That’s why you need to stimulate your child’s mind at home. You need Socrates.

A technological breakthrough in teaching.
Socrates is the complete Educational Video System, for ages 5 and up, that can turn your television into a one-to-one learning and fun center.
You simply connect the main unit to your TV antenna input, and your TV screen comes alive with colorful animation that guides your child through math, spelling, word games, art and music. No other equipment is necessary.
Your child’s responses to questions and problems appear on the TV screen by using a wireless remote control keyboard.
That means Socrates can be operated from a comfortable position in the room, while others can easily participate in the learning and the fun.

Math, music, art.
5 built-in subjects. Over 90 program variations.
The reason kids learn so much with Socrates is that they interact with Socrates. Not only will they see an array of animated learning aids on the TV screen, with 256-color capability, they can also hear the encouraging voice of Socrates with the optional voice cartridge.
In all, there are more than ninety involving programs that will advance your child’s thinking at his or her own pace. Math activities include step-by-step tutoring, challenging math quizzes and math games for two.
Then there are word games where kids can name the objects, learn spelling, even play Hangman, Word Search and Word Scramble.
The Socrates Super-Painter lets kids create their own computer generated drawings. And when kids tune in to the musical games, they’ll find ten pre-programmed songs to play along with. Or they can program notes to create their own songs.
Quite simply, education has never been more fun. Or is it
Adding to the system is child’s play.
Expanding your Socrates system is as easy as inserting a new cartridge. Other subjects include higher-level math programs, word programs and action games.

Socrates can also teach preschoolers numbers, letters, shapes and colors with an easy-to-use Touch Pad tablet.
And if that isn’t enough, add the optional remote Mouse system. It’s an ideal introduction to Computer Aided Drawing (CAD) systems, including four drawing modes from architecture to fashion. As an added feature, you can even store and playback drawings on a VCR unit. With Socrates, the learning and the fun will grow with your child.

Another school of thought.
Socrates can stimulate your child’s mind, build your child’s confidence and help make your child a better student. Because when it comes to Educational Video Systems, it’s in a class by itself.

Helping children learn one-to-one.

Figure 9.3

SOCRATES: Helping Children Learn One-to-One

(Advertisement reproduced with permission from "Psychology Today", September 1988: 40-41)
to the learner--students are empowered to develop basic skill requirements at their own pace. An example of such software (now available), "Just Think," is advertised (by Thomas Geale Publications, Kappan, September 1986:93) as providing:

- a complete year's curriculum with easy-to-follow directions and worksheets to:
  - develop oral language and creative design skills
  - teach comprehension and critical thinking
  - adapt to a wide range of learners (gifted, learning disabled, etc)
  - parallel multi-curricula requirements.

Acting as tutor/consultants, teachers focus their attention on helping students learn how to learn (with more emphasis on such process skills as thinking, analysing, reasoning, etc. than heretofore); and how to work cooperatively with each other on joint learning projects. Ever learning with their students, and through cooperative initiatives with other staff members--teachers serve as role models of 'good learners' for their pupils.

A variety of different patterns of groupings of students might be envisaged. For example, assuming that the school will want to offer a timetabled program of lectures, seminars, and workshops (prepared and delivered by highly competent people) to its community of learners, we might imagine participation in such events on a voluntary, mixed-age basis. Social and recreational skill-building might, similarly be offered to anyone interested in signing up;

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5 Such practice is not seen as necessarily precluding group instruction by the teacher.
and/or, be organized through the establishment of 'family' divisions within the school/community (e.g. similar to the 'house' system used in many British schools). On the other hand, skill-building in activities dependent upon the possession of certain pre-requisite skills or physical build (as in certain sports) would, obviously, entail prior qualification—as would (voluntary) presentation of student candidature for examination and academic advancement.

All in all, we might picture the process production school with an ever-changing kaleidoscope of voluntary staff and student groupings i.e. with informal structures that meet new challenges and opportunities, as they arise, for such things as creative and research oriented projects, task forces, organizing committees, etc.

The orgware of process production schools. The formal structure of (staff) role relationships can be expected to reflect the increasing complexity of the instructional (i.e. the production) technology in use.

From the perspective of the basic managerial functions (of Development, Marketing and Production), it would be more than likely that the highly specialized (and costly) task of curriculum software development would be found at a system level quite removed from the school (production plant). Indeed, it might well be found linked with the development and production of hardware, and located in the private sector (as suggested by the advertisements quoted above). Research on the best and most suitable
hardware and software for use by the educational infrastructure would probably need to be coordinated (for purposes of ensuring system-wide compatibility, and reducing purchase costs through bulk ordering) at a high level in the system. Accordingly, we might expect to find a new emphasis on **marketing** in education—both in respect to the purchasing of hardware/software materiel and specialist services from outside the system, and to the 'selling' of educational delivery services by schools to (non traditional) potential consumers—such as business, industry, and adults of all ages.

Within the school (**production** plant) itself, we should expect the demand for teachers with computer systems-related expertise (e.g. in the fields of programming, communications, and operations) to result in the creation of a new, taller and narrower, structure of staff roles. And, based on Woodward's (1958) experience of change from mass production to process technology in the petro-chemical field—where the formerly high status of the chemists was pre-empted by a new breed of process-expert engineers—we might anticipate that a change in instructional technology in schools would lead to the displacement of old-time subject (or grade level) specialists and departments by a new breed of systems analysts whose expertise would be applicable at all levels in the school.

Concomitantly, (in keeping with Woodward's findings noted on pp. 133, 134) we should expect there to be an increase in:
(a) the graduate level work required by supervisory personnel (i.e. teachers and administrators);

(b) the number of rungs in the teachers' career ladder;

(c) the ratio of indirect staff (e.g. clerical aides, lab. and computer-systems technicians, counsellors, and co-curricular practitioner personnel) in proportion to the (direct) student (worker) body.

And, we should expect there to be a decrease in:

(d) the overall number of qualified (master) teachers required to supervise students (from a 'control' point of view), and, therefore, a decrease in the percentage of the total educational budget (at the District level) spent on labour costs;

(e) class size (span of control of the first-line/teacher supervisors);

(f) specialization between functions of management (e.g. between old-time grade level and subject specialists); for when the objective is to help students learn how to learn, the focus is on more general process skills rather than on specific content knowledge;

(g) the separation of administration and the supervision of production (i.e. a greater involvement on the part of school administrators with pedagogic concerns and with staff development).

With respect to working conditions for students and teachers, we might expect the advent of process technology (with its imperative to work the plant to full capacity) to result in an extended day (if not round-the-clock), round-the-year operation of the school plant. However, while organizational flexibility to experiment with such things as length of school day, term (semester, trimenster, quarter) cycles, is decreased, so too are the frustrations attendant upon such decision-making choices. Similarly, choices around which learning programs to use are likely to be few,
given the likelihood that the need to ensure hardware and software compatibility, and to reduce purchase costs, will necessitate these decisions being made—with very great care, and rationality—at a higher system level.

As a result of greater rationality in decision-making at the District level, and the elimination (through self-paced learning by students) of the need to keep 'control' of batched classes, we would expect teachers to find greater job satisfaction. And, as a result of empowering students to learn at their own pace, and to undertake their own formative evaluation by means of computer-processed criterion-referenced tests that focus on mastery, rather than on norm-related scores, we can expect that all students will know what it is to succeed, and will be greatly motivated to learn. Moreover, it could be expected that the de-emphasis on individual competitiveness, the promotion of cooperative joint learning ventures among students, and the institution of a client/consultant relationship between students and teachers, would result in a harmonious and happy work environment for all concerned.

It might be expected that school staff would be remunerated according to their qualifications, and to their level of attainment along a graduated career ladder of differing job responsibilities; and that bonuses for overall school achievement (e.g. for attracting high enrollment figures, for student performance on external examinations) might be earned by the school, and shared amongst the staff.
Correspondence Between the Change
Properties of the Metaphor

The nature of both process production schools, and the environmental conditions in which they might exist in some future time is highly speculative. This renders the assessment of correspondence between the change properties of the vehicle and the subject of the metaphor a somewhat tenuous activity—certainly, one requiring assumption-making about change.

Some assumptions about change. One such important assumption is that our societal environment will, as predicted by Toffler (1983) and others, continue to be characterized by increasing turbulence. This raises questions about how our school systems are to manage system-change for survival under such conditions. For history suggests that, to date, they have acted as systems in-equilibrium, or in-near-equilibrium environments. System change under such conditions is characterized, as already noted, by morphostasis—i.e. by deviation-correcting (first-order) changes that help keep the system in a steady state; one in which 'plus ça change plus c'est la même chose.'

Now, a different kind of system change has been mooted as necessary for system survival in the case of systems that find themselves in a far-from-equilibrium state. It has been suggested that such systems need to (metaphorically) 'gear-up' (as if they were gear-shift cars), by engaging in morphogenic (deviation-promoting) or second-order, change i.e. to change their change practices,
and thereby their structure.

What we don't know, however, is the nature of the structural features that characterize a system that has to function, and survive, in a state that continues to be far-from-equilibrium. For, we are still trapped—with Wittgenstein's fly—in the (metaphoric) bottle of what we 'know' about system functioning in near-equilibrium situations. We are caught in what Sawada and Caley (1985) have called 'The Newtonian Legacy.'

The Newtonian Legacy. According to Sawada and Caley (1985:15), "The Newtonian Legacy is exemplified by a system at-equilibrium." Such a system is "complete, objective, stable, homogeneous, and deterministic." Accordingly,

Schooling at-equilibrium is epitomized by the "tight ship" or "top down" school that some principals pride themselves on directing: Everything is ordered, in balance, in the proper form at the scheduled time in accordance with the rules. These formal aspects of the school are the legacy of the Newtonian Paradigm.

(Sawada and Caley, 1985:15)

This paradigm is seen as embracing the normal curve, "the epitomy of prediction and control" (p.15). And it is noted that living under the 'normal' metaphor means that "any initiative fighting to overthrow the metaphor will be met with awesome stabilizing forces" (p.16). The pattern of (first-order) change works constantly to eliminate any deviation from the 'norm'; so that innovation is mere fashion, and bandwagon in effect. To Sawada and Caley it constitutes "living under the metaphor of Being at-
equilibrium," in a condition that prevents any real change. For the only change possible is in space and/or time; changes which Sawada and Caley suggest are merely permutations and combinations of existing information.

Thus Becoming within a system at-or near-equilibrium is but an illusion: There is no real change, and progress is simply more elaborate variations on the same theme. Change in this mode always leads back to the Being from which it emerged, the full participation in the metaphor of "normalcy" as formed by the Newtonian worldview. Thus education will remain the cyclical overlay of fads and fashions; the themes from the 17th century are again the "hits" of the 20th century. Unless some revolutionary metaphors are found to break this stabilizing cycle, the 21st century will be a very unbrave old world, slowly but increasingly rushing to its own entropic (heat) death (Rifkin, 1981).

(Sawada and Caley, 1985:16)

**Beyond the Newtonian Legacy.** One way to overcome the stabilizing force of 'normalcy,' suggest Sawada and Caley, is to deny the Newtonian legacy by simply stopping the imposition of stabilizing boundary conditions, i.e. by letting go of 'control.'

Now, from the perspective of the Newtonian paradigm this would be considered an illogical\(^6\) thing to do. For, it would be seen as allowing the system to get into a state of

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\(^6\) In this regard, Watzlawick, Weakland, and Fisch (1974:24 + 27) note: "... it is our experience that second-order change appears unpredictable, abrupt, illogical etc. only in terms of first-order change, that is, from within the system. ... . It will be remembered that second-order change is of the next-higher logical order, the \((n+1)\)th level, than first-order change. It cannot, therefore, be expressed in the language appropriate to first-order change or achieved by the methods applicable to the first-order change level without causing the most perplexing, paradoxical consequences."
disarray. However, in light of the recent discovery that turbulence—which we have for so long identified with disorder and disarray—is also (on the microscopic scale) a source of order, then Sawada and Caley's idea of letting go of stabilizing 'boundary control' (and letting some turbulence in) may not be so illogical. It actually stems from a radically new theory of self-organizing, self-regulating systems. These are systems that are seen as capable—in a far-from-equilibrium situation—of internally generating fluctuations which, at some point, will make possible the occurrence of a spontaneous and dramatic reorganization of matter and energy. Systems capable of such re-ordering are known as "dissipative structures".\(^7\)

Having found that the notion of dissipative structures underlies recent developments in a wide variety of scientific disciplines, Sawada and Caley suggest that it holds promise for creating new realms of meaning in education. To this end, they have proposed the theory of dissipative structures as a new metaphor for 'Becoming' in education; and have interpretively transposed the characteristics of systems in far-from-equilibrium situations (Prigogine and Stengers, 1984) into what might be considered analogically corresponding educational terms.

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\(^7\) Sawada and Caley footnote: "The term dissipative refers to the fact that systems of this type must take energy and/or matter from the environment (thus by implication dissipative structures are bounded) and use that energy and matter to maintain their existence with equilibrium as the lowest possible state. The laws of thermodynamics ensure that some of the energy is lost or dissipated during the maintenance process" (p.18).
Education as a system far-from-equilibrium. To start with, Sawada and Caley relate differences in the behaviour of close-to and far-from-equilibrium systems (noted in the following excerpt cited from Prigogine and Stengers) with differences in educational research paradigms:

In contrast with close-to-equilibrium situations, the behaviour of a far-from-equilibrium system becomes highly specific. There is no longer any universally valid law from which the overall behaviour of the system can be deduced. Each system is a separate case; each set of chemical reactions must be investigated and may well produce a qualitatively different behaviour.

(Prigogine and Stengers, 1984:144-145; cited Sawada and Caley, 1985:17)

Sawada and Caley infer from this that the search for sweeping principles of instruction would be counter-productive (in a far-from-equilibrium education system); and, note that "the investigation of situation specific systems in search of 'qualitatively different behaviour'" that is implied, is a "radical departure from the hypothesis refutation logic of classical educational research" (p.17).

The second interpretive point made by Sawada and Caley refers to the participation of the teacher as a role model.

... in far-from-equilibrium situations, the participation of a role model in the process of education functions as a catalyst in the Becoming of students. The role model acts initially in a cross-catalytic manner, and as the students progress they become auto-catalytic. This is a powerful metaphor. It demands that teachers continually Become as they guide their students through the processes of Becoming.

(Sawada and Caley, 1985:17)
Thirdly, they make (from the findings of Prigogene and Stengers) the following important inferences:

(a) communication is the vital process through which self-organization emerges, and

(b) the system itself determines its own size and structure.

In educational terms, Sawada and Caley translate this as meaning that the school (in a far-from-equilibrium situation) will be a self-organizing community where teachers and students will be very sensitive listeners (both verbally and non-verbally). Moreover,

Membership in the community, like all decisions concerning the community, cannot be made unilaterally by teachers since the community will determine its own intrinsic size. Teachers will not, therefore, impose "admission policies" based on criteria extrinsic to the [school]. The [school] will not be chaotic or random, a system gone haywire. On the contrary, '... the system may display stationary, time-independent behaviour, and stable spatial structures may appear' (Prigogene and Stengers, 1984, p. 149).

What can [school] members do to guarantee that stable structures appear that support their community? Nothing! There are no guarantees! In this context there are no universal laws! It is important to realize this. Nothing will guarantee the emergence of particular stable structures. A desire for such control simply results from participating too long in the normal metaphor.

(Sawada and Caley, 1985:17)

An educational computer environment was set up by Sawada, with the explicit intent of achieving a community in which the members would often be in far-from-equilibrium states (i.e. be engaging in creative, and—in 'normal' school terms—'deviant' behaviour). This condition was facilitated by promoting the participation of children, from
grades 1 to 6, in open-ended projects in which there was free choice to identify and pursue interests, usually with the aid of a computer using LOGO.

The study suggested that,

The child, as a "pursuer of projects" was not so much a "pursuer of learning (Being) as he/she was a "pursuer of knowing (Becoming). The child was a knower, or better still, an epistemologist in the sense of Papert (1980); it is the "child as epistemologist" that consciously propels the child toward new realms of Becoming. . .

and,

All this creation of new order has a price; it cannot be created out of nothing (the first law of thermodynamics). The price (production of entropy) is the destabilization and self-reorganization of the classroom: No longer can the classroom be the scene of orderly "progress." All semblance of an assembly line will disappear. For educators who like a neat tidy classroom, the price may be too high. For those who like to live as epistemologists sharing the investigative wonder of children Becoming, the "price" will constitute a new lease on teaching. (emphasis added)

(Sawada and Caley, 1985:18)

Conclusion

Now, there would seem to be considerable compatibility between the features of the school posited by Sawada and Caley (and the computer environment set up by Sawada) under the metaphor of systems in far-from-equilibrium situations, and the characteristics projected (earlier) for the school as a process production workplace. Accordingly, it might be concluded that if Toffler is right about the environmental turbulence to be encountered by tomorrow's schools, the process production school might well be viewed as a system with a dissipative structure, and as possessing appropriately corresponding change properties.
UTILITY OF THE REFRAMED PROBLEM

In the last section, we examined the change properties of (the metaphor of) the process production school, by analogically relating it to a projection of the school as 'a system with a dissipative structure in a far-from-equilibrium environment.' Finding an appropriate analogical correspondence to obtain between the features of the schools described in each case, we are led into a tacit conceptual fusion of the two metaphors. It is, accordingly, proposed that before embarking upon an examination of the value implications of the metaphor, this fusion be acknowledged by reframing the metaphor as follows:

"THE SCHOOL OF TOMORROW AS A PROCESS PRODUCTION WORKPLACE WITH A DISSIPATIVE SYSTEMIC STRUCTURE."

Acceptability of the Value Implications of the Metaphor

On the face of the data gathered by this study, it can be argued that the process production school—in contrast to the mass production model—actually has the capacity to meet our most deeply cherished goals; to wit, the provision of educational services that:

* recognize individual differences (between students),
* give all students equal educational opportunity to—
* realize individual growth potential.

This argument, however, is predicated on two assumptions.
The first assumption is that the process production school will not be so considered unless it meet all the criteria proposed in respect to the complete compatibility of its hardware, software, orgware and thruput. For, clearly, it would be possible for computer hardware and software to be introduced into today's schools without there being any change made to their role and mission, and thereby their mass production orgware and thruput—so that, in effect, the school would remain operationally unchanged.

Similarly, the school can be expected to remain virtually unchanged while the Newtonian paradigm holds court (Sawada and Caley, 1985). Accordingly, the second assumption is that the process production school will be a manifestation of total (educational) system change (i.e. not a singular aberration such as Summerhill\(^8\)); one marking the end of the ascendancy of the normal curve\(^9\). For, it can be seen that the batching and tracking of students on the

\(^8\) Neill's (1962) "Summerhill" tells of an internationally renowned, small (45-70 pupil), 'progressive,' English boarding school (for children from ages 4-16), founded by Neill in 1921, and run by him for some 40 years. Of course, it lacked the hardware and software of process production that is only now beginning to be available to us; but, from the standpoint of its operational philosophy—which focused on student self-management, and freedom of choice—the orgware and thruput of Summerhill might well be viewed in terms of our model for a process production school.

\(^9\) Inasmuch as a public process production school with a dissipative systemic structure could not exist within the Newtonian paradigm, this assumption is unnecessary. The point is made, however, to draw attention to the fact that our espoused values are not, and cannot be, met while our schools are subject to the Newtonian principles that have guided the way they 'normally' operate.
basis of 'normal' distribution has proved antithetical to the realization of our most cherished educational goals (i.e. of recognizing individual differences, providing equal educational opportunity for all, and aiming toward the realization of potential for all students).

The values implied by process production. The values implied by process production would appear to be congruent with those we hold dear, and have so far been unable to achieve. For, first and foremost, the hardware and software of process technology make possible the (long called for) individualization of instruction. This means that every student could have equal access to the very best instruction and methodology available, i.e. state-of-the-art instruction that is tailored to meet our individualized learning needs at any given moment, wherever we might fall on continua ranging from 'gifted' to 'handicapped,' 'left-brain' to 'right-brain,' 'very dyslexic' to 'only slightly dyslexic,' etc.

The secondary effects of being able to deliver individualized instruction are numerous; and the extent to which these are also congruent with our espoused values is noteworthy. They might be categorized as falling under one or other of the following four headings:

(1) Potential for actualization.
(2) Promotion of self-regulation.
(3) Increased production.
(4) Decreased (financial and human) costs.
Potential for actualization. In reporting on the outcome of a sociotechnical change project called "The Baric Experiment," Bain (1982:51) observes:

... relevant to the current debate about the supposed dehumanizing effect of new computer technologies, the Baric experience indicates that the reverse is possible, that a more advanced computer technology can provide a greater range of tasks and satisfactions than is possible using less advanced technologies.

Certainly, evidence suggests that the freedom from teacher-led, class-paced instruction, and the introduction of non-judgmental feedback that computer program learning affords, provides students with conditions that are conducive to what has been called 'real learning' (as opposed to mere rote memory learning). Sawada and Caley (1985:18) suggest that, "as investigator, the child becomes, more and more, a self-actualizing epistemologist (Sawada 1985)—thus Knowing and Becoming are one."

If it is assumed that every person has the capacity to 'become' self-actualized in this way, and that the individualization of instruction made possible by process technology can be positively used by educators to achieve this end, then such an outcome would surely be considered of the highest value. It would certainly seem to be a more worthy goal that that which currently exhorts us to strive for "excellence"—when by definition (in the world of the 'normal' curve) this can only ever be achieved by the 'top' 5% or so of strivers.
Promotion of self-regulation. Because interaction with a computer requires knowledge about, and very conscious awareness of, the language of instruction (as opposed to the content of what the instruction is about), users are trained to be very much more accurate in their communication with the machine than they ordinarily are with each other. This consciousness of process represents a different order of logic from the consciousness required to focus one's thoughts on the content of a 'conversation.' It is also a pre-requisite of reflective self-awareness. The ability to be reflective, to 'witness' one's behaviours (and feelings, thoughts, emotions) is a necessary first step in becoming a self-regulating and adaptive human 'system.' And since the language of process must surely be the lingua franca of the process production school, we might suppose that the discourse between students and teachers would, there, be conducted on at least two levels, if not a third (e.g. let's talk about how we talked about the talk you gave to the group)—with the result that not only students and their teachers, but the school community as a whole, are enabled to become self-regulating and adaptive systems.

As students become self-regulating, they do not require to be disciplined (as Neill's experiences with students at Summerhill attest). And, when treated as self-regulating individuals, students (and teachers) enjoy a feeling of being integrated within the school organization. Moreover, integration is actualized when they contribute jointly with 'management' in decision-making that affects
their 'work' lives in the school (again, as witnessed at Summerhill). The increase in participative, and cooperative practices in the school can be viewed as valuable both in terms of developing a sense of belonging, and healthy self-esteem for all participants, and of developing in students the attitudes and behaviours that will stand them in good stead as they move into the world of work, and the global village in which they are to reside.

**Increased production.** It can, clearly, be expected that the advent of process technology will bring increased productivity\(^\text{10}\). Not only is there likely to be more efficient utilization of school plants (as they operate round-the-clock, round-the-year), but, undoubtedly, a more effective use of pupil and teacher time when (a) student learning is not slowed down by class-pacing, and (b) teachers don't have to waste their time with issues of 'crowd control.'

However, inasmuch as process technology increases the capacity of the school to focus on such process skills as thinking, analysing, abstract reasoning, problem solving, etc., it is likely that the assets most valued from increased productivity will be appreciated in qualitative

\(^{10}\text{In their research on the effects of flat and tall organization structures, Carzo and Yanouzas (1969:191) found that "structure did have a significant effect on performance as measured by profits and rate of return on sales revenue. Groups under the tall [process] structure showed significantly better performance than groups under the flat structure.}
rather than quantitative terms. One of these may well accrue from the greater incidence of student-student interaction through joint project work. For research (Johnson, 1981) has indicated that while teacher-student interaction is emphasized, and student-student interaction eliminated in many traditional (mass production) classrooms, it is student-student interaction that may be a more important determinant of educational success. In the same vein, research has suggested that cooperative learning experience may be far more effective in promoting desired educational outcomes than the practice of competition and individualistic learning that currently predominates.

Shifting from the production of a finite number of graduate products into the business of providing the entire community with infinite 'change services' can be seen to support the relatively recent valuing of 'lifelong learning'—along with an invaluable, never-ending market of lifetime learners to absorb whatever the school can produce.

Decreased *(financial and human)* costs. These must be considered valued outcomes of any enterprise. And, predictions are that—after the initial outlay of capital for retrofitting the schools with the necessary hardware and software, and the staff with new skills—schools will be operationally more cost effective.

But, no doubt, the greatest saving would accrue from the elimination of the human waste that is now dumped into the societal environment in the form of un-recycleable
educational rejects, and dangerously alienated 'drop-outs.' For it can be anticipated that these problems would all but disappear from the process production school—for many of the reasons already touched upon. However, the following excerpt from an article in Process Technology International, (about the changing attitude toward protecting the environment from pollution by aqueous wastes) is of more than passing interest if applied metaphorically to education:

In the past it was often the custom in preparing the flow sheet of a project to neglect the real impact of the wastes resulting from a process, and merely to indicate their existence on the flow sheet. The details required for the treatment required for their disposal would be absent. Nowadays the engineer faces the issue squarely at the process plant design stage and so regards the process proper and the treatment of the resulting wastes as an integral whole, with the possibilities of recycling a recovered value to process, or changing the manufacturing route so as to minimize the production of waste, kept to the forefront. (emphasis added) (Macdonald and Chem, 1973:309)

Capacity of the Reframed Problem to Lead to Action

As the capacity of any frame to lead to action will depend on the support it can attract from those in a position to lend (capital "P") "P"olitical leadership, and to exert (little "p") "p"olitical influence, evidence was sought that such support might be forthcoming for the metaphor of the process production school. However, since no other reference to this metaphor (per se, i.e. as it is presented in this study) could be found, the evidence sought had, perforce, to be of a metaphorically suggestive nature.
Evidence of "P"olitical support. That "P"olitical support exists for considering the role of technology in the restructuring of schools (in the U.S.) is evident in a report by John H. Sununu (1986), Governor of the State of New Hampshire, and Chairman of the NGA Task Force on Technology. The goal of this task force was to make recommendations to governors (of states) regarding policies and programs that focus on the effective use of technology in the classroom. In this report, Sununu observes that "despite more than a billion dollars in purchases and an incalculable amount in donations nationally during the past few years, schools have generally not become more productive through the use of technology" (p.220). And, he suggests that Americans have not, as a nation, invested in the kind of research and development needed for technology to be rendered useful to students in schools; and that one reason technology has failed to achieve its potential in the past is that "not enough high-quality training was provided for teachers and others who were to use that technology in the schools" (p.220).

The following things are clear, says Sununu:

First we should be thinking about a variety of machines--satellite television, videodiscs, robots--not just computers. Then, too, not enough school districts are planning for their use of technology. . .

No single school--not even an entire district--is a sufficiently attractive market to influence those who create and sell hardware and software. And education has paid a price because of this reality. Noncompatible computers, other machines, and software are stacked in closets. We need to help reorganize the marketplace, and states are the natural level of government to help aggregate markets. . .
Indeed, this situation is not at all parochial in scope. Because the manufacturers of these high-tech machines and software have a national market, aggregating markets across state borders may be necessary to significantly influence the manufacturers' actions.

... It is essential to restructure the schools, but the role of technology in the restructuring remains elusive. We must encourage experimentation. We need to find out more about how computers can help teachers and administrators change their ways of doing business, how staff and student ratios can be changed, and how students can learn at their own pace.  
(Sununu, 1986:220)

It can be noted that every one of the points made by Sununu is consonant with the picture projected for our model of process production schooling.

Evidence of "political support. In September, 1985, the (U.S.) Committee for Economic Development (CED) released a policy statement titled, "Investing in Our Children: Business and the Public Schools." According to Doyle and Levine (1985:114), "the CED policy statement will be taken seriously because the 200 members of the Committee for Economic Development are drawn from the highest ranks of the U.S. business community and academia."

Viewing the quality of the U.S. public schools from the unique perspective of the corporation, it is not surprising to find that "corporate executives see the production of tomorrow's workforce as one of the most important functions of the school" (p.118). However, what was found to surprise many educators was that:

... the CED policy statement issues a call for liberal education--by which it means schooling that teaches students to think critically and analytically, to cooperate and communicate as well as compete, to assume responsibility for themselves [be self-regulating], to solve problems, and to continue to learn...
In the late 20th century, all students leaving secondary school need the same set of skills—whether they are entering the workforce, enrolling in institutions of higher education, or enlisting in the military. No longer does the nation need one group of students narrowly trained in academic pursuits and another group narrowly trained in vocational skills. All young people today need "higher-order cognitive skills." In other words, they need to know how to think.

No humane or practical society can afford to let large segments of its population fail. That practice is both wasteful and dangerous. What, then, are the strategies that will prepare all youngsters for the future?

In tomorrow's workplace, success will go to those individuals who are flexible and adaptable [as are self-regulating dissipative structures].

(Doyle and Levine, 1985:118)

If the school is no longer to sort and stream students along academic and vocational tracks, or to fail large segments of its student population—but is to prepare all students to assume responsibility for themselves, to think critically and analytically, to communicate and to cooperate, and to continue to learn—we have a school that sounds very like our process production model.


Without touching, here, upon the nature of the 'control theory' that underlies Glasser's model, suffice it
to say that its cornerstone is cooperative, or team learning. (Glasser is an advocate of group work because he considers that being a member of a team helps people feel important, and satisfies their basic need for 'belonging'.) Some of his other ideas—ones which seem to reflect the essence of process production orgware—can be captured by this response to an interview question asking him what role the teacher plays in dealing with learning teams.

The teacher acts as a consultant, a facilitator—someone who lectures once in a while, who teaches traditionally at times, but who also teaches nontraditionally, moving (as a good manager) from team to team to give leadership, support, and encouragement to the students (who are the workers). Control Theory in the Classroom contains an important chapter on the teacher as a manager—because, if teachers see themselves as workers, they will try to stimulate the students [according to stimulus/response theory under which Glasser maintains everything currently operates], and, in so doing they will treat the students more as objects and less as human beings. This new role for the teacher is another facet of my vision of a control-theory school.

(Glasser, quoted by Gough, 1987:659)

Evidence of action begun. Following the findings of A Study of High Schools (1984) another project (centered at Brown University in Providence, R.I.) was set up by the co-sponsors (the National Association of Secondary School Principals and the National Association of Independent Schools) called The Coalition of Essential Schools. According to its Chairman, Sizer (1986), the Coalition is "a practical effort at "rebuilding," at making new compromises in the goals and procedures of schooling that will allow for better performance by students and more sensible conditions of work for teachers" (p.38).
The Coalition partners (40 schools) are tied together by a set of ideas, the practical expression of which varies with each school community. These ideas are reduced to a set of nine generally stated principles, or Common Principles of the Coalition. Now, while most of these principles are consonant with those of process production, the following three point have been selected as being particularly reminiscent of our process production model:

5. **Student-as-worker**
The governing practical metaphor of the school should be student-as-worker, rather than the more familiar metaphor of teacher—as—deliverer—of—instructional—services. Accordingly, a prominent pedagogy will be coaching, to provoke students to learn how to learn and thus teach themselves.

8. **Staff**
Principals and teachers should perceive themselves as generalists first (teachers and scholars in general education) and specialists second (experts in one particular discipline). Staff members should expect multiple obligations (teacher-counselor-manager) and should show a sense of commitment to the entire school.

9. **Budget**
Ultimate administrative and budget targets should include, in addition to total student loads per teacher of 80 or fewer pupils, substantial time for collective planning by teachers.

(Sizer, 1986:41)

Other initiatives which are suggestive of action in the direction of the process production metaphor include school restructuring through the creation of career ladder models, and group faculty rewards for effectiveness. According to Pipho (reporting in 1987), North Carolina was moving ahead on its teachers' career ladder model (then in
The North Carolina career ladder plan provides a differentiated salary structure that is tailor-made for the lead teacher concept proposed by the Carnegie Forum. The North Carolina school systems taking part in the project are working toward the establishment of teaching departments headed by lead teachers, who will have control over decisions related to instructional strategies, the assignment of teachers and students, and the use of time during the school day.

(Pipho, 1987:351)

Pipho (1987) also reports that in Utah, the state affiliate of the National Education Association approved a package (that would be introduced in the legislature early in 1987) that would create a system to reward effective school faculties.

Teachers and principals, working in teams at the building level, would decide how to earn and how to spend their rewards. A given faculty would be rewarded to the extent that its school met a set of criteria for school effectiveness. [a bonus to be shared!]

(Pipho. 1987:351)

Conclusion

Based on the foregoing, it might be concluded that—at least, in the United States—the metaphor of the process production school would be likely to win the endorsement of the "P"olitically powerful members of the (U.S.) NGA Task Force on Technology, the "p"olitically influential members of the Committee for Economic Development, and the not inconsiderable following of William Glasser. It would, moreover, be reasonable to suppose that the participants of the Coalition of Essential Schools, and those other
educational practitioners who have begun the process of restructur- ing their schools, might identify within the metaphor of the process production school their own vision of the future of schooling.

Indeed, it could be that for those who have intuitively recognized the need for a shift in the role of student—from passive object (raw material) of teacher 'treatment' to active, responsible 'worker'—the way of framing the problem of schools that has been presented here might come as a welcome rationalization. Bearing, as it does, considerable face validity, it could well serve as a conceptual framework for helping to integrate and give direction to a host of future change initiatives. It holds promise of acceptance in that it maps 'elegantly' and 'pragmatically' onto the existing metaphor of the school as a mass production type workplace; and could be more robust than other metaphors that have the same intent, but which (like Goodlad's 1983 'school as an ecosystem') are too far removed from our current understanding of what school is like.

Seeing considerable promise, then, not only in the value implications of the process production metaphor as a way of visualizing schools of the future, but in its capacity to lead to action, it would seem appropriate to confirm the utility of the larger restructured 'metaphor for change'; and to examine (in the next chapter) the implications for policymaking, at the school and school system levels, of so reframing the problem of schools.
Chapter 10

IMPLICATIONS OF THE REFRAMED PROBLEM
FOR POLICYMAKING

Industrial Man was machine-tooled by the schools to occupy a comparatively permanent slot in the social and economic order. Super-industrial education must prepare people to function in temporary organizations—the Ad-hocracies of tomorrow.

.......

Organizational goals ... of the Future thus become clear: dispersal, decentralization, interpenetration with the community, ad-hocratic administration, a break-up up of the rigid system of scheduling and grouping. When these objectives are accomplished, any organizational resemblance between education and the industrial-era factory will be purely coincidental.

(Toffler, 1970:362-363)

Examination of the policy-related utility of the reframed problem of schools led (in Chapter 9) to the conclusion that educational policymakers might find it fruitful to (metaphorically) view today's schools as (if they were) mass production workplaces 'gearing-up' to become technologically more advanced process production workplaces of tomorrow. If policymakers were to employ such a 'metaphor for change' for purposes of projecting future demands, they would need to have a ready appreciation of the implications it suggests for policymaking in general, and for the strategic planning required of them, as leaders,
in particular. The implications for policymaking presented in this chapter are intended to serve this end.

EXAMINING THE IMPLICATIONS OF THE METAPHOR FOR CHANGE

Before embarking upon this examination, it might be wise to recall that the nature of metaphor is such that it does not signal itself to be a metaphor. Accordingly, while we understand, at one level, that to say, "the school is a mass production workplace" actually means, "the school is seen as if it were a mass production workplace," our subsequent discussion of the proposition has the effect of reifying it. As a consequence we are led into believing that what we are dealing with is literal reality. With this in mind, we shall need to remember that—notwithstanding the plausibility, appropriateness, and utility of the metaphor for change developed in this study—it represents merely one way of 'seeing' and framing what is currently problematic about our schools. In the same vein, the implications suggested below can be seen to be mere speculations¹. They are drawn from a 'model' of the future that has been hypothesized by others, and to which the model of the

¹ It might be noted in this connection that, according to Dror (1968:244):

Policy science should favour innovation and should try to achieve significant breakthroughs in designing policymaking systems. Searching for new alternatives for public policymaking requires imagination, and a recognition that hypothetical speculation is a legitimate pursuit of policy scientists, so long as it is clearly labelled as such. (emphasis added)
process production school as a system with a dissipative structure would, with some plausibility, seem to belong.

The implications so suggested are presented in systemic order, beginning with the implications of the metaphor for society at large. Next are the implications that would seem of consequence for educational policymaking at the school system level. Following this, is an examination of the implications of the metaphor for change in the school itself, with particular reference to the difference between the policy implications of this metaphor as opposed to those emanating from the Commission report, "A Nation at Risk."

Implications for Society

It was noted (in examining the acceptability of the value implications of process technology, Chapter 9) that while the process production school holds promise of having the capacity to meet our most cherished educational goals, this promise is premised on two assumptions. The first was that such a school not be so labelled unless it meet all the criteria proposed in respect to the complete compatibility of its hardware, software, orgware, and throughput. The second was that the process production school be a manifestation of total educational system change, one marking the end of the ascendancy of the (Newtonian Legacy of the) normal curve. Now, given that the educational system is nested within the larger societal context, we could hardly entertain the possibility of such a shift occurring, unless it were,
itself, a manifestation of a larger system shift—one that transported society-at-large 'beyond the Newtonian Legacy.'

**Beyond the Newtonian Legacy.** According to D. E. Beck (1982:79) the beginnings of a fundamental change in our thought, perceptions, and values "are already visible in all fields and are likely to dominate the present decade." Beck describes some differences we might expect to find between the worldview bequeathed us by the older (Newtonian) physics, and that spawned by the new physics.

If the worldview is Newtonian, the brain will be seen as mechanistic with separately functioning parts; psychology will be dominated by categories, types of people, with the mind and body separate; organizations will be static, linear, hierarchical, with a clear division of labour and differentiated levels of responsibility and status.

If the worldview is holistic, the brain will be seen as an organic/holistic mosaic influx with constantly changing gestalts; psychology will fuse biological and sociological models that define a human being as a total living system; organizations will be seen as synergistic processes in constant motion with the flow of the arrangement of people determined by the flow of the function; training and development will be closely integrated into the basic organizational or societal processes and tuned to the natural way and time that different people "learn" and "develop."

(D. E. Beck, 1982:80)

In keeping with the Prigogene and Stengers' (1984) description of the nature of dissipative structures, Beck suggests that the newly emerging worldview is based on "the internal plasticity and flexibility of living systems, whose function is controlled by dynamic relations within a situation, rather than rigid mechanical structures" (p.79).
It would certainly make sense to suppose that if, in order to survive emerging environmental conditions that are far-from-equilibrium, the school is to be seen as needing to gear up to a new systemic order (as a dissipative structure), the same would be true for the societal suprasystem in which the school system is embedded. Such a requirement would bear implications for those in leadership and culture-building roles; for they would be needed, as noted by Toppin (1982), to break down opposition to change by helping to change people's perceptions. Without such a change, our societal institutions would be in danger, suggests Pogrow (1982:611), of falling prey to a phenomenon he calls "environmental collapse."

**Environmental collapse.** It will be recalled (from Chapter 9) that environmental collapse occurs when clients/constituents of a system are so dissatisfied that they stop bothering to try and change the organization. They simply abandon it "for an economically compelling alternative made possible by a fundamentally new technology." Now while the requirement for technological currency is probably most apparent in the industrial sector, where market competition serves to spur on the drive to be continuously innovative in the way goods are produced, this drive for up-to-dateness has not been so apparent in the way society has traditionally provided services (e.g. rail, dockside, postal, transportation, housing, health care, education, etc.). Clearly, if the environmental collapse of publicly
owned/operated institutions were to be avoided, very careful planning and decision-making would be required. For, the social interest might not necessarily be best served by the simple expediency of privatization—as we might conjecture in the case of public education.

Privatization of education. If the school system is not geared up to integrate computers and other microelectronic tools into classrooms in such a way as to release teachers from the delivery of basic skill instruction, it is conceivable that the system will, as Pogrow asserts, suffer environmental collapse. As more and more companies get into the business of producing affordable home-computers, and effective software for the delivery of basic skill instruction, the more likely it is that a tax-paying public will opt for competing alternatives to an increasingly costly public education system. For, as Pogrow (1982:611) suggests, "through technology . . . small private schools will be able to offer comprehensive curricula at less expense than at present. Tuition tax credits would further reduce cost differential between public and private schools . . ." Were such a situation to eventuate, and lead to an exodus from the public school system of a substantial number of students from middle and upper income families, there would, clearly, be serious implications for the resultant status of public schooling.

It is also clear that the kind of changes required to replace the present labour-intensive delivery of basic
skills instruction with computerized instruction are well beyond the capabilities of individual schools, and school districts. They represent changes that need to be inspired and led from the 'top'--carrying implications for both political leadership, and educational policymakers.

**Implications for Educational Policymaking**

First, and foremost, it would need to be recognized that a societally-driven imperative to gear up to a more advanced technological future would place an enormous demand on educational institutions to produce an appropriately educated and trained citizenry; and that this could simply not be accomplished unless these institutions were themselves operating as role-models. For, the issue, here, is much broader than that of merely teaching people how to operate and use new machines. It involves socializing them for new roles in entirely different kinds of workplaces from those operated in the old mass production tradition. It will require the learning of whole new ways of thinking and interacting, ways epitomized by the shift suggested earlier (by Beck) in respect to the change from a Newtonian to an holistic worldview.

The task of restructuring our educational systems to meet such societal needs is, clearly, one requiring careful, and long-range planning. Such planning would need to be predicated on a clear vision of the desired end-state to be achieved; and this vision would need to be (shared and 'owned' by the planners) and based on a thorough
understanding of what was entailed.

In consideration of the data generated by this study, it is suggested that such understanding would need to include (at least) the following three areas:

* implications of the link between system survival and the shift from a Newtonian to an holistic worldview;
* implications for education of the consequences of increased technological complexity;
* implications of establishing a new organized technology.

The link between system survival and the shift from a Newtonian to an holistic worldview. Given that the **raison d'être** of planning is control, it can be anticipated that the requirement to let go of the Newtonian imperative for system control, 'normalcy,' and predictive certainty will be the biggest hurdle to be faced by policymakers, administrators, and teachers alike as they head (with everyone else) into a highly uncertain future. However, as noted by Sawada and Caley (1985), it would seem that in order to survive the vicissitudes of life in a hyperturbulent environment we shall need to operate, as do dissipative structures, in a highly adaptive (non-predictive) manner. The goal of policymakers under such circumstances would be to develop policies that are process-rather than content-oriented: policies that would be enabling rather than regulatory, and geared to promoting self-organizing, self-regulating systems at all levels.
Implications for education of the consequences of increasing technological complexity. To develop such policies presupposes that the policymakers and planners concerned will have a working understanding of the basic characteristics of process technology—at least, as we can understand them in the light of experience in other workplaces. Further to this, it would seem essential for policymakers to work out for themselves the implications for education of the major consequences of increasing technological complexity. On the basis of Galbraith's (1974) predictions (noted on page 231), for example, we might assume that:

1) Increase in time span of process would translate into an increase in years of schooling—leading, ultimately to a focus on lifelong learning.

2) Increase in capital required would mean more money having to be spent on educational plant/equipment.

3) Increase in inflexibility of means of performance of a particular task would no doubt mean that we had better make wise investments in our hardware and software. In a positive vein, educators could take comfort in the belief that the methodology employed in the software was, indeed, state-of-the-art; and focus attention on those aspects of schooling which would be flexible, by developing their own coaching/counselling/consultative skills.

4) Increase in manpower specialization (both technical and organizational) suggests that present educational personnel (at all levels) would need 'retrofitting' and that the system would need an injection of new staff with new technical and planning skills.

5) Increase in coordination required (to organize greater number of specialists) would have implications for administrator training—especially with respect to the development of more consultative-focused skills.
6) **Careful and long-term planning** requirements suggests that policymakers would have to depoliticize the educational arena—by working through consensus-seeking representative committees—to develop long-term understanding, ownership and commitment on the part of all constituent groups for costly long-range decisions.

**Implications of establishing new organized technology.**

As the data (cited in this study) from the findings of Woodward (1958, 1965) and Dobrov (1979) have stressed, the injection of new technologies into the production process requires a concomitant change in the organizational arrangements (the orgware) that support the new hardware and software, if the enterprise is to be successful in its change effort. This position is supported by those who have felt, like Leonard (1984:51), that "it would be possible to put millions of computers in the schools without producing any real change in education"; and who would agree with Salomon and Gardner (1986:18) that "computers do not really affect learners in any direct way; it is the way they are used that is crucial." Indeed, as Papert (1987:30) notes, "schools will assimilate computers to their traditional culture,..." Papert's observation in this connection might be seen as providing educational policymakers with useful advice:

> The context for human development is always a culture, never an isolated technology. In the presence of computers, cultures might change and with them people's way of learning and thinking. **But if you want to understand (or influence) the change, you have to center your attention on the culture—not on the computer.** (emphasis added) (Papert, 1987:23)
Now, the educational policymaker might be tempted to suggest that the way computers are used in schools is up to the schools (i.e. the teachers and administrators who work in them) themselves. Certainly, the not inconsiderable attention, over the past few years, on research into, and promotion of, so-called "effective schools" has tended to suggest that the onus for effecting change lies in this quarter. However, while it makes sense to promote a "bottom up" approach to organizational change, it also needs to be recognized that 'real' (second-order) change will require considerable support— and initiative—from the "top down."

One such initiative touches upon the re-conceptualization of the nature of the throughput that a shift to process technology must occasion—as suggested earlier. And, based on the findings of research undertaken by Glisson (1978) in human service organizations, this would seem to be a critically important first step. Glisson found that the organization's perception of the nature of the raw material (as defined by management) influenced management's perception of the technology necessary to deal with it. This in turn was seen to affect the perception of the structure required; and, once implemented, the structure imposed a routinization of workers' jobs. Thereafter, the structure reinforced, and was reinforced by, this routinization. Applied to schools, it is not hard to see how the organized technology of mass production has so locked teachers into the way they routinely perform their
jobs that they appear to be the culprits in resisting change.

Reconceptualization of the school's role and mission. Only when our policymakers have so geared themselves up (so to speak), will they be ready to commence the task of reconceptualizing the future role and mission for schools. The findings of this study suggest that it would be appropriate for them to consider the process production school as having a process- rather than a product-oriented mission; and a role as provider of change process services rather than as provider of credentialled graduate products.

Their next task will be to set the strategic goals required to achieve this mission; and to delegate to those responsible for achieving these goals, the task of developing appropriate objectives and action steps. Three areas of strategic goal/policy setting suggest themselves at this initial stage. These are concerned with the areas of hardware, software and orgware—as follows.

Hardware. The requirement of process production technology for a very large initial capital investment in plant/equipment suggests the need for high level intersectoral policy planning aimed at developing multi-use community facilities. The provision, for example, of 'incentive grants' to municipal/regional authorities and bodies such as colleges, schools, sports and recreational clubs, and performing and fine arts societies, to 'joint
venture' the delivery of their services through a single community complex would do much to rationalize capital (facility and facility maintenance) costs. Similarly, 'subsidization grants' that promoted the utilization of microelectronic hardware and software that was 'suprasystem compatible' would have the effect of reducing (a) equipment costs (by allowing bulk purchasing), and (b) administrative costs (by facilitating cross-system communications).

Software. The software of process technology consists of continuous and advanced computerized processes—indeed, what we now understand by the term "computer software." Since it would seem that the development of educational computer software has been pioneered by the manufacturers of computer hardware, it is now probably more cost effective for school systems to be provisioned from this source. If the educational enterprise were to become dependent upon external expertise for the development of its educational programs, it would need to establish a marketing arm to research the relative pedagogical merits of available software products, and to provide investment advice to purchasing units (at local and/or district levels). It would, no doubt, be tempting to have the marketing arm serve as the purchasing agent of the suprasystem and negotiate with competing manufacturers for the 'best' bulk buy. However, such a move might be seen as running counter to policies aimed at empowering local systems to act as self-organizing, self-regulating dissipative structures.
Given that (by analogy with the industrial experience) the central managerial function of process technology is (long-term) marketing, the establishment of a marketing arm is certainly indicated for purposes of (a) scouting future market demands, (b) seeing that marketable products/services are developed, and (c) 'selling' these to the community at large (i.e. to individuals of all ages and educational levels, and to industry/business in general).

Orgware. To achieve the optimal combination of human, technical, and methodological resources for process production, the structural/operational organization of the school would need to change from the 'regulated flexibility' required by mass production (e.g. set time-spans for instructional periods, set class sizes, set hours of schooling, etc). For (metaphorically speaking), mass production schooling has been technologically and [therefore] structurally geared—through the specialization and routinization of (teacher) labour—to 'treat' (i.e. 'give learnings' to) pre-sorted and graded batches (classes) of (pupil) raw material, for the purpose of turning out standardized (norm-referenced) and appropriately labelled (credentialled) finished end products (educated graduates).

In contrast, the process production school would be technologically geared—through highly automated micro-electronic hardware/software—to provide skill-building instructional programs, along with ongoing (non-judgmental) diagnostic feedback on pupil performance, that is directly
and interactively responsive to the unique learning requirements of each individual student. Thus freed from the requirement to provide (and maintain all the controls necessitated by) norm-paced instruction to groups of students, school staff could be redeployed to provide a more adaptive (i.e. non-routinized) structure (of interrelated and interdependent role relationships). An adaptive structure would be required to match the situational demands associated with process technology, and to support the school's reconceptualized mission of providing (consultative type) learning-process services.

Being thus predicated on a changed role for school personnel (teachers, administrators and ancilliary staff), it can be seen that the change in orgware required for the successful operation of process production schooling would necessitate a supra-system level reconceptualization of what might/should be involved in the training and development of staff for such roles. Consideration would need to be given to the development of educator (as opposed to teacher) training that encompassed a range of skill-sets that could be combined to provide a variety of career/role paths.

It might be supposed, for example, that the foremost need would be for staff who have knowledge of computer systems operations and who possess the people-relating skills needed to serve students (of all ages) as process facilitators and consultants. In addition, the need for combined expertise in the fields of curriculum development and computer programming might be anticipated (regardless of
whether such personnel would be employed by the education system or a company producing educational software). And, given the recognition that learning is enhanced when students engage cooperatively with each other in joint learning projects, the demand for educators with the (old-fashioned) combination of a liberal arts background and group facilitation skills might be expected to be higher than ever.

**Implications for Schools**

The implications for schools of a changed systemic perspective are, here, examined in relation to (a) a changed role and mission for the school, (b) a changed view of the nature of its thruputs, and (c) a change in its organized technology. And, the difference is noted, in each case, between the policy implications of this (metaphoric) perspective and those emanating from the Commission Report, "A Nation at Risk."

**A changed role and mission.** The public school has, traditionally served a dual role. On the one hand, it has been required to provide educational services for young people in the form of basic skills instruction, and cultural socialization; and, on the other hand, it has been expected to evaluate the competency of its 'clients' in respect to the skills taught them by the school, and, on the basis of this evaluation, to credential (and socialize) them in preparation for entry to (suited) positions in society's
workforce. That there is a conflict of interest inherent in an arrangement whereby the results of a service are thus evaluated by the very agency that provided the service would, no doubt, be obvious if said agency were considered to be in the business of providing a service to its clients. That the school is, actually, seen to be (predominantly) in the business of producing appropriately credentialled graduates--and, therefore, to have a product-oriented mission--is reinforced by the Commission proposals that focus on "expectations" (re: the credentialling of student [thruputs] for promotion, graduation, and acceptance into post-secondary educational institutions).

If the role and mission of the school were changed (as the findings of this study have suggested they would) in accordance with the (metaphoric) view of the school as a process production workplace, the school would be seen in the singular role of providing learning/ change-process services. Under such circumstances, it would be inappropriate for the school to be additionally responsible for the credentialling of its clients. Indeed, it could be argued that under no circumstance should those who serve as consultants/advisors (as do teachers in the preparation of students for examinations) also serve as examiners, for in effect they are then put in the position of judging the results of their own advisory efforts. A possible solution to this dilemma would be to have credential-specific tests/examinations set, and administered by those for whom such screening/credentialling were relevant (e.g. academic,
vocational, technical and professional training institutions, and prospective employers).

The findings of this study suggest that the mission of the process production school would be to facilitate the development of every student as a self-organizing and self-regulating person; and that, to this end, the curriculum would be focussed on helping students develop such process skills as thinking, analyzing, categorizing, and so on. In contrast, the Commission recommendations concerning school curriculum were focussed on the "content" oriented requirements of "Five New Basics" (English, mathematics, science, social studies, and computer science) for local high school graduation.

That what is considered to be 'basic' today may be radically altered by the advent of new technologies in the future, was noted by Scriven (1979:12) in regard to the development of recorders (with voice and scanner input, and voice and print output) with the potential for eliminating the handicaps of those who now fail to master decoding, or who cannot see. It could well be, as suggested by Scriven, that "these gadgets will make reading and writing and learning other languages as unnecessary as arithmetic skills have been made by the hand calculator." It might also be argued, as suggested by Fraley and Vargas (1975) that:

The new technologies cannot be successfully used until we reorient our organization structures, roles and responsibilities away from patterns and reward structures that assume the essence of instruction to be in its content.

(Fraley and Vargas, 1975:6)
A changed view of the school's thruputs. Schools have, traditionally, tended to treat students in ways that suggest a certain duality in role. As noted in connection with the Commission Report, students can be seen, on the one hand as (metaphorically) providing the passive raw material throughput of the system; and, on the other hand, as serving in the role of worker. As workers, students (along with teachers) have invariably been treated—in keeping with McGregor's (1960) theory 'x' view of workers—as if they were inherently lazy and untrustworthy, and in need of strict supervision and discipline if they are to be productive. This view is evident in the Commission findings regarding both "expectations" and "time."

Under the metaphor of the process production school, the role of the student is reframed in a way that makes (plausible and positive) sense of this perceived duality. For, under this view, the student is seen as a client-worker who strives—in partnership with other workers (teachers and peers)—to transform the raw material provided by his/her own capacity to learn/change/grow. Implicit in this model is McGregor's theory 'y,' which sees workers as being essentially keen to do a good job, and capable (when treated as trustworthy) of managing themselves and their work in a responsible way.

Now, while it can be observed that the relationship between staff and students in our public schools has generally tended to evolve in the 'y' direction over the
past few decades, it is probably true to say that a number of practices would need to be revised if students were to be treated, truly, as clients. To start with, teachers would need to be viewed, and treated by the system as if they were trustworthy professionals; parents as if they were clients who were free to exercise choice in respect to their children's education; and students as if they were, indeed, clients who should, for example, be included in parent/teacher conferences on the subject of their own progress and/or behaviour.

A change in organized technology. As has been noted, replacement of the present labour-intensive teacher-delivery of basic skills instruction with computerized instruction would lead to a very changed role for school staff. As a consequence, we should expect a decrease in the demand for teachers with knowledge of specialized subject matter (for such 'content' information would be readily available to students in computerized data banks); and we might anticipate an increase in the demand for educators with the pedagogic expertise needed to help students learn how to learn for themselves. Contrary to these expectations, the Commission recommendations in respect to "teaching" were focussed on the need in teacher training for subject matter courses, rather than on ones in "educational methods."

Undoubtedly, the greatest change occasioned by a shift in organized technology is that concerning the relationship between students and teachers. It is nicely
summed up by Sleeter and Grant in an article titled, "Success for all students":

. . . students and teachers must view one another as partners in the teaching/learning process. Within each classroom, enough trust and openness must exist to encourage the sharing of ideas, the picking of brains, and constructive disagreement. Teachers and students should learn to view the classroom as a laboratory, not as an assembly line. Meanwhile, the social environment within each classroom should help students develop the requisite skills and attitudes for effective cooperation. (Sleeter and Grant, 1986:299)

CHAPTER SUMMARY

This chapter examined the implications for policymaking of the metaphor for change that sees "the school of today as a mass production workplace gearing-up to become a process production workplace of tomorrow." Respecting the policymaker's role as a strategic planner, the implications presented for examination were those concerned with the impact of the metaphor for change on:

* society at large,
* the task of educational policymaking, and
* the changed role, mission and organization of schools.
Chapter 11

REFLECTING UPON THE STUDY.

... the idea of reflection on seeing-as suggests a direction of inquiry into processes which tend otherwise to be mystified and dismissed with the terms "intuition" or "creativity". 

(Schön, 1983:187)

... we might need to change the organization of our thinking in order to think about how we change our organizing.

(Smith, 1982:316)

This chapter provides a summary of the study, and reflects upon the implications suggested by its findings. The first major section of the chapter reviews the dual purpose of the study, the problems with which it deals, and the approach adopted for integrating these into a distinct policy study. It goes on to summarize the subsequent unfolding of the inquiry as it relates to the development of a procedural framework for problem-setting frame analysis, and the trial application of the proposed procedures to the case of schools. The utility of this procedural framework is examined in the second section, along with the implications it suggests for further research vis a vis both the content and the process-related aspects of the study. Some brief concluding remarks bring the chapter, and the study, to a close.
AN OVERVIEW OF THE STUDY

Based on an approach to problem setting for social policymaking that had been advocated by Rein and Schönb, this study attempted:

(a) to develop a procedural framework for conducting problem-setting frame analysis, and

(b) to apply it to the case of schools in the dual interest of:
   (i) assessing its applicability and utility for purposes of practical policy research, and
   (ii) shedding light on the currently troubled state of public schooling in Canada and the United States.

Because inquiry was seen as being directed in the interest of acquiring policy knowledge of two different orders (the specific policy-issue involved in the case of schools and the policymaking process of problem setting), the framework adopted for integrating these into a distinct policy study was seen as being made up—in the manner of nested Chinese boxes (as shown in Figure 11.1)—of the following three levels of discourse:

1) The Framework for the Integrated Study

2) A Procedural Approach to Reflective Problem Setting in Policy Research

3) The Case of Schools
   [as 'seen' in the document, "A Nation at Risk"]]
Figure 11.1
The Nested Three-Tier Structure of the Study
Framework For The Integrated Study

The dual purpose. This study stemmed from the inquirer's interest in addressing its dual purpose—of seeking policy-issue, and policy-process related knowledge in an integrated way. In turn, this dual purpose can be seen to have sprung from the duality of the problematic situation with which the study attempted to deal. This duality was responsible for the peculiar nature of the problem of the study.

The problem. The problem and research question of the study can be expressed as follows. Given:

(a) that complaints in the U.S. about the ineffectiveness of recent reform measures to deliver 'real' change (because they were aimed at getting schools 'back on track' rather than at improving performance in new and better ways) means, by definition, that the proposals were geared to addressing the 'wrong' problem; and, given

(b) that problem structuring (required for getting the problem 'right') has been identified as the most crucial, but least understood aspect of policy analysis,

Can the (rough-hewn) approach to problem setting suggested by Rein and Schön be successfully honed into a demonstratably applicable analytical tool— one that could help educational policymakers better understand 'the problem of schools'?
The study sought to answer this question by attempting to clarify the ideas advanced by Rein and Schöns, and to refine them, through trial application to the case of schools, into a systematic procedural framework that would serve as an effective analytical tool for elucidating 'the problem of schools.'

A Procedural Approach to Reflective Problem Setting in Policy Research

Background. According to Rein and Schöns, the problem setting process begins with some apprehension of a problematic situation. This is experienced perhaps as intuited discomfort, concerns or irritation—i.e. as worries that elude an orderly formulation of what exactly constitutes 'the problem.' Judgment about what it is that is actually problematic is viewed as requiring a way of 'seeing' the unfamiliar situation in terms of a familiar pattern of events or phenomena—i.e. in terms of a pattern which can give it meaning. For it seems to be a generally accepted idea that we learn and 'know' by such tacit metaphor-making means (Wittgenstein, 1953; Nietzsche, 1968; von Bertalanffy, 1981; Bateson, 1977; Bates, 1982).

When the process of SEEING-AS (the "meta-pherein" or "carrying-over" of frames or perspectives from one domain of experience to another) projects onto unfamiliar situations familiar notions that are already evaluated, it is thought of by Rein and Schöns as providing a generative metaphor (it is generative because it automatically carries with it
an evaluation of what is wrong, and what needs to be done to 'fix it'). As Schö́n sees it, generative metaphors influence how we think about things, make sense of reality, and set the [social policy] problems we later try to solve.

His concern is that because we are generally unaware that we thus 'see' the world in metaphoric terms, we neglect to check out the appropriateness of the generative metaphors we employ to make sense of problematic situations (and thereafter use to frame the policies we think will remedy them). Rein and Schö́n, accordingly, suggest that we deliberately seek out the problem-setting frames that people have used to describe a particular problematic situation, and that we subject to critical scrutiny the generative metaphors upon which they rest.

Toward a methodology for problem setting. A preliminary distillation of the ideas presented by Rein and Schö́n (1977) and Schö́n (1979) concerning the development of a "methodology for problem setting" suggested that the conscious (reflective) practice of problem setting might be viewed as involving the following five procedural stages:

1. discovering the problem frame that has been used to give meaning to a problematic situation;
2. spelling out the generative metaphor that underlies (i.e. generative of) this problem frame;
3. elaborating the assumptions of that metaphor; then,
4. judging the adequacy of the problem frame (in the light of the assumptions of the underlying generative metaphor, and in the context of the given situation); and
5. confirming or reframing the problem to be addressed.
A discussion (Chapter 2) of the key concepts expounded by Rein and Schön, and consideration of what seemed to be involved in the conduct of each of the stages of problem setting, led to the identification of certain preparatory research tasks and sub-problems that would require attention. These were addressed in Chapter 3, along with a rationale for the procedures suggested for the conduct of analysis at each stage of the framework.

The Case of Schools

Based on the criteria developed for guiding the selection of the problem-setting 'story' to be analyzed, the document chosen for this study was the 1983 report by the U.S. National Commission on Excellence in Education titled, "A Nation at Risk: The Imperative for Educational Reform."

Uncovering and spelling out the generative metaphor used to frame the problem of schools. In this analysis, the authors of "A Nation at Risk" were seen as having framed the problem of schools according to a widely-held deep root-metaphor that views the organization of schooling in terms of the organization of an industrial workplace; one whose output (of scholar-graduates) has become 'shoddy' as a result of declining standards and levels of productivity. This metaphor was apprehended on the basis of a schema recognition (Rumelhart, 1979), whereby the researcher perceived a correspondence between the nature of the reform proposals recommended by the Commission, and the nature of proposals that would be made by an industrial management
Elaborating the assumptions of the metaphor "school as an industrial workplace". In order to assess the usefulness to policymakers of framing the problem of schools according to such a metaphor, its underlying assumptions were elaborated through the development of a 'pattern model' of the industrial workplace. The model thus developed recognized three distinct sets of organizational relationships. These had been found in the industrial workplace (by Woodward, 1958) to be associated with the changed situational demands of production technology as it increased in complexity from 'unit,' to 'mass,' to 'process' technology.

Since these three sets of organizational relationships (labelled in terms of their associated technological forms) were (metaphorically) seen as distinct systemic forms—separated by discontinuity along the same 'suprasystem' continuum of increasing technological complexity—the underlying assumptions of this (open systems) metaphor were spelled out. Accordingly, the common characteristics of open systems were reviewed, and illustrated with examples of analogous features from industrial workplaces having 'unit,' 'mass,' or 'process' production technology.

From this review was developed a conceptualization of systemic process as "organized technology" (based on
organized technology being comprised of the hardware, software, orgware, and thruputs of any open social system, regardless of whether it be at a 'unit,' 'mass,' or 'process' level of technological complexity. Also from this review was developed a conceptualization that related the Woodward schema of 'unit,' 'mass,' and 'process' technology with both the concepts of organized technology, and of first and second-order systemic change (as in Figures 6.2, & 6.3).

It was noted that to make organizational changes within the constraints imposed by any one of these forms of organized technology is to engage in first-order system change. First-order (or morphostatic) change is for the purpose of making homeostatic adjustments to system operations, so that the organization can counterbalance any deviations from its intended course. If, however, such adjustments cause the pattern of relationships that characteristically obtain between the hardware, software, orgware, and thruput of the organization to be lost, then, either system viability will be jeopardized, or there will be a shift to a different (usually more complex) form of organized technology.

A shift from one form of organized technology to another represents change of a different order—second-order system change. The intent of second-order (or morphogenetic) system change is to promote deviations—thereby elaborating or building up systemic structure—in order to adjust to a changing pattern of perturbations in
the environment.

The conceptualization thus developed suggested that the nature of the implications associated with 'seeing' the school as an industrial workplace was dependent upon the nature of the organized technology that the viewer associates with schooling. For, the viewer who 'sees' schooling from the perspective of a unit/small batch (private tutor/school) enterprise will view both the problems, and the solutions to these problems, in quite a different way from the viewer who 'sees' schooling as either a (lock-step, graded) mass production, or a (continuous progress, ungraded) continuous process type enterprise. However, since it was taken that the Commission findings tacitly portrayed a widely-held generative metaphor which sees the organization of schooling in terms of the organization of a mass production enterprise, it was the implications contained within the framework of a mass production mode of organized technology that were examined for analogical correspondence with the school situation.

Examining the policy-related utility of the problem frame used in the case of schools. This examination proceeded in accordance with the framework developed in Chapter 3, and shown in Figure 3.7. As a result of this examination, it was concluded that a remarkable similarity was to be found between the internal properties of the industrial mass production metaphor and the school system "terrain" as it was experienced in schools today—and has been for much of
the past century (as shown in Fig. 7.3). However, when it came to examining the change properties of the (subject and the vehicle of the) metaphor, an appropriate correspondence was not found. For, it was clear that any proposals for change—such as those proposed in the Commission report—that were aimed at sustaining system viability within a given mode of organized technology (such as mass production) were of the first-order, deviation-counterbalancing variety. And, it was recognized that the societal contexts in which today's school systems are embedded are experiencing an acceleration of change that is of a different order from anything that has gone before, and to which it seemed clear, school systems must now respond in new ways—with second-order, deviation-promoting kinds of changes—if they are to remain viable.

Appropriate correspondence was not, therefore, found between the change properties of (the subject) "the school" and (the vehicle of) the metaphor of the "industrial workplace with a mass production mode of technology." However, the pattern model of the industrial workplace (developed in this study) did offer promise that plausible correspondence could be found if the metaphor were restructured to focus on the problem at a different level. For, in terms of this model, the introduction of second-order change into an industrial workplace would mean it shifting to a new level of organized technological complexity (by making appropriately balanced changes in the hardware, software, orgware, and thruput of the production
process). By analogy, the introduction of second-order change into a public school system would mean 'gearing up' the whole system of producing education (the hardware, software, orgware, and thruput of the school system) so that it shifted from large batch/mass production to that of process/flow technology.

Reframing the problem of schools. Given, then, the demands of a fast approaching microelectronic age, it seemed plausible to suppose that some form of morphogenetic 'gearing up' will have to take place if our school systems are to remain viable in the long term. The problem of schools was, accordingly, reframed (as illustrated in Figure 8.1) in terms of the following restructured metaphor:

"The school of today as a mass production workplace gearing up to become a process production workplace of tomorrow."

Attention was, accordingly, focussed (in Chapter 8) on spelling out and elaborating the assumptions of the vehicle (i.e. "a process production workplace") of this new metaphor, so that it might provide a (metaphorical) template against which the analogical implications for schools (and other workplaces) in a more technologically advanced future could be drawn.

Examining the reframed problem. Evidence was sought, and readily found, to support the 'plausibility' of the
reframed problem, both from the standpoint of the researcher's interpretation and from the perspective of the frame's general face validity. However, evidence to suggest that an appropriate correspondence might obtain between the internal properties of the metaphor of the 'school as a process production workplace' was not so readily found. For, there was no existing 'model' of a school displaying the necessary combination of hardware, software, orgware, and thruput characteristics that could be considered analogous to those associated with process technology. Such a model had to be created from the implications suggested by the industrial pattern model developed in Chapter 8 (and displayed in Figure 8.5).

Basic to the model was an awareness that a shift from mass production to process technology entails a change in the very nature of the raw material thruput that can be used. For the raw material processed by mass production takes the form of discrete, countable, gradable, integral units, while the raw material processed by 'flow' technology is measurable in dimensional and ungraded terms such as volume and capacity. By analogical implication, this suggested a shift in educational mission, from the product-oriented pre-occupation of mass production schools with turning out the largest possible number of (integral) graduate outputs, to a process-oriented mission of providing an unlimited flow of learning services. In this way, the thruput of the process production school was conceptualized as the ungraded and unlimited volume of its students'
learning capacity (i.e. their intellectual, physical, social, emotional, and psychological growth potential). Concomitantly, the role of the student was seen as requiring to change from that of passive raw material (in the mass production school), to active (and probably voluntary) client/worker.

A summary of the analogical implications of process production on the hardware, software, and orgware of the process production school is provided in an annotated form in Figure 11.2.

In order to examine the change properties of the metaphor, it was assumed that (a) the societal environment of tomorrow's schools will, as predicted by Toffler (1983) continue to be characterized by increasing turbulence; and, that (b) to be able to survive under such conditions, systems (such as school systems) will need to be continuously adaptive, and—like those described by Sawada and Caley (1985) as "dissipative structures"—be self-organizing and self-regulating. The characteristics of such systems having already been transposed by Sawada and Caley (from Prigogene and Stengers, 1984) into analogically corresponding educational terms, it was possible to assess the correspondence between these and the features projected in this study for a process production school. Considerable compatibility was found between these. It was, therefore, concluded that the process production school might well be viewed as a system with a dissipative structure, and, as such, to possess appropriately
School System Organization

**School Plant** —community-centre type complex.

**Tools** —microelectronic systems/networks, video etc.

**Operating Procedures**

- Programmed instructional SERVICES provided by multimedia technology to client/worker students of all ages.
- Teachers serve as tutor/consultants to coordinate group (student-student) joint learning ventures, and assist individuals to progress along a continuum of non-graded self-paced, criterion-referenced, mastery learning of process skills (e.g. thinking, abstract reasoning, etc.).

Feedback on Progress and diagnostic help provided on continuous basis as part of programmed instruction.

--testing for credentialling when student ready.

**Structure**

- Curriculum & process software (like hardware) likely developed outside District (probably even educ.) system.
- Influx of computer system specialists & technicians; requirement for teachers to learn system & consultative skills renders more rungs in career ladder (tall struct).
- Teachers responsible for supervising small work groups & providing more system than subject related assistance.

**Marketing of school's SERVICES central to survival**

- Have to compete with private enterprise for market share of student-citizen 'education vouchers.'

**Students, teachers & ancillary staff expected to:**

- Work as a joint-venture team in the learning process helping each other understand and improve the programs.
- Take responsibility for 'managing' the learning tools, & improvising in the event of system breakdown.

**Staff remunerated according to qualifications & level of system responsibility; & perhaps with a group bonus if their standard of service increases market share.**

**Growth Potential of Students**

- Intellectual, Physical, Social, Emotional & Psychological

---Figure 11.2

The Projected Implications of Process Technology on the Organization of Schools
corresponding change properties.

An examination of the value implications of the metaphor suggested that process technology could make possible the realization of our most cherished educational goals, i.e. of providing for individual differences through the (long called for) individualization of instruction; equal opportunity through equal access (on an individual basis) to the very best instruction and methodology available; and the continuous development of growth potential for all students. Moreover, it was noted that the delivery of individualized instruction could lead to numerous other salutary effects. These were itemized under the rubric of:

(1) Potential for actualization.
(2) Promotion of self-regulation.
(3) Increased production.
(4) Decreased (financial and human) costs.

With respect to the frame's capacity to lead to action, evidence was found to suggest that not only would the implications of the metaphor of the process production school be likely to receive the endorsement of informed community leaders, politicians, and educators, but that some promising moves in this direction had (in the U.S., at least,) already been taken.

On the strength of these findings, it was concluded that the 'school as a process production workplace of tomorrow' would provide educational policymakers with a fruitful generative metaphor from which to project future demands, and upon which to base the kind of strategic
planning needed to bring about 'real' (i.e. second-order) change in our school systems. Implicit in this conclusion was confirmation of the larger restructured complex metaphor—a metaphor for change—which had reframed the problem of schools as: "The school of today as a mass production workplace gearing up to become a process production workplace of tomorrow."

Premised on the warrantability of pursuing this proposed metaphor for change, the implications it suggested for policymaking were next examined (in Chapter 10). These related to the impact that such a metaphoric perspective might be conjectured to have on: society at large; the task of educational policymaking; and the changed role, mission, and organization of schools.

EXAMINING THE UTILITY OF THE PROCEDURAL FRAMEWORK

Assessment of Outcomes

Assessment of the utility of the procedural framework developed during this study is seen as resting upon the feasibility of its application in actual policymaking situations, and upon the extent to which the outcomes of the analysis it has guided in the course of this study are viewed by those concerned with educational policymaking as:

(a) making sense (i.e. having face validity),

(b) being relevant (in the context of current and anticipated future socio-political realities),

(c) bearing policy implications that warrant serious consideration.
From the inquirer's (obviously subjective) perspective, the results of the analysis seem promising, and worthy of being put—by dint of further research—to the "test of objectivity" suggested by Kaplan:

The test of objectivity is said to be prediction—if the alleged pattern is the pattern, we can expect to find such and such other elements in these and those places. . . . For the pattern model, objectivity consists especially in this, that the pattern can be indefinitely filled in and extended: as we obtain more and more knowledge it continues to fall into place in this pattern, and the pattern itself has a place in a larger whole.

(Kaplan, 1964:335)

Proposed Areas for School-Related Research

The questions raised by the content-related findings and implications of this (case) study suggest unlimited possibilities for research. The three groups of research topics outlined below are, however, premised on the warrantability of pursuing, for educational policy purposes, the restructured problem-setting metaphor proposed in the study.

The areas of research suggested for investigation in the first group are seen as foundational. For, they are aimed at helping policymakers develop a clearer picture of the implications for schools of a second-order change that would move the school from a mass production to a process mode of organized technology. The second group of research topics represent some key areas that can be anticipated to require carefully developed strategic change planning. And, inasmuch as the two topics suggested in the third group can
be considered basic to any policy-directed action at all, they might be labelled "meta-strategic."

Foundational research questions

1) What are the general hardware, software, orgware and throughput features that are characteristically found in industrial/business workplaces currently operating with a process or quasi-process mode of organized technology? How do they compare with those indicated in this study?

2) What can be learned from workplaces that have successfully 'geared up' from a mass production to a process mode of organized technology (or are in the process of so doing) that could be generalized for application in the case of schools?

3) How do the findings of a study of school and school system practices that (like the [U.S.] Coalition of Essential Schools) appear to be consonant with process production compare with the findings of current workplace practice in the industrial/business sector?

4) In terms of dissipative structures, what does it mean to be a self-organizing, self-regulating system? How might this understanding be translated into behavioural terms in relation to individuals and their social organizations?

Research for strategic change planning

1) Seek and study any educator (i.e. teacher, administrator) training/development programs considered suitable for preparing/retrofitting school personnel for the roles that (the findings of this study suggest) they will be required to fill in the process production school.

2) Seek and examine models of extant school practice that is consonant with the notion of student as client/worker.

3) Investigate any models/methods that are (or have been) used to screen/select or credential applicants for positions/credentials that would better serve the applicants and intaking organizations than the current practice of having schools perform this (conflict-of-interest) task.
4) Research the structure, functions, and techniques used by the marketing departments of process production organizations.

5) Seek and study examples of incentive programs designed to promote the joint venture development of multi-use community facilities.

Research for meta-strategies

1) For purposes of developing strategies to help leaders become "new-culture" builders, seek models of leaders and culture-builders who have been successful in breaking down opposition to change because they have been able to help people change their perceptions/worldviews.

2) Seek/develop a model for multi-constituent participation in the consensual development of policies for long-term social planning.

Operational Observations

Contextual constraints. From an operational standpoint, it should be noted that the procedures reported in this study are presented in a manner and a sequence that reflect certain contextual constraints (e.g. being bound within the requirements of a doctoral dissertation). For example, in the practice of deliberate (reflective) problem analysis, we should expect the examination of the plausibility of an uncovered problem frame to occur almost simultaneously with its detection. It would, certainly, make little sense to undertake detailed analysis of a problem-setting frame (spelling out its underlying generative metaphor, and elaborating the assumptions that flow from it) before checking out its plausibility—as is suggested should happen according to the order in which these procedures are, here, reported, in Chapters 5/6 and 7.
respectively. However, this sequencing was chosen in order to encapsulate for discussion (in a single, focussed, chapter) those aspects of frame analysis that might be seen as falling under the rubric of "assessing the adequacy of a problem frame."

It can only be hoped that the imposition of such "historical revisionism" does serve, as it was intended, to provide a more coherent ordering of ideas for the consideration of the practitioner. For, indeed, one of the major difficulties encountered in the conduct of this study was the requirement to "spin a linear thread of yarn" from what was (metaphorically) gathered as an amorphic "ball of wool." In this connection, it is hoped that the diagrammatic "metaphor-mapping" formats developed to represent metaphoric patterning in this study might, similarly, be found helpful to others.

The use of metaphor-mapping formats. The metaphor-mapping formats used in the study were found helpful because the patterns they projected allowed the inquirer to scan the analogic picture of the metaphor they represented in a 'whole' way. Then when, later, elements of the metaphor had to be 'teased out' to form a linear 'thread of yarn' (as spun by a storyteller) it was easier to discern the part it played in relation to the other elements (either 'named' or omitted) in the total pattern of relationships; and to appreciate the analogic implications it suggested.
The development of a pattern model. What seemed like a disproportionate amount of time (and space) was taken up with the task of developing a pattern model of the metaphoric term "industrial workplace." However, in retrospect, the time spent on investigating the systems, technology, and organizational structures that go to make up our knowledge about the world of the workplace might be judged to have been time well spent. For, the pattern model of the industrial workplace that emerged provided such an extended appreciation of the original metaphor, that it was possible to apprehend its—hitherto unrecognized—potential for reframing the problem in question.

This experience suggests that we should pay conscious and reflective attention to the generative metaphors we employ to make sense of troublesome situations, not only to ensure that they are appropriate to our purpose—but to ascertain whether they might contain insights that had been previously overlooked.

Limitations. It has to be recognized that the procedural framework developed (through application) in this study can only serve the practitioner as a rough guideline. The extent to which it can serve the purpose for which it was intended is limited by:

(a) the repertoire of relevant schema that the inquirer/interpreter possesses (from experience of the societal context), and therefore has available for recognition;

(b) the inquirer/interpreter's ability to 'see' similarity in schema patterns (recognizing that new insight requires openness to random exploration);
(c) the inquirer's ability to reframe the problem in a way(s) that:

(i) has credibility, acceptability, and utility to the majority of stakeholders,

(ii) ties in with other currently articulated (re)framings/worldviews.

Implications for Process-Related Research

The procedural framework developed in this study for analyzing a problem setting frame was devised (a) by a particular inquirer, and (b) in response to a particular (policy) problematic situation. As such, it raises the following research-related questions:

(i) how differently/similarly might other inquirers have dealt with the problem and research questions of this study?

(ii) in what ways does the conduct of this inquiry into problem setting compare/contrast with current policy analytic practice?

(iii) how generalizeable would this framework prove to be if it were applied to a wide range of (policy) problematic situations?

Generalizeability of the Procedures

In this context, the term generalizeability is not intended to include the notion of reliability—i.e. in the sense of yielding replicable results across numerous applications to the same situation. For, clearly, the purpose of engaging in reflective problem setting is to generate new (and insightful) frames for 'seeing' a problematic situation.
Concluding Remarks

The extent to which this study can be deemed to have been successful in its purpose of developing a procedural framework for conducting problem-setting frame analysis that is of interest, and use, to other policy analytic inquirers remains to be seen. Its trial application, here, has certainly served to reinforce for this inquirer the need for a more self-conscious awareness of the metaphoric frames and assumptions that we, as researchers, bring to the framing of the problems we so 'objectively' endeavour to investigate. Indeed, as summed up by Murphy (1982:211-214):

The more sophisticated analysts have become, the more complicated, diverse, and debatable the understanding of social reality; simple stories have been replaced by multiple views of the same policy puzzle. The more self-conscious analysts have become about the nature of reality, the more they realize that their reports have something to do not only with facts "out there," but also with the way they perceive the world and with their particular biases. . . .

There are no ultimate solutions, but at best "better troubles."
# REFERENCES

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Clarke, Patricia  
1982a  An Analysis of the 1980-81 Accreditation Reports.  
A working document prepared for the Ministry of  
Education, Province of British Columbia.  
Victoria: Queen's Printer.

Clarke, Patricia  
1982b "Through a glass darkly: Toward a new philosophy  
of science," unpublished paper. Department of  
Educational Administration, University of British  
Columbia.

Cohn, Marilyn M., and Anna DiStefano  
1984 The recommendations of the national commission  
on excellence in education: A case study of their  

Common, R.W.  
1985 "The school as Bermuda Triangle." The Canadian  

Cornbleth, Catherine  
1986 "Ritual and Rationality in Teacher Education  
15, No. 4:5-14.

Cross, K. Patricia  
1984 "The rising tide of school reform reports." Phi  

Cross, Nigel; David Elliott, and Robin Roy (eds.)  
1974 Man-Made Futures: Readings in Society, Technology  

Cuban, Larry  
1982a Teacher as Captive and Leader: Continuity and  
Change in American Classrooms 1880-1980.  
Washington, D.C.: National Institute of Education

Cuban, Larry  
1982b "Persistent instruction: The high school class-  
room 1900-1980." Phi Delta Kappan, October  

Cuban, Larry  
1984 "School reform by remote control: SB 813 in  
California." Phi Delta Kappan, Nov. 1984, Vol.66,  
No. 3:213-215.

Cunningham, Luvern L.  
1985 "Leaders and leadership: 1985 and beyond." Phi  
Delta Kappan, September 1985, Vol. 67, No. 1:17-  
20.
Dobrov, Gennady M.  
1979 "Technology as a form of organization."  
International Social Science Journal, Vol. XXXI,  
No. 4:585-605.  

Dorr-Breme, Donald W.  
1985 "Ethnographic evaluation: A theory and method,"  
Educational Evaluation and Policy Analysis,  

Doyle, Denis P. and Terry W. Hartle  
1985 "Leadership in education: Governors, legislators,  

Doyle, Denis P. and Marsha Levine  
1985 "Business and public schools: Observation on the  
policy statement of the committee for economic  
development."  Phi Delta Kappan, October, 1985,  
Vol.67, No. 2:113-118.  

Dror, Yehezkel  
1968 Public Policymaking Reexamined.  Scranton, Penn:  
Chandler Publishing.  

Dunn, William N.  

Feinberg, Walter  
1985 "Fixing the schools: The ideological turn."  

Fraley, Lawrence E. and Ernest A. Vargas  
1975 "Academic tradition and instructional technology."  
Journal of Higher Education. Vol. 46,  
No. 1, also in James M. Johnson (ed.) Behavior  
Research and Technology in Higher Education.  
Springfield, Ill.: Charles C. Thomas.  

Freire, Paulo  
1970 Pedagogy of the Oppressed.  Translated from the  
original Portuguese manuscript, 1968 by Myra  

Fullan, Michael Gerald  
1969 "Workers' receptivity to industrial change in  
different technological settings."  Unpublished  
Doctoral dissertation, University of Toronto.  

Fullan, Michael,  
1982 The Meaning of Educational Change.  Toronto:OISE.  

Galbraith, J.K.  
1972 The New Industrial State (2nd. edn.) André  
Deutsch.


Goodlad, John 1984 "Understanding schools is basic to improving them." The Canadian School Executive, March 1984:3-10. (Quarterly, 14:366-376.)


Hanson, Norwood Russell 1965 Patterns of Discovery. Cambridge: University Press.

Hart, Leslie A.

Hickling, Allen

Hlynka, D., and B. Nelson
1985 "Educational technology as metaphor." PLET (Programmed Learning and Educational Technology) 22, 1:7-15.

Husén, Torsten

Husén, Torsten

Husén, Torsten

Immegart, Glenn L. and Francis J. Pilecki

Johnson, David W.

Kaplan Abraham

Katz, D. and R.L. Kahn

Kelsey, J. Graham T.
Koberg, Christine S.

Lakoff, George and Mark Johnson
1980 Metaphors We Live By. Chicago: University of Chicago Press

Leonard, George

Macdonald, J.O.S. and F.I. Chem

Marshall, L. G.

McGregor, Douglas

Miles, Matthew B. and A. Michael Huberman

Miller, George A.

Morris, G. Barry

Murphy, Jerome T.

Murphy, Joseph A. and Philip Hallinger
National Commission on Excellence in Education

Neill, A.S.
1962 Summerhill, A Radical Approach to Education. London: Victor Gollancz Ltd.

Neitzsche, F.

O.E.C.D. External Examiners

O.E.C.D. Secretariat

O.E.C.D. Reviews of National Policies for Education
1979 "Education policies in perspective: An appraisal of OECD country educational policy reviews" by Prof. Maurice Kogan, Brunel University, U.K.

O.E.C.D.

Oettinger, A.

Ohanian, Susan

Ortony, A.
1975 "Why metaphors are necessary and not just nice." Educational Theory, 25:45-53.

Ortony, A. (ed.)
1979a Metaphor and Thought. Cambridge University Press.

Ortony, A.
Papert, S.  

Papert, S.  

Pedersen, K.George, and Thomas Fleming  

Pepper, S. C.  

Pepper, Stephen  

Perrow, Charles  

Pipho, Chris  

Pogrow, Stanley  

Prigogine, I. and Stengers, I.  

Ragsdale, Ronald G.  

Ravitch, Diane  

Rein, Martin and Donald A. Schöen  
1977  "Problem setting in policy research." In Carol H. Weiss (ed.), Using Social Research in Public Policy Making, ch. 16:235-251; Toronto: Lexington
Resnick, Daniel P. and Lauren B. Resnick  

Rifkin, J.  

Ronco, William C. and Donald A. Schön  

Rumelhart, David E.  

Salomon, Gavriel and Howard Gardner  

Salganik, Laura Hersh  

Sawada, Daiyo and Michael T. Caley  

Scheffler, Israel  
1960  The Language of Education, Springfield, Ill.: Charles C. Thomas

Schön, Donald A.  

Schön, Donald A.  

Schön, Donald A.  
1975  "What is an organization that it may learn?" Draft paper, December 1975.

Schön, Donald A.  


Scriven, Michael 1980 Presidential Address to the AERA 1979 Annual Meeting, reported in Educational Researcher, April and June, 1980.


Sizer, Theodore  

Sleeter, Christine E. and Carl A. Grant  

Smith, Kenwyn K.  

Smith, John K.  

Smith, John K. and Lous Heshusius  

Smith, N. L. (ed.)  

Stables, Allan  

Sununu, John, H.  

Sykes, Gary  

Taylor, C.  

Tetreault, Mary Kay and Patricia Schmuck  

Toffler, Alvin  
Toffler, Alvin

Toffler, Alvin

Tourangeau, and Sternberg

Trist, E. L.

Tucker, Marc and David Mandel

van Raalte, Miep

Vickers, Sir Geoffrey

Von Bertalanffy, Ludvig; Paul A. LaViolette (ed.)

Wallin, J.H.A.

Watzlawick, P., J. H. Weakland, and R. Fisch,
Weick, K. E.  

Weizenbaum, J.  

Westley, William  
1977  "A socio-technical approach." In Part I, Approaches to Inter-Sectoral Educational Planning, pp 139-155, Inter-Sectoral Educational Planning. France: OECD.

Wholey, Joseph S.  

Wildavsky, Aaron  

Wirth, Arthur G.  

Wirth, Arthur G.  

Wittgenstein, L.  

Woodward, Joan  

Woodward, Joan  

Woodward, Joan (ed.)  
Publications:

Clarke, Patricia, "Animal fair," The B.C. Teacher, November 1971, 51:1

Clarke, Patricia, "Job satisfaction for those involved in education in B.C.: a preliminary study in support of a comprehensive survey of educators in B.C." Learn, June 1977

Figure 9.1

"The Changing Nature of Work"

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