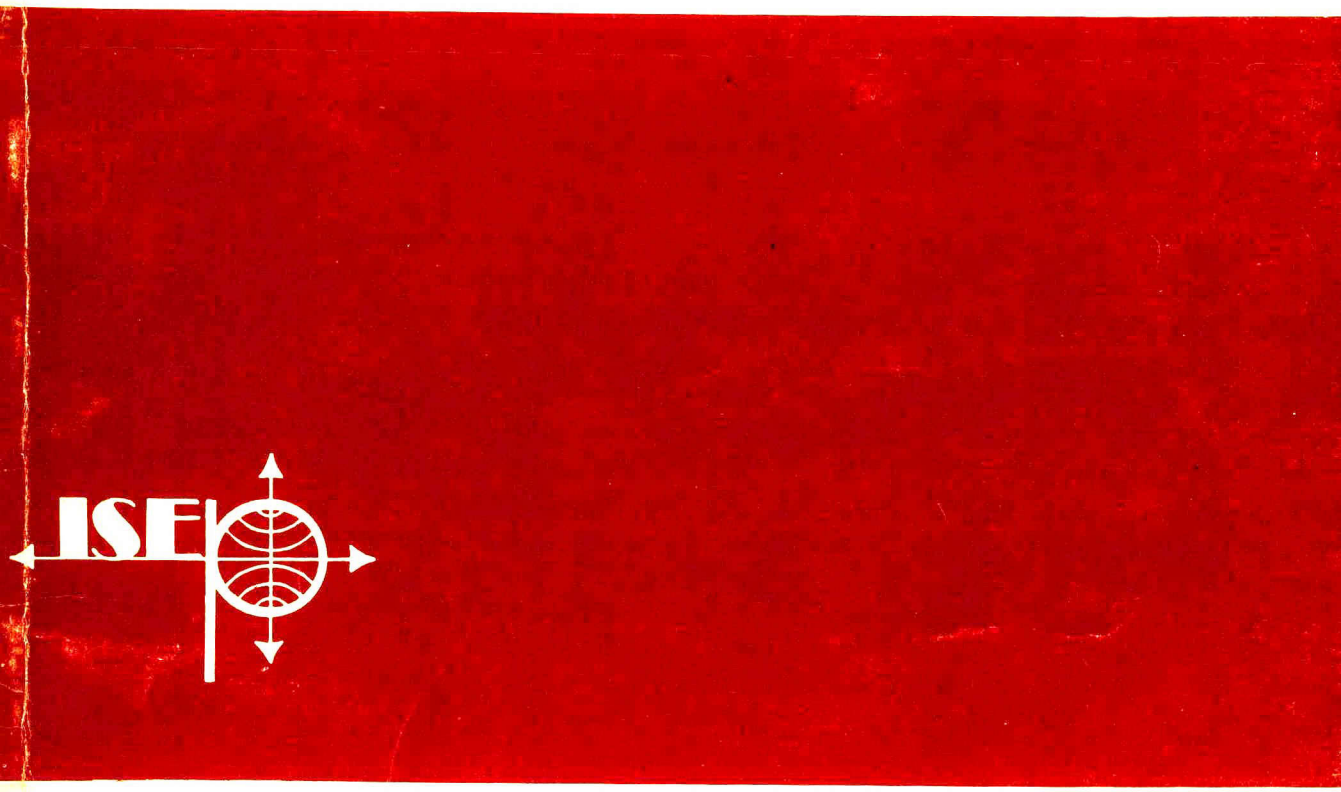
EDUCATIONAL PLANNING



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Cicely Watson, The Ontario Institute for Studies in Education

The journal prints articles on the theory and practice of educational planning, case histories, and articles from related specialties (economics of education, sociology of education, demography, town planning, institutional research, operations research, educational research, and applied mathematics) which are of interest to educational planners.

The journal also regularly includes reviews of publications in this field and related fields.

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Cicely Watson*

THE PRESIDENT'S ADDRESS

Fellow ISEP members and guests, you will have observed by now that this year we changed the format of our annual conference. Up to this year we had followed one design: we chose a theme, invited one or two major speakers to deal with its chief elements, and a number of other speakers to discuss specific and detailed aspects of each element. For each day there was a recognizable theme and the papers of the conference were intended to sum to a whole. Over the years it became the custom for the President Elect to take charge of the conference arrangements, assisted by a planning committee. This format illustrates one of the weaknesses common to all planning – a weakness which we encounter in the real world, one which is not adequately dealt with in the textbooks. The planner's success depends crucially upon his control of the elements of the plan. He never has complete control. He seldom has what might even be termed good control. If his agency is wealthy and committed, he may have what could be termed reasonable control. In arranging a conference if the society has wealth and prestige the planners have a relatively easy time.

The planners for our annual conference have never had wealth at their disposal. We have not even been able to pay the travel expenses of our speakers. And although at times our planners have had high personal prestige and influence, it has not been so high as to avoid a great deal of contingency planning and program re-planning each year. It says much for the ingenuity of our conference planners that they have stayed calm and cheerful when making their fifth or sixth replacement of a keynote speaker. When two weeks before a conference the final program is being printed and we find that only one-quarter of the names appearing on the final list were those appearing on the first list of speakers, it becomes clear that the program format must change.

So this year's program consists of a series of submitted case studies and papers. The presenters have a message or a set of experiences which they wish to publicize; they have been chosen from among a large number of submissions. Presumably their keenness and commitment will ensure that there are few withdrawals at the last minute. In its wisdom, when the Board decided to try this type of program, its members also adopted another suggestion which had been made from time to time over the years – that the President address the conference, not in the sense of announcing a few membership and financial figures and outlining our major current difficulty, as we have done in the past, but that the presidential address serve as the keynote speech. I am the guinea pig and you are the first victims of experiment. This innovation cannot be said to have been planned. It does not fall into the category of a reform which is long overdue and which takes place in response to overwhelming public demand – and therefore is likely to be a generation out of date as an appropriate response to the need. Nor is it the clever and farsighted innovation of a group of technocrats – an innovation stealthily and surreptitiously implemented disguised among other more popular activities, an innovation which will be recognized several years hence as having been a sensible move. For example we have breached one textbook tenet of good planning – alternatives have not been studied. This innovation

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of the President's address falls into the category of unplanned change. In that, it is in the mainstream of change in our world. If it appears to be successful and becomes a part of each year's conference program eventually, a decade from now, we shall dress up the decision with justifications and make it look like an astute and careful choice, taken only after *comprehensive* study of the *interrelatedness* of portions of our annual conference program, showing that it will fulfill a *need* and after proper *evaluation*, in which there was a great deal of *participation in the decision-making* and with the Board acting in a duly *accountable* manner. In fact, of course, the Presidential Address has one supreme merit and only one – the incumbent cannot avoid it. If, after this morning, next year's conference committee decides that there shall never again be a President's Address, then it should be noted for the record that this was not a planned innovation – it was one of those regrettable, *ad hoc*, entrepreneurial, bright ideas of Don Adams, made after he had completed his term as President. If on the other hand it proves to have been an unforgettable experience, establishing a firm tradition, then the credit should go to Ken Tanner who planned this year's conference and will be faced with giving the presidential address next year.

Knowing that I would be participating in this innovation, I thought very carefully about my presidential address. In fact I thought so much about it I didn't get down to writing it till last Sunday evening. And I only wrote it then because I was leaving Monday afternoon on the first leg of my journey to Nashville. My handwriting is so bad that sometimes I cannot read it myself so I dare not present a handwritten paper. Otherwise I might well have waited to write until last night. However, even the most stupid innovation sometimes presents unexpected dividends, which is a second good planning tenet I would like to bring to your attention. The successful planner has to be something of an opportunist – which sounds like a paradox, does it not? This paper has been typed. Therefore it can be read quickly and we can move on to discussing it. And next January when some unfortunate member of the Board has to edit the conference papers for the journal at least he will have a text to re-write; instead of having to write one from notes.

My problem is not unfamiliar to planners – lack of properly stated goals. The Board and the Conference Committee told me to give a presidential address, but they failed to tell me what they wanted me to say and why I was to say it. Now I give a great many speeches each year. They fell into two types, neither of which is appropriate for this audience.

The first type is some sort of a reply to the question, "What is Educational Planning?" When it is given as an introduction to students I play it straight with definitions, history and *caveats* trying to show that I recognize that real life changes, in real life systems seldom follow planned lines. When it is given to administrators, teachers or trustees I pretend that changes really can occur the way they are planned and I use as illustration some of the changes which happened in Ontario's educational system in the past fifteen years.

The second type is some statement of vision of the future – the next decade in Ontario according to the gospel of the listener and the speaker: future educational costs, the future of teachers, the school building of the future, the future problems of X board in Y county. In some ways this is the easiest of the speeches I give – six pages of text, sixty pages of tables and graphs, a *son et lumière* routine with my colleagues Saeed Quazi and Albert Kleist handling the overhead projection. It's a very satisfying speech. They do the work.

I get the credit. I end the speech with a few provocative statements or unanswerable questions and the meeting takes off to a satisfying ding dong discussion with plenty of polite controversy.

What should an annual presidential address be? Should it follow the theme of the conference of which it is a part? This year's theme is "linkages", the importance of the linkage between the practice of educational planning and research, and that between the practice of educational planning and plan implementation. The planner as middle-man, the consumer of research, and sometimes *faut de mieux* the researcher himself because there is no relevant research relating to his problem and he dare not begin to plan a change in a condition so ill documented and so little understood. The planner as advocate salesman trying to ensure that his plans, timetables, propositions and formulae (which he hopes are sufficiently detailed to meet the needs of the administrators) are understood by them, trying to ensure that they won't be amended, distorted and jettisoned without prior consultation with him; trying to ensure that supplements to the plans (further planning wich is always necessary as time goes on) will be referred to him, or if not, that it will not place in jeopardy his original major planned change.

On reflection I decided that neither of my party pieces would do, nor should I bore you with a version of my experience of linkages in planning. However, thinking about examples of linkages started me thinking about our field, our profession. So I decided to make the state of our field the subject of this address. Ours is a new field – there is doubt even as to whether educational planning can be called a field or a discipline. It's a grab bag of borrowed ideas, techniques and procedures. It is singularly lacking in a comprehensive planning theory, let alone a theory of planning linkages. Thinking about this field I drafted yet another version of the topic, "What is educational planning?" So those members who feel we have talked this subject out and nothing more can usefully be said, should leave now for the coffee break. This will be a very personal impressionistic look at that which is called educational planning. What have we been doing in the past two decades, under this rubric?

You will recall that in the late 1950s and the first years of the 1960s educational planning as a national and international activity came to light in Europe, fostered particularly by two agencies – UNESCO and OECD. The experts employed by these agencies, and the academics and civil servants with whom they worked in different countries, were concerned about the economic and social rehabilitation of the nations they were studying or serving. These planners equated national well being with progress toward development. The more informed and sensitive among them were aware of the dissatisfactions and criticisms being made in their countries – criticisms of public services of all types (including education) and desires for what might be called a better quality of life. Their goal was to plan and implement changes which would ameliorate the criticized conditions and relieve the dissatisfactions.

But in order to achieve general policy goals one must be able to identify specific targets and objectives which will lead toward fulfillment of these goals. And to achieve these targets in a planned, rather than a hit or miss or random, fashion one must be able to identify several things. Let me list them:

- the hierarchy of targets;
- the correct sequence by which if one target is achieved the achievement of the next target becomes possible;

- the complex network of related acitvities and interests which will continue to operate while the first target is being achieved and which must be so conducted as not to inhibit the achievement of this target;
- the way in which the activities for the achievement of that target might affect and and distort the on-going related activities – so that at the end, after it has been achieved, it may well be decided that the price of success was too high, that putting into effect the goals of the plan has created more problems than it has solved.

The complexity of national planning efforts ensured that educational planning would not be an end in itself. The planned change in education was merely one cog (albeit an important cog) in a vast machinery of planning. Therefore it was axiomatic, for these planners, that educational service must be moulded to the general need. Which brings me to another general planning tenet – if the essential nature of the activity is not well understood and protected, efforts to reform it might well destroy it. These early planners (those involved, for example, in the educational plans for the Mediterranean countries) have been criticized for subordinating educational plans, particularly higher education or university plans, to economic development needs, particularly to their perception of the manpower development component of their economic development goals. Their preoccupation was predictable. Most of the experts were economists and statisticians. They worked with senior civil servants in the countries involved. And both groups saw growth in the wealth of the country as the indispensable prior condition to effecting any other change. I remember once having a heated argument (in 1967) with a group of OECD experts. I argued that up to that time only one kind of educational reform had been planned – system expansion of service (i.e., the provision of increased numbers of student places). No real change had been planned in the structure of educational systems or in the process of education (the curriculum, the educational experiences of the students, the behaviour of teachers, the methods of evaluating the activities being undertaken). No real planned change had been undertaken even in the governance of education, i.e., in the relationship of education as a public service to other public services. To do this would have meant changing the forms of financing education and the authorities responsible for making public policy for education. Let me give an example of what I am referring to: In the countries of the western world standard education (elementary/ secondary) has for many decades been entirely a public charge. In the 60s there was a trend to extend this, to have increased free education in underdeveloped nations where fee paying even for primary grades of school had persisted, and in the industrialized countries to extend free education down to pre-school age groups and up beyond the age of 18 to all types of post secondary and university groups. For the latter not only were fees abolished but in many countries students were put on salary. This trend was simply taken on trust. It had not, and it still has not, to my knowledge, been subjected to much research investigation. It seems to me that even the narrow financial and economic implications of this extension of public funding have not been understood, let alone its broader social effects. The answer to my criticism was, of course (and it was reasonable at that time), "One cannot suspend all plans to change public services until we have research findings on the possible effects of all reforms". At that time I argued that expanding the educational system's numbers might well provide the estimated needed manpower for desired economic development, but there was no evidence to suggest that these additional candidates would come from different social groups than had traditionally been the case. If the additional participation (in higher education, say

was drawn from the same social groups as before, this would exacerbate the already evident dissatisfaction with the educational system – the feeling that too many groups in the nation were being excluded from educational experiences which lead to a better life. The economic experts recognized that this might be so, but they argued that there has to be some limit to the responsibility of the planner. If the planner can persuade the political authority that an expansion of the system is desirable, that the larger numbers can be achieved (i.e., the pool of candidates will be there), and that a certain distribution of educational places by type of course, discipline or program will provide the needed manpower – if he can show all this, then as a planner he has done his job.

The responsibility for implementation must be left to others. Program planning must be left to educational administrators. After the fact we found, of course, that far from being a great egalitarian social reform the much planned expansion of university systems of many countries of Western Europe scarcely broadened social participation. After the fact we realized why this was inevitable. The intellectual process of higher studies presupposes a certain type of educational preparation. Educational research studies for many years had been demonstrating that educational achievement is very closely linked with a type of conditioning which is virtually independent of the school, conditioning which is provided by the home and the community. Without radical alteration of school process (particularly a revolution at the secondary school level) the broadening of social participation at the higher level will not take place.

Which brings me to another basic planning tenet – one cannot transform the attributes of one educational sector unless the transformation of its feeder sectors has already occurred. In the university planning the target numbers were achieved – the new places were filled, the required number of graduates emerged from the institutions, but they proved to be the less academically able youngsters of the middle class and the lower middle class not the youth of rural communities and the urban working class. Moreover in some countries, these additional university students persisted in entering the "wrong" programs – so that the new science places remained empty and those in the humanities were over-crowded. Why did the higher education planners fail to realize that the secondary school had to be transformed first? In justice to the economists who were these first educational planners we must admit that, when a cohort of educational planners emerged from the administration of schools and colleges their efforts were not much better. Educators do not seem to be able to plan and carry out process changes either – witness the whole movement to try to change teacher behaviour through changes in pre-professional training, in-service courses, updating study leave, participatory planning, the whole competency based teaching movement. The net effect of two decades of attempted educational process reform, at least in North America, has been to induce a profound public mistrust of the ability of teachers to teach and schools to educate. The educational process of Canadian and American elementary and secondary schools has seldom been subjected to such a prolonged period of research and development and attempts to induce change. Yet our schools have seldom enjoyed less public confidence. Everywhere there is public demand for a return to the "basics", to the good old days of traditional process. This was the very process which, in the early 1960s was attacked as inadequate. It was stigmatized as serving well only those children whose home conditions had made them "learning prone". The planned reforms in process were initiated for the benefit of the *non* learning-prone child. They appear to have failed.

The first European educational planning efforts were *ad hoc*, unsystematic. But by about 1966 or 1967 (let us say by the year that a seminal conference was held at Syracuse which gave rise to a little volume of papers called *Educational Planning* edited by Don Adams) there had been enough attempts to plan the reform and expansion of educational systems in various countries for (1) the label "educational planning" to be widely used, and (2) some analysis of the activities to have begun. There rapidly had emerged a body of literature for the new field – accounts of planning experiences; papers describing planning techniques; inventories of needed research; descriptions of implementation problems; discussions of the relationship of planning to research and to administration; discussions of appropriate planning control and monitoring devices (particularly in the fiscal realm). By that time planners were working at so many levels of the educational system, were responsible for so many tasks and performing them in so many different ways, that it had become difficult to identify who was an educational planner and what he was doing when he was engaged in educational planning.

In arguments with the economist – and statistician – educational planners, those of us who were not economists (generally a mixed company of sociologists and psychologists, humanists who had ended up as educational administrators, educationists who had some grounding in theories about the teaching/learning process) were at a distinct disadvantage. When we talked about the activity of planning it was agreed that we needed goals in order to plan change, and that (eventually) the changes we had implemented as planned had to be evaluated in the light of these goals. It was also conceded that since no one public service or social institution was an end in itself there must be a hierarchy of goals with the specific planning goals of any one period of time, or any one service, subsumed under the general goals. But there we were stymied. The economic-based planners had an overall general national goal. It might be phrased in a number of ways but the following will do: "The increase of the nation's wealth by the development of the economy; the creation of the conditions which will enable economic development to occur, one important condition being the development of human skills and potential through education". We were told on more than one occasion, "No one *objects* to the general goal that the nation shall get richer. There may be all kinds of disagreement as to the means by which it shall get richer, the conditions necessary for getting richer, and the distribution of the increased wealth. But the overall goal is not rejected".

Those of us who were not economists but who called ourselves educational planners rejected the overall economic goal as the main basis for planning national educational systems but we failed to agree upon other satisfactory general goals. We were not simply being negative. Try enunciating them. It is difficult even to come up with some general motherhood type of statement to which all will agree. The maximization of human potential? The greatest good for the greatest number? The greatest improvement for the most profoundly disadvantaged? Or that old hoary phrase, equality of educational opportunity? All are eminently unsatisfactory as goal statements. Recognizing their inadequacy as philosophers many educational planners turned their backs on philosophizing. They sought refuge in becoming technocrats. And the field of educational planning suffered immeasurably as a result. It is true that this action had the advantage of not constraining the work by any overall theory or set of theories. Educational planning did not, as did some academic disciplines, have to "shed its skin" from time to time in order to address itself to new developments and problems. But on the other hand anyone's definition of planning has become as good as his fellows'. One cannot show one's students

sets of activities and say, "These are good planning. Those are poor planning practices." One cannot say, "This plan failed because it violated this fundamental tenet of planning theory". Opinionated teachers like me do make statements such as these, but they are personal opinions. They are not founded upon any authority or any theory. I think the time has come when there is an urgent need for philosophers of planning to enunciate their theories and creeds. We have had about twenty years of *ad hocery*, creative invention and adaptation; self promotion, self justification and self evaluation. We desperately need some general theories and general standards.

You will remember that Bowman and Anderson in that little volume which was produced from the Syracuse conference defined planning as a process. They established categorically that the preparation of elaborate national plans for the reform of an educational system (like the early plans produced for Nigeria) do not in themselves constitute planning. We all know instances of technically beautiful documents, elaborate plans which sit on a shelf in some Ministry or Department of State and have never been implemented. They represent several man years of intense professional work. They have been disregarded, not because they were judged to be inappropriate, inadequate or faulty but because during the lapse of time between the inception and completion of the work they became irrelevant.

Today there is little disagreement with the notion that educational planning is a process, not the production of a set of plans. But what kind of a process? Is the preparation of plans an indispensable part of that process? Well, it would seem not. There are agencies indulging in educational planning which would be hard put to produce a "plan" on request. We have people employed in educational systems, called educational planners, who could not produce a set of formal plans of professional calibre. (A formal plan here is defined as a set of descriptive and evaluative prescriptions sufficient to carry out a reform in the manner desired, at the pace and cost agreed.)

In the same volume which printed Bowman and Anderson's article there is reference to the much quoted definition of Dror where the planning process was seen as involving a series of steps: goal definition, needs analysis, plan preparation, plan review, plan scheduling, plan evaluation, a second stage of plan review, replanning, new scheduling. Over the years the steps have been defined with different terms and re-arranged somewhat. Additions and requirements have been suggested. The planning procedures were seen to be iterative, not a once-for-all-time activity and so the term "rolling planning" was coined. Planning was seen to have not a single set of targets but ever evolving targets (a sort of moving infinity) and so the concept of target planning gave way to that of vector planning. There was disagreement as to where the planner should start his work. It was noted that starting with goal definition wastes endless time on disputes and attempts to define and agree upon goals. Leaving aside the philosophic general goals and starting with the definition of specific target conditions, the planner soon faced the need to trade one target goal against another, to decide upon sequencing and choose priorities. As his clients' attention was directed to this need to choose priorities, the planner found that he needed some general goal references. He soon learned that agreement upon targets was not stable. Agreement lasts only as long as the price of the trade-off is not apparent. All relinquished targets become more attractive as the plan evolves. So the planner found that the work of re-defining specific targets was never ending. This became particularly evident when educational planning descended, so to speak, from national policy planning to the level of operational planning for changes in the work of schools.

The "classic" set of planning steps had the planner methodically, and with statistical precision, mapping and describing the present condition. This description and an understanding of the past trends would then enable him to project the future condition. The difference between the desired objective each year hence and the likely condition each year hence was a measure of the change which would have to be planned for. For some planners this proved to be too slow, too conservative a process. They preferred to start by choosing a radically changed situation a decade or so hence, working backwards and defining the necessary annual states which would be needed to achieve that end condition. For them the major task of planning involved taking care of the discrepancy in the immediate future, eliminating the difference between the current condition and the first step on the new vector. Some educational planners have been so caught up with the attractions of alternatives that they have never been able to push their systems to the point of making choices. Others have set out their plans as if there were actually few choices to be made and incurred the criticism of being undemocratic and authoritarian, unwilling to consult and permit participation in the planning effort. There are many activities directed by planners which might be called community development work or social action training. Such planners never actually progress to the stage where they undertake any planning; their work consists entirely of pre-planning activities.

Over the past 15 years we have learned to draw pretty flow diagrams using various shapes (squares, triangles, circles) to represent procedures and relationships, thereby implying that the process has a scientific basis in knowledge which we do not in fact have. We use opinion tracking and predictive techniques which are but one step in advance of the Ouija board. This is acceptable only if we admit that they are in fact primitive. As our borrowed techniques have become more sophisticated and precise, our use of words has become more sloppy. One has only to look at the literature of some of the fads of planning to realize our need for self discipline. The word "need", for example is used to represent a desired level of magnitude of a condition, given acceptance of a set of premises and concurrent related conditions. Thus manpower needs are expressed as numbers of graduates qualified with particular skills of a certain level of sophistication, who will be employed if the economy operates at a given level, producing goods by means of personnel used in very fixed numbers and production roles. In some countries after considerable educational planning and heroic educational reforms to produce the estimated number of graduates who were said to be needed, changes in the level or type of economic activity, in the type of production, or technological or market changes, made the graduates unnecessary. They were no longer needed and there were high levels of unemployment. "Need" is also used to refer to the gap between the present and the desired future state; the gap between the predicted future state if no planned change is effected and the desired future state; what is required to change the present into the future; an output in the future; or a characteristic of the future.

It should be noted that much national educational planning which took place actually achieved some of its intended goals but that it was successful *in spite of* the planners. The planned reorganization of elementary teacher training in Ontario, for example, was carried out, but at many times the expected cost. The reform involved closing the teachers colleges and putting all teacher training into the universities. If the cost of transferring all training into the universities had been known when the policy plans were accepted, they would almost surely have been rejected or grossly modified. Only a rich jurisdiction could have carried out such a reform in such a way. In fact, the original

transfer plans, the ones on which the reform commission based its recommendations, did not even include cost estimates. Their plans were entirely concerned with the flow of teacher supply/demand, the capacity of the university system to accept the additional task, and the preferences of the teaching profession and the public as to the type of pre-professional training experience students ought to receive.

The planning of the 1960s which was actually implemented in such countries as Sweden and which did result in changes in the educational system has been criticized because it was uncontrolled. During the implementation phase modifications were made which radically altered the plans themselves, their goals and the pace of change – all, usually, without reference to the original group of planners, although they were criticized if the end result was unsatisfactory. So by about 1969 planners were turning their attention to theories of control systems and the literature blossomed with borrowings from the physical and management sciences. The economist – planning personnel gave way to planners who were engineers, operations research and computer systems experts. The planners became more adept as managers and technicians making forecasts and projections, and building their simulation models. They also were more aware of the dangers of error. So they attached probabilities to the plan targets. Before agreeing upon a hierarchy of goals they attached premises and probabilities to the rankings. They even attached probability statements to the activities being planned. "Goals" came to be formulated not merely in concrete measurable targets but in behavioural terms. At least this is what educational planners now claim should be attempted. But this assumes that we can recognize and describe the behaviour we wish to end up with. It presumes that we understand which component (among the complex of observable behaviour actions) is *the* important one to influence in order to achieve the overall behaviour we wish to obtain. Much of recent educational planning literature on this subject reads like religious ideology rather than science. Planners have got themselves into a revivalist frame of mind. This, in my opinion, is particularly evident in the United States where planning is being used as a strong purge to cure the constipation of the political system. When objectives are recast into behavioural terms one finds either normative exhortation statements or specific and narrowly detailed action and attitude statements of the cook-book recipe variety. Neither inspire confidence that the real behaviour we are trying to encourage will emerge from the school reform being planned.

So in self defence in the past few years educational planners have taken to distinguishing between "policy planning" and "implementation planning". The former is safer. If the desired policy does not succeed it is not necessarily because the planning was inadequate. It is the fault of the institutional or system environment which is unsympathetic to change. Implementation planning, on the other hand, can be judged as planning – it either succeeds or it does not. The change either occurs in the manner expected, at the pace desired, by the persons and groups intended, at the cost already approved – or it does not. One can even talk about (and presumably measure) degrees of success in implementation planning. One can plan the evaluation of the target achieved and the planning process, at the same time as one is planning the reform innovation itself. So in recent years we have emphasized evaluation and review, quality control and accountability. And we have lost sight of the fact that evaluation, however necessary and useful, is not planning. One can evaluate a change which has *evolved* as readily as one which was *planned*. Another recent development is that planners have discovered communication. It is a useful catchall, a scape goat, to account for the failure to effect the desired change.

The planning failed, not because it was shoddy planning, but because it was not communicated. Communication is so much more than simply explaining what is to be done and describing the desired final condition – in words, in numbers, in graphs, in attractive flow charts or (ultimate of ultimates) in algebra so that only the initiates can follow the explanation. Now the question must be faced, "To whom are the plans being communicated? To whom is the planner talking? To whom should he be talking?" Obviously the planner has always had to use different language to different groups and individuals (according to their background). But now even more is demanded of him. The planner is now in danger of compounding his "double talk" with "double think".

We have come full circle. In trying to be all things to all men, the educational planner who once knew his task and could perform it with reasonable assurance now has difficulty deciding what his task is. Every amateur is entering his act. So that now not only is there a serious question to be asked: "What is educational planning?" but the even more difficult one, "Who is the educational planner?" At the Toronto conference on the politics of planning (in 1974) we exchanged horror stories of how the different levels of political authority insisted upon influencing (distorting?) the planning activity. At that time, speakers agreed that the participatory mode of decision-making could not be avoided in education. The professional planner was invited to involve in his work, not only his system's administrators, elected officials and organized political groups, but also its teachers and their unions, its clients (the students and their families), and all the amorphous, unorganized and self elected pressure and lobby groups who claim to represent some portion or other of the community. It has since become evident that the taboos and constraints imposed by such widespread participation are a guarantee that the planner shall not plan.

Planning implies coercing (and surrendering) individual and group desires and priorities in favour of some overall common intention, and keeping to that pattern for a sufficiently long time to realize the target at which the plan is aimed. It presupposes social discipline and social cohesion. The most effective planning in western countries has been undertaken in time of war, when fear puts self interest into perspective. I think the level of fear is not high enough in North America to induce any real commitment to educational planning. What does seem to be happening is that large groups of citizens are involved in talking about public services (including education) in such a way as to give them the illusion they are participating in planning and governance. No real power has been transferred to these groups. Their intervention is sporadic and intermittent. But their intervention makes for unstable political conditions, particularly at the local level. In these conditions it is difficult to plan.

As for our field, we can make no real progress until we learn how to distinguish the amateur from the professional, good planning from poor planning. We now seem to be at the stage where any activity advocating or leading to educational reform gains respectability by calling itself educational planning. Everyone is an educational planner. This state of confusion will not be cleared up until as practitioners, we agree upon some theory and philosophy governing our work. We have need of a period of codification, a period of synthesizing, of enunciating general principles of planning and defining standards of acceptable work.

Edgar A. Fresen and K. Fred Daniel*

STRATEGY PLANNING FOR EDUCATION IN FLORIDA: A CASE STUDY IN ORGANIZATION AND METHOD

Introduction

Preoccupation with forecasting the future is an old concern dating back to the origins of civilization. Probably one of the oldest professions – if not the oldest, at least honourable – is that of the expert on the future. This need to forecast the future is based on the desire to anticipate misfortune or to profit from future events. Recently there has been added the desire to mould the future. Forecasting is based on the belief that as we move forward in time there are signals which, if properly interpreted, can provide insight into coming developments. Our belief in the ability to interpret such signals is based on cause-effect interpretations of reality which are the cornerstone of modern science. With the recent rapid rate of change in our society, the number of events which can be predicted directly from cause-effect relationships has declined. This has lead to the realization that conventional planning methods and forecasting techniques in some cases are unable to deal effectively with the future.

In turn, the inability of conventional methods to anticipate the rate of change has reduced the relevance of experience in planning and forecasting. In earlier times the ability to forecast the future was related to supernatural power, and forecasting was the domain of religious figures. This type of forecasting involved using previous experience to interpret the future. In recent years the religious figure has been replaced by the scientific expert, who in most cases forecasts from present experience determined by observation. Lately, the expert is being replaced by reliance on a community of experts. The need to contemplate, simultaneously, a multitude of factors generally exceeds the capabilities of a single individual, whatever his or her qualifications.

So the rapidity and extent of change and the need to study it from the vantage point of many disciplines, theories and techniques has led to the need for planning which incorporates intuition and creativity. Nevertheless the planning process requires that activity be organized, systematic and consistent.

In the Florida Department of Education, strategy planning is defined as the analysis of proposed policies in terms of their future consequences. Alternatively, it could be defined as the generation of information and analysis of future trends and conditions in relation to policy needs and opportunities. Or it might have been defined as anticipating policy needs by the identification of problem areas before they reach the crisis level. Although the function is known by several names, basically it requires two activities: long-range planning and social monitoring. Most strategic planning is designed to provide decision-makers with information. In some cases the process in which the information is generated is also used to build support for specific goals.

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Such planning requires the means for broad participation. The quality of the planning, in many cases, is dependent not only on the talent but also the number of individuals involved in the process. One of the most important features of such planning is the belief that the future can be modified by making choices or revealing preferences about it. The preferences should be established democratically, hence the requirement for broad-based participation in the process. Strategy planning requires the planner to perform as an educator instructing in the concepts and data which relate to the determination of objectives and policies. Conventional forecasting techniques are not totally discarded. They perform the valuable function of forecasting short-run developments. Their limitations become more apparent when projecting for long-range or dealing with complex human reactions and social outcomes.

Areas of Concern for Strategy Planning

There are two reasons for applying strategy planning to education. The first has to do with the fact that education is essentially a product for the future and, therefore, we must have an understanding of the environment in which the skills and knowledge imparted in the educational institutions will be used. The second, has to do with the reasonable expectation that organized education will play a role in the future, and that the educational process will be more integrated with other social functions than it presently is. Our approach to strategy planning has been to combine conventional short-range planning with comprehensive long-range planning. In short-range planning we treat the future essentially as the present. Such planning deals with the immediate impact of legislative and budgetary changes. A simple intermediate-range planning technique has been to start from a goal and try to create a future around it. This has been the approach used for basic educational skills. For long-range planning we attempt to picture a comprehensive future by analysing trends and identifying the opportunities and problems associated with them. We have identified the following areas of concern:

Economic. Trends indicate that in the future the rate of economic growth in Florida will probably be slower than it has been in the past. Reduction in the rate of growth suggests that resources available for education will become increasingly scarce, placing a greater emphasis on their efficient allocation. A further consequence of decline in the rate of growth will be reduction in our ability to provide employment at present or past levels. Consequently, we must contemplate the possibility of higher levels of unemployment which may lead to early retirements, shorter work weeks, and the implementation of guaranteed income laws. Other economic elements of concern for future planning are problems faced by the market system with its limited ability to deal effectively with public goods. This may force greater planning and greater centralization of economic decision-making.

Politics. Of equal concern to future planning for education are changes in the political sector. On the national scene there is the increasing demand for accountability for government actions, a demand which may result in reduction in the power of government agencies and units. The general public impression of bureaucratic inefficiency may produce additional bureaucracy in the form of an administrative control system. Internationally, we must contemplate the possibility of renewed isolationism. Paradoxically, it must be admitted that there is an equal probability of greater U.S. involvement in international affairs. Finally, within the nation there has been increasing evidence of a

shift in political power from the northeast and industrialized states to what is presently called the 'sun belt'. It is considered that such a shift would provide new opportunities to our state.

Social and Demographic. Such trends represent very critical contingencies for future planning. One of the most important is the continued in-migration to our state from other parts of the country. This rise in population, which is shared by most warm areas, indicates that Florida will grow at four times the average rate of the U.S. Also of great concern is the rapid increase in the divorce rate which will greatly affect family life, and hence, have serious implications for education. A final element of concern is the changed age composition of the population of the state. The proportion in the traditional education age-groups will reduce, providing a relatively older population.

Environment and Energy. Long-range planning must show awareness of environmental and energy changes. Two particular trends are of paramount importance: (1) environmental problems posed by population and industrial growth which may well require environmental controls; (2) the possibility of a serious and prolonged energy crisis.

Education. There are observed trends in education which must be of prime concern to the planner. The first is the increased rate of obsolescence of skills. This leads to the idea of lifetime education which, in turn, will force education to serve population groups which in the past have been neglected or only superficially considered. There is also a growing need to redefine the functions of education, and in the process, education may produce some novel and surprising institutions and structures.

Science and Technology. The last area of concern for strategy planning in education deals with changes in science and technology. There is some evidence that a revolution in communications is underway which could dramatically alter the function of the education system. It is also important to recognize and plan for the increased use of computers.

Planning in Florida.

The strategy planning unit in the Florida Department of Education was created in 1975 as part of the Department's reorganization. The unit is responsible for long-range planning, but it is also concerned with the present since it must view present decisions in terms of their future effects. The Department is unique as a state education agency in that it encompasses all levels of public education, preschool through graduate school. It is organized into four divisions:

- that of public schools, which coordinates educational programs in 67 local school districts;
- that of community colleges, which coordinates educational programs in 28 community college districts;
- that of vocational education, which coordinates vocational programs operated by school districts or community colleges; and
- that of universities, which operates the nine universities which comprise the state's university system.

The strategy planning unit reports to the Deputy Commissioner, and its work relates to all four divisions of the Department. It strives to balance the use of technical planning aids with processes which allow maximum participation by interested constituents. In,

fact, when the technical planning aids described below are fully implemented, they will provide supporting information which will strengthen the participatory planning process.

The prime clients of the unit are the Deputy Commissioner, Commissioner of Education, and State Board of Education. The analyses and recommendations of the strategy planning staff are for the use of these clients in taking action to modify current policy. Such action might affect the operating policies of the Department, the Rules of the State Board of Education, or statutory changes being considered by the Legislature. Naturally, every effort is made to involve prime clients in the planning process. During 1975-76, a series of "Commissioner's Seminars" was held to stimulate discussion of educational policy issues. The seminars generally were conducted by university faculty and participants were the commissioner, deputy commissioners, division directors, and their guests. The following topics were covered: Economic theories of public education. The Florida economy and the effect of education on it. What is known about the knowledge levels of Florida citizens? Who is served by education; who should be served? The cost of education: what does it cost and what should it cost? Anticipating the future.

The second key group which participates in the planning process is the Planning Committee of the Department. It is composed of one representative from each division, usually the divisional planning chief. Each division has a planning office which plans specifically for its segment of the public education system. Participation of divisional planning representatives in strategy planning activities increases the liklihood that Department-wide planning and division planning will be consistent and mutually supportive. The Planning Committee usually reviews the outlines and drafts of proposed planning products. The products are often revised significantly as a result of committee members' recommendations. Also, since much of the statistical data used in strategy planning comes from the divisions, their involvement in the Planning Committee assists the acquisition of needed data.

Department of Education specialists in areas other than planning are also consulted frequently. This normally occurs when there is need for multi-disciplinary input. It also occurs when specific specialist advice is needed – a recent example was the development of a state strategy for improving education in the basic skills. Specialists from school districts and institutions are also consulted frequently. In the recent strategy planning project for basic skills, groups of reading, mathematics, and language arts specialists were assembled to recommend strategies for improving education in the basic skills. The expenses for attending these meetings are paid by the Department of Education. On other occasions, drive-in conferences have been held in various locations in the state.

For some projects, unions and professional organizations participate in the strategy planning. Student groups and non-educational organizations having an interest in education have also participated. A series of meetings for examining social and economic indicators relevant for educational planning was held in Fall 1975. Four categories of participants were invited: faculty/teachers, educational administrators, general public, and students. Participants were nominated by their organizations. The faculty/teachers groups came from such organizations as the American Association of University Professors, the Florida Association of Community Colleges, the Florida Education Association, and the Florida Vocational Association. Administrators came from such organizations as the Florida Association of District School Superintendents, the Florida Administrative and Supervisory Association, the Community College Presidents' Council, the State University

System Council of Academic Vice-Presidents, and the Florida Association of Private Schools. Representatives of the public came from such organizations as the Florida Association of County Commissioners, the Florida Association of Retired Persons, the Florida Congress of Parents and Teachers, the Florida House of Representatives, the Florida Senate, and the Florida Chapter Federation of Laborers (AFL/CIO). The student groups were nominated by such organizations as the State Council of Student-Body Presidents, the Florida Junior College Student Government Association, the National Honor Society, and the Florida Association of Student Councils.

Technical Aids for Strategy Planning

Two planning techniques – cross impact matrix and trend impact analysis – have been adopted by the Department for the purposes of strategic planning. The cross impact matrix is a technique which analyses the probabilistic interaction of future events. We have adopted the approach and the computer program used by the "Futures Group" of Glastonbury, Connecticut. Under this version of CIM, individuals involved in the planning process are required to develop a set of manageable goals, events or contingencies and alternative strategies, and enter the items into a matrix. Participants then establish initial probabilities for entries in the matrix, and fill out the matrix with conditional probabilities for these items in relation to every other one in the matrix. After the matrix has been completed, the original probability estimates are adjusted in order to achieve consistency between the conditional and initial probabilities. The process involves choosing at random an element of the matrix and determining by a Monte Carlo technique its occurrence or non-occurrence. The occurrence or non-occurrence of an event alters the probability of the remaining events. These are then adjusted to a new set of probabilities. Following this adjustment a new event is chosen and the process is repeated several times until all the outcomes are assumed to be exhausted. The process produces a set of probabilities which are considered to be the 'final' probabilities of the event based on the inputs provided by the participants. Since the technique is applied in a computer interactive mode, the process can be repeated several times allowing for adjustments in the magnitude of the original probabilities and in the sequence in which events are expected to occur. The final portion of the process involves examining the changes in probabilities produced by the simulations, and determining those events which tend to have greatest impact on the probabilities of other events in the matrix.

In the past CIM has been used primarily for government and industrial planning; in only a few instances has it been used for planning in education. The literature on CIM is very extensive and the technique is familiar to educational planners. Although several problems remain to be solved in its application, it provides a very efficient method for determining essential information, and a valuable framework for analysing the future by eliciting creativity and allowing for intuition – factors which are normally ignored in other forms of planning. Contrary to common expectations, it does not provide new knowledge about the future and it cannot be expected to provide exact answers. As with any other technique of planning, its value depends upon the other inputs into the process.

Trend impact analysis was developed by members of the same "Futures Group". This technique is based upon extrapolation of historical trends which then are modified by probabilistic expectations about the future. The technique allows planners to determine

a particular trend and examine systematically the effect which possible future events will have upon it. The application of TIA requires a set of historical data for one variable. By their use a functional form is determined. The functional form is then extrapolated to generate what is termed a surprise-free forecast. The second step requires the planner to use his imagination and intuition. The trend in the surprise-free extrapolation is forced to react to specified changes. A list of events is created which should be considered to be possible, potentially powerful in impact, and verifiable in retrospect. The list can be derived by consensus of those involved in the planning process or determined by recognized authorities in the field. Once the list of events is complete, the probability of occurrence for each event is determined and made a function of time. Then the impact of each event on the trend under consideration is estimated. The impact of unprecedented events can be specified in the following ways:

- Time of occurrence.
- Peak impact.
- Magnitude of impact.
- Duration of impact.
- Time of trend-return to original course or steady-state.

The TIA program combines the impact and event probability judgements with the results of the surprise-free extrapolation to produce an adjusted extrapolation with estimates of upper and lower limits. The expected value of the combined impacts is computed by summing the products of the probabilities of the impact of events for each year in which they are possible, with the magnitude of their expected impact, taking into account the specified impact lags. Normally, events in a trend impact matrix analysis are treated as independent of one another. However, if the occurrence of one of these events is likely to influence the probabilities of another, a combination of CIM and TIA is required.

The use of such methods forces planners to think systematically, consistently, and creatively about the future for which they are planning. The methods themselves cannot be expected to be exact or to produce new knowledge. Their greatest advantage is that they eliminate communication problems commonly encountered in planning sessions where internal group dynamics and politics overshadow or inhibit the creative process. Furthermore, they allow for a broad-based participation in the planning system -- one of the essential features of strategy planning in the Florida Department of Education. This planning is best illustrated by the three case summaries which follow.

I Education Element of the State Comprehensive Plan

A major planning project was carried out in 1973-75, before the strategy planning unit was officially established. This was the preparation and adoption of the education element of the State Comprehensive Plan (Phase I). The plan is an instrument to "provide long-range guidance for the orderly social, economic, and physical growth of the State by setting forth the goals, objectives, and policies".* It includes 17 elements, education is one. The development of the education element was carried out by the Department of Education in cooperation with the Division of State Planning of the Department of Administration (an agency which reports to the Governor). Within the Departmen+

*Chapter 33, Florida Statutes.

responsibility for developing the element was assigned to the chairman of the Department Planning Committee (who later became the Strategy Planning and Management Information Systems Director). He worked closely with the Department Planning Committee. Their first step was to inventory current education policy as found in statutes and regulations. Each division made an inventory of the statutes which affect its operations. Since the education element was to be a synthesis of the many policies contained in statutes and regulations, it was assumed that its contents could be deduced from a detailed analysis of them. This work provided the Planning Committee with a much fuller understanding of the statutes and regulations, but the education element could not be produced by means of the inventory alone. It was necessary for the Committee first to think broadly and identify sound policy for education, and then review the proposed policy in the light of current statutes. Where there were mismatches it was necessary to consider whether the problem was with the statute, or with the proposed policy.

Using this approach, the formulation of the education element went through three drafts, each draft receiving a wider review. The first was reviewed by the Planning Committee. The revised draft was then circulated to all professional staff in the Department. After further revisions the document was then circulated to the general public. It was distributed to the news media with a press release. Copies were mailed to all educational organizations and many others with an identified interest in education. All were invited to comment. The Commissioner of Education appeared on statewide television where he discussed the document and invited comments. Editorials appeared in a number of papers within the state, and the document was printed in part or in whole in several publications.

A deadline for comments was set for about two months following the initial public release of the draft. Following this, the responses were analysed and significant revisions were made to the document. It was then submitted for approval to the State Board of Education and the Legislature. The process took approximately eighteen months. The first six were consumed in discussing various approaches to preparing the element; the next six were used for the policy inventory; the final six for producing the three drafts and the final version. The education element is significant in that it articulates policies regarding the population to be served by education, establishes a new set of state educational goals which encompass all levels of public education, describes the legal foundation for public education and outlines policy for allocating resources to it.

II Economic Analyses of Florida Education

During 1975-76 the economic conditions of the state have been our major concern. The strategy planning unit has undertaken a series of activities designed to place the situation in perspective. It began by commissioning three papers* on the costs and benefits of education. The authors were assisted by a penal composed of faculty of the state's universities, staff of the Department and representatives from school districts. They addressed regional meetings, which were attended by the four categories of persons described earlier – faculty/teachers, educational administrators, general public and students. Copies of their papers were provided in advance of the meetings.

*Fiscal Ability and Effort to Support Education", and "Education as an Investment in State and Individual", by Kern Alexander; and "Indicators and Costing of Florida's Educational Goals", by John S. Waggaman.

The Commissioner's Seminars (described earlier) also provided a series of activities designed to promote an enlightened approach to planning for education. A summary of each seminar was prepared and circulated, and tape recordings of them were made available to participants.

During the academic year, two projects were sponsored at universities within the state, (1) to identify and refine economic indicators relating to education, (2) to project the future status of those indicators and (3) to recommend any needed policy changes. Each project was staffed with one faculty director (part-time) and two graduate students. Twenty percent of their cost was provided by the Department through contract and the remaining funds were provided by the universities through state research funds.

Another strategy planning effort to provide enlightened economic planning for education has been the preparation of two papers by staff of the unit. The first, "An Analysis of Enrollments and Expenditures for Public Education in Florida in 1974-75, 1980-81 and 1985-86", analyses enrollments and expenditures in terms of the goals of education for Florida and projects the analysis into the future. The analysis encompasses all levels of public education, kindergarten through graduate programs, showing the relationship of each level to the goals of education with the relationship expressed in terms of full-time-equivalent students to be served. It also shows the expenditure of funds for the goal and how expenditure varies among goals and among levels of education. The second paper, "projections of Enrollment, Expenditures and Revenues for Public Education", contains the same enrollment and expenditure data but analysed differently. It also contains projections of real revenue (i.e., discounted for inflation) in 1980-81 and 1985-86. The revenue projections are compared with the projections of educational expenditure (in 1976 dollars) to show that it will be necessary either to increase available revenues for education or to lower educational costs. The paper discusses possible approaches for decreasing expenditure and increasing revenue.

This project was timed to interface with the preparation of the Department's 1977 Legislative program. Guidelines for developing the legislative budget are issued by the Commissioner in July. Proposals are developed by the divisions in August. The Commissioner submits the proposed budgets to the State Board of Education on October 1, and transmits them to the Governor on November 1. The Governor then analyses recommendations from all agencies and issues his recommendations around February 1. The legislative session officially begins in April, but is preceded by committee hearings which begin in January or earlier.

III Florida School Finance Project

This project was established to evaluate and reform the Florida Education Finance Program. It is expected to take 18 months, from July 1, 1976 to January 1, 1978. Four major areas of research have been identified. The first will deal with taxation problems of the state, analysing tax equity, alternative sources of revenue for education and the distribution of the economic benefits of education. The second will deal with the allocation of resources in the educational sector. It will attempt to determine the educational needs of the state and the resources required to satisfy them. For this purpose, an evaluation of the existing Florida Educational Finance Program allocation system will be conducted together with an analysis of the adequacy of provision for educational services. It will also assess the effects of the geographical distribution of wealth in the

state on the educational system and educational opportunity, and the effects of federal funds upon the equalizing efforts of the Florida formula. Under this general topic there is also included development of a demographic model to establish uniform enrollment projections for all divisions of the Department. Along with the demographic model, an econometric model of the educational system will be developed to aid in decision-making and planning and to serve as a framework for the decentralized research efforts conducted by different units of the Department. Finally, computer simulation capabilities will be implemented to deal with funding issues.

The third research area will deal with cost analysis and management issues. In this the productivity of different factors involved in the educational process will be studied, school facilities and the externalities associated with size in the operation of schools and administrative units will be examined, and issues related to school transportation will be explored.

The final portion of the project will deal with policies which currently influence the decision-making-process for school finance in Florida. It will investigate the means by which the needs and requirements of the system are articulated to decision-makers. The entire project will be conducted jointly by members of the Department and outside consultants. The Office of the Associate Deputy Commissioner will coordinate the research effort. A board representing different divisions in the state government will advise on the study.

Conclusion

The problem of developing a strategic planning approach to education will vary with the experience and composition of the planning unit. However, the following problems will be common: (1) Decision-makers in large governmental units usually favour policy alternatives which will produce immediate returns. By definition, strategic planning deals with a future which in most cases is very distant. This in turn produces less than adequate support for its conclusions and recommendations. (2) Large bureaucratic organizations tend to feel threatened by change. Their structures are designed to deal with problems as they arise and their members are unlikely to change these work habits and attitudes. (3) A problem which is common to any form of planning is that of motivating people involved in the process to think creatively. The value of strategic planning is that essentially it is based on creativity.

David N. Wilson*

EVALUATION AS A COMPONENT OF THE EDUCATIONAL PLANNING PROCESS: EVALUATION OF A TRANSFERRED CANADIAN TECHNICAL INSTITUTION, THE ACCRA TECHNICAL TRAINING CENTRE

Introduction

This case study describes the prototype educational evaluation project undertaken by the Canadian International Development Agency (CIDA). The author served as leader of a joint Canadian and Ghanaian evaluation team, which evaluated the Accra Technical Training Centre (ATTC) in Ghana. The ATTC was constructed in 1964 under the auspices of the former External Aid Office of the Canadian Ministry of External Affairs, the predecessor of CIDA. This version of the study must avoid confidential details which have not yet been released by the two governments (Canada and Ghana) at this time, but sufficient of the findings are public to serve our purpose here.

It is our contention that *evaluation* constitutes a component of the educational planning process. In the past, unfortunately, planners and policy-makers merely paid lip service to this notion, which explains many of the difficulties encountered during plan implementation, difficulties which have proved to be extremely costly. The second theoretical perspective of this paper involves the concept of institutional transfer. This is a case study of the transfer, under the auspices of Canadian technical assistance, of a Saskatchewan technical-vocational institution to Ghana. In 1975 the government of Ghana requested a joint Ghanaian-Canadian evaluation of the ATTC. This was to be the prototype after which the Ghanaians would evaluate other comparable institutions which have been transferred to that country through the technical assistance programs of other nations. Their goal is to rationalize these diverse institutions into a Ghanaian system of technical education. The Technical Division of the Ghana Education Service visualised the evaluation step as essential for the proper planning of their "New Education Programme".

Since the theme of this conference is the linkage between educational planning research and practice the value of this case study lies in its description of the adaptation of 'tracer study' manpower planning research techniques and institutional planning methods to the design of an evaluation. In the writer's view planning is a *continuous* process in which the diverse elements of an educational system are rationalised and planned (and often re-planned) in order to make them suitable to changed educational goals. This was the case in Ghana with their "New Education Programme".

In 1971 the Phi Delta Kappa National Study Committee on Evaluation proposed a new definition of evaluation, which states that it is "the process of delineating, obtaining, and providing useful information for judging decision alternatives".[1] For this case study we would define evaluation as the process by which the structure and function of an institution are examined to assess whether or not it is performing as expected and whether it is meeting its expressed objectives. This definition is not incompatible with

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that of the Phi Delta Kappa and it relates better to the theme of institutional transfer, which the writer believes best explains the way in which educational institutions evolve in developing nations.

One could define evaluation in as many different ways as educational planning is defined. The writer thinks it more useful to observe the common features of many definitions: that educational planning is a process, oriented to the future, which analyses past and present performance, is concerned with education and development, deals with decision-making and resource allocation, and is focused upon change and growth. In this process evaluation is a necessary integral component. The prototype evaluation which was attempted in Ghana provides the opportunity to take stock of progress being made in this component. The schematic description of the planning process (given in Figure 1) shows evaluation as the means of leading into needed re-phasing or re-planning to correct or modify plan implementation as required. Each stage of the planning process lends itself well to the evaluation process. The sequence, problem identification – data collection – data analysis – trend prediction – re-phasing of the plan, describes the method by which the ATTC evaluation project was carried out.

Figure 1 EVALUATION AS A COMPONENT OF THE EDUCATIONAL PLANNING PROCESS

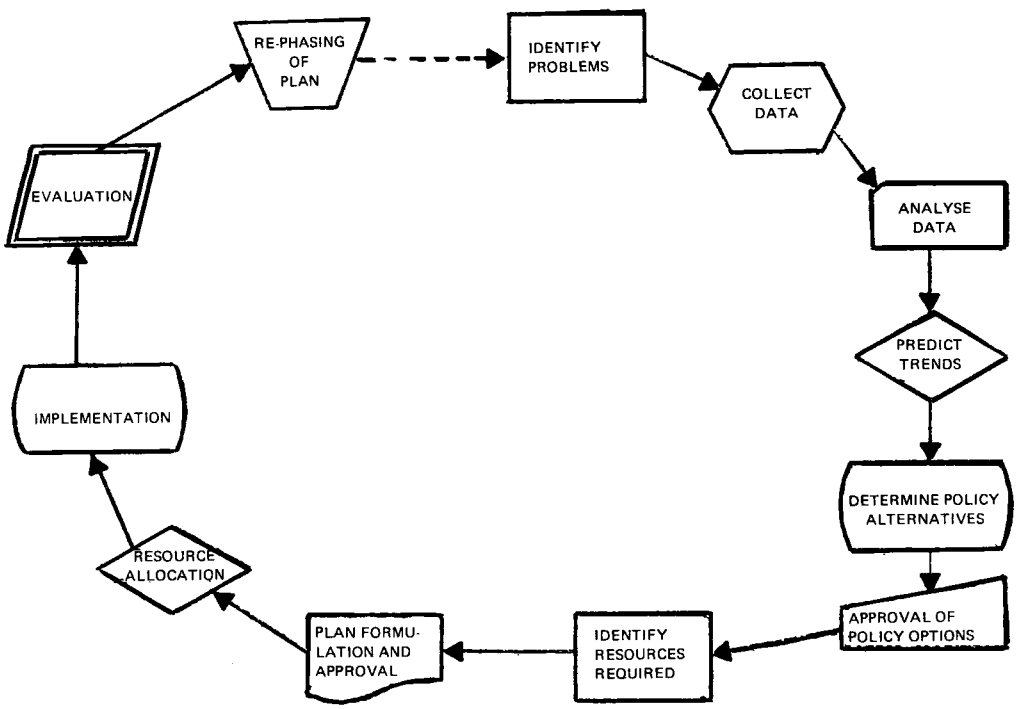
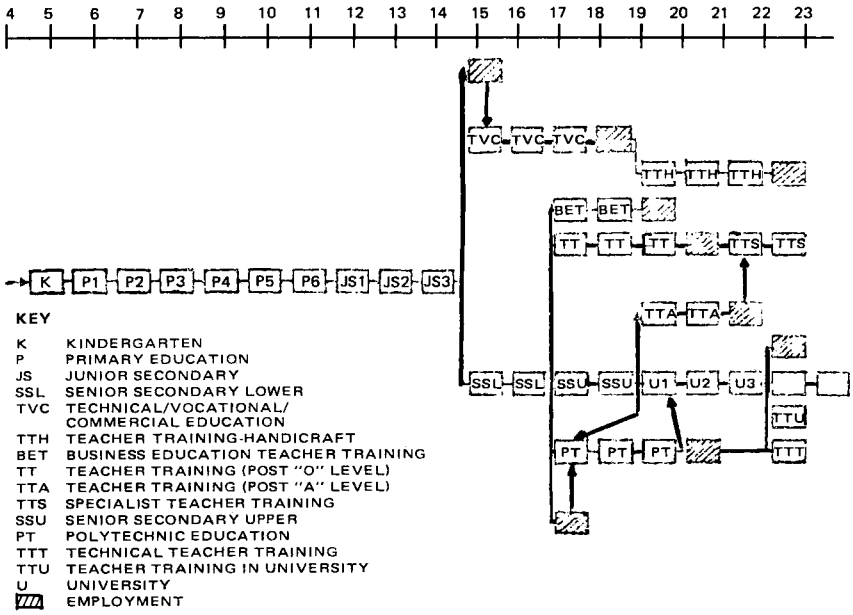
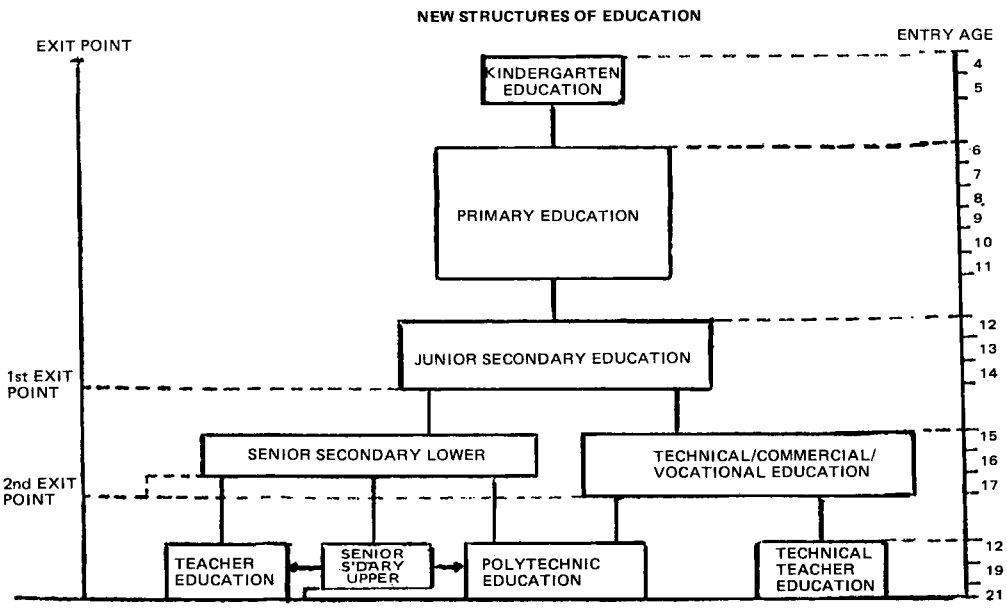


Figure 2 NEW STRUCTURE OF EDUCATION





Technical-Vocational Education in Ghana

To locate the ATTC in its national context, we must first briefly describe the educational system of Ghana. Figure 2 depicts the "New Structure of Education" which is being introduced. The basic six-year primary school is preceded by a kindergarten. Middle schools, re-named junior secondary schools will consist of three years, rather than the present four. From that point, the system differentiates into: (a) three or four years of technical/commercial/vocational education; or (b) senior secondary lower and upper of two years each. From (a) students may proceed either to polytechnic education or to technical teacher education. From (b) they may proceed either to teacher education, polytechnic education, or university.

The 1974 enrollment in first cycle educational institutions is shown in Table 1. These students then go into the institutions of the second cycle, of which the ATTC is one. Table 2 shows the 1973/74 enrollment at the second cycle and Table 3 that in technical-vocational education. In the past entry to the ATTC occurred after completion of middle school (attainment of the Middle School Leaving Certificate). With the new educational structure entry will be after completion of junior secondary school. According to the Ghana Education Service 1973/74 Digest of Educational Statistics, enrollment in technical-vocational education has been irregular in past years. Intake into these specialised institutions depends upon the demand of employers for specialised training, as well as the availability of places, and the availability of specialised equipment. This is in marked contrast to student flows in the more academic secondary education sector. As may be seen from tables 2 and 3 the technical-vocational sector is only one-seventh as large as the academic secondary sector. These conditions make the prediction of future technical-vocational enrollment somewhat difficult.

Statistics in this digest indicate that enrollment in full-time technical education rose from 5,246 in 1971-72 to 5,516 in 1972-73 and to 6,075 in 1973-74. During this period enrollment in day release courses ranged from 324 to 210 to 469 and in evening classes from 2,775 to 2,396 to 3,804. During 1973-74 the ATTC had 241 full-time students (237 male and 3 female), 219 day release (all male), and 453 (450 male and 3 female) in evening classes. The national totals for Ghana that year were: 6,075 in full-time study; 469 on day release and 3,804 in evening classes; 10,348 in the entire technical-vocational sector.[2]

The ATTC offers pre-employment and apprenticeship (block release) courses in the following trades:

Auto body repairs
Auto mechanics
Heavy duty diesel mechanics
Welding
Carpentry
Masonry
Plumbing
Electrical construction
Refrigeration and air conditioning
Radio-television-electronics
Office machines service

In addition, in evening classes the above list is supplemented by courses in marketing and

Table 1 GHANA
STATISTICS OF FIRST CYCLE EDUCATIONAL INSTITUTIONS, 1974

PRIMARY SCHOOLS

Primary	Greater Accra	Eastern	Central	Western	Volta	Ashanti	Brong-Ahafo	Northern	Upper	Total Ghana
Number of Schools	509	1,275	737	683	927	1,371	721	317	303	6,843
Enrollment:										
Male	54,122	108,156	62,138	56,567	76,373	118,743	55,308	21,272	20,356	573,035
Female	50,967	88,013	44,202	40,000	57,179	98,496	40,972	11,302	10,798	441,929
Total	105,089	196,169	106,340	96,567	133,552	217,239	96,280	32,574	31,164	1,014,964

MIDDLE SCHOOLS (TO CONVERT INTO JUNIOR SECONDARY)

Middle	Greater Accra	Eastern	Central	Western	Volta	Ashanti	Brong-Ahafo	Northern	Upper	Total Ghana
Number of Schools	334	718	426	353	507	804	346	76	147	3,711
Enrollment:										
Male	24,593	49,906	30,682	24,337	34,709	57,012	22,636	6,573	8,372	258,820
Female	21,443	34,677	19,381	16,030	22,681	44,840	14,660	3,196	4,337	181,245
Total	46,036	84,583	50,063	40,367	57,390	101,852	37,296	9,769	12,709	440,065

Table 2 GHANA 1973/74 SECONDARY SCHOOL ENROLLMENT

	Male	Female	Total
Form I	10,213	4,826	15,039
Form II	10,089	4,255	14,344
Form III	9,630	3,588	13,218
Form IV			
Science	3,459	547	4,006
Arts	4,237	2,127	6,364
Commercial	850	450	1,300
TOTAL	8,546	3,124	11,670
Form V			
Science	3,167	441	3,608
Arts	3,636	1,745	5,381
Commercial	758	299	1,057
TOTAL	7,561	2,485	10,046
LOWER Form VI			
Science	970	91	1,061
Arts	859	273	1,132
Commercial	32	1	33
TOTAL	1,861	365	2,226
UPPER Form VI			
Science	920	89	1,009
Arts	689	221	910
Commercial	26	1	27
TOTAL	1,635	311	1,946
GRAND TOTAL	49,535	18,954	68,489

Table 3 GHANA: 1973/74 TECHNICAL INSTITUTION ENROLLMENT

	FULL TIME			DAY RELEASE			EVENING CLASSES		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Accra Polytechnic	697	222	919	–	–	–	564	181	745
ATTC	237	4	241	219	–	219	450	3	453
Tema Textile Trg. Centre	34	5	39	–	–	–	–	–	–
Koforidua Tech. Inst.	171	–	171	–	–	–	–	–	–
Asuansi Tech. Inst.	262	–	262	–	–	–	–	–	–
Kikam Tech. Inst.	168	–	168	–	–	–	–	–	–
Tarkwa School of Mines	180	–	180	70	–	70	221	–	221
Takoradi Polytechnic	579	37	616	17	65	82	989	158	1,147
Kpandu Tech. Inst.	481	47	528	–	–	–	158	23	181
Kumasi Polytechnic	643	100	743	77	21	98	393	110	503
Kumasi Tech. Tchr. Training Inst.	148	35	183	–	–	–	–	–	–
Mampong Tech. Tchr. Training Inst.	263	–	263	–	–	–	–	–	–
Sunyani Technical Inst.	312	46	358	–	–	–	48	14	62
Tamale Technical Inst.	498	–	498	–	–	–	182	–	182
Bawku Technical Inst.	47	–	47	–	–	–	–	–	–
Kukurantumi Tech. Institute	111	–	111	–	–	–	–	–	–
Ho Technical Inst.	477	28	505	–	–	–	241	69	310
TOTAL	5,308	524	5,832	383	86	469	3,246	558	3,804
GRAND TOTAL:	8,937 Male								
	1,168 Female		10,105						

bookkeeping. Enrollment at the ATTC has increased from 256 to an average of 400 students per term in day classes, block release and pre-employment programs. Evening classes commenced in 1968 and in recent years have averaged about 450 students per term. The demand for places exceeds the maximum capacity by several hundred each term. Since 1966, over 8,000 students have enrolled at the ATTC and 1,652 have completed either the pre-employment or the apprenticeship programs. The pre-employment program provides full-time training for one or two years to equip trainees with the basic production skills necessary to obtain employment. With the exception of the two-year courses in radio-television-electronics and office machine servicing, it is assumed that, once employed, trainees will re-enter the ATTC block release program under the sponsorship of their employers and complete the remaining phases of apprenticeship training. Apprenticeship (block release training) is so organized that employers release trainees for 13 weeks each year, for four years, during which time training on a full-time basis is provided by the ATTC. Upon successful completion of this program, trainees sit examinations which grant certification at the craftsman or journeyman level.

The Evaluation

At the request of the Government of Ghana the general objective of the evaluation was, "to determine whether or not the ATTC is functioning to its full capacity and is serving the manpower needs of Ghana's industrial community", and the specific objectives were:

- to determine internal efficiencies/inefficiencies of the ATTC and where difficulties are discovered to suggest remedial action,
- to determine whether the present program is meeting the needs of industry,
- to establish a mechanism to provide industrial training institutions with on-going feedback on changing trained manpower requirements in industry.

The first of these suggests that the evaluation project should be concerned with the present structure of the ATTC and its functioning as an institution for trades training. The fact that trainees enter the ATTC both from the Ghanaian population generally, and from its educational institutions and industries specifically, made it necessary to carry out the evaluation in terms of an internal and an external component. The ATTC output flows directly into industry to serve its immediate requirements for specialised skills. Therefore, it was appropriate that the second and third specific objectives relate directly to this role.

Our task was to design the process whereby the ATTC's internal and external functioning might be examined. The internal evaluation component used a modified institutional planning approach "rating" the ATTC in terms of:

1. Facilities
2. Equipment
3. Procedures for recruitment
4. Course admission standards and tests
5. Demand for places and enrollment patterns
6. Class scheduling and facilities loading
7. Curriculum development
8. Specialised training programs
9. Instruction and supervision
10. Teaching aids
11. Student achievement
12. Student records
13. Instructional staff qualifications and experience
14. Equipment and plant maintenance

To accomplish this two-questionnaires and a rating checklist were combined with staff interviews. A questionnaire was adapted from those which had been used for several Canadian studies. It was confidential since it elicited professional, experiential and attitudinal data from the instructional staff. The questionnaire which supplemented this form was not confidential.

The external evaluation component modified 'tracer' study methods combining them with methods used in manpower planning requirements studies. Three questionnaires were designed to obtain attitudinal, situational and experiential information from: (a) pre-employment trainees, (b) apprenticeship (block release) trainees, and (c) employers. The employers' questionnaires were supplemented by personal interviews. An industrial match sample was designed and employee respondents were located through the industries

in which they were employed. This tracer method demonstrated that the close working relationship between planning and research was well-suited to tracing the ATTC trainees' vocational training experiences, employment search patterns and industrial skill applications. Data were gathered to prepare an input-output analysis of the ATTC, based upon student flows from the general population into the ATTC and out of the institution into the labour force.

While the internal component was designed to assess the internal efficiency of the institution, the external one viewed it as a feeder institution to Ghanaian industry. That is, the external component studied ATTC's input and output; the internal component analysed its "throughput', 'process' or the inner-workings. Here we are able only to discuss the methodology and conceptualisation of the evaluation since the findings of the report have not yet been released. The industrial match sample was stratified, as subsamples by trades, in order to ensure representation of the eleven trades taught at the ATTC. An overall sample of fifty industries or employers was selected and questionnaires delivered to them for both employers and employees. Where necessary, in order to ensure sufficient representation for certain trades, additions to the sample were made. A trial mail administration of the additional employee questionnaires verified that mail administration of questionnaires was feasible in Ghana. When the employee and employer questionnaires were collected from these industries, the employers were interviewed by members of the Canadian/Ghanaian team.

Of the 384 employee respondents, 378 were male and only six female. This reflects the enrollment by sex, as can be seen from Table 3. The sample divides into 142 pre-employment and 242 apprenticeship participants, with 30 of the former having re-entered the ATTC in the apprenticeship program, under the sponsorship by their employers. These data validate the philosophy underlying pre-employment training by confirming that the flows between training and industry are indeed taking place. Because an unknown proportion of both the universe of ATTC participants and our stratified sample would be (a) employed, (b) unemployed, or (c) students, our questionnaires were designed as 'branching' ones. All respondents completed Part A, which solicited general information and ATTC experience. Full-time students completed Part B; those employed full-time completed Part C; and those who were unemployed, Part D. Each section was printed on different coloured paper.

Part A provided data about the trainees' characteristics and where they came from, whether they met the ATTC entrance criteria, how they were sponsored, what they desired to achieve by attending the ATTC, how they perceived their previous schooling and the instruction they received at the ATTC, how they rated their ATTC training and whether it was similar to that given by other technical and vocational training institutions in Ghana. Part B provided data about the respondents' subjects of study, why they were taking them, what other schools they had attended, what examinations they planned to sit, their future job plans, their experience in gaining employment and why they were presently studying. Part C provided data about respondents' trades and employment, when they began working, the nature and size of their employers' establishments, their salaries and their other income; what tools, equipment or machinery were used, their present job commitment and future plans, their views on the ATTC training, how it compares to that of their fellow workers, and how they searched for their present job.

From the employers, data were gathered about the nature of the establishment: whether it was privately owned, a share corporation or governmental; the size and structure of the work force; their products or services; whether the establishment had been able to fill all technical job openings with trained workers; skill requirements desired in workers; future skilled manpower requirements; whether the establishment undertook its own training; their sponsorship of trainees at the ATTC; the number of sponsored trainees sent and the number remaining in their employ; whether ATTC-trained workers had been promoted to supervisory positions, and if so, how many in comparison with other workers; the performance of ATTC-trained workers and whether this met the establishment's requirements; attitudinal data about the ATTC and other technical training; how these firms judged the competency of new employees; what new training programs were desired; and whether employers would be agreeable to participate in joint industry – ATTC curriculum development and other committees.

Selected Findings

The external component of the evaluation was effective in tracing ATTC trainees' educational and occupational career patterns and industrial skill applications. Data were gathered which enabled the preparation of an input-output analysis of the institution, based upon student flows into it from the general population and out of it into the labour force. For example, we were able to show that there was a relatively smooth flow of students through primary and middle schools of Ghana, then, through the ATTC to industry. Sponsorship by employers of their workers for ATTC training was evidenced by the age of entry, about two-thirds of our respondents were less than 24 years of age. We also found there was a high degree of urban migration. This was consonant with the geographical distribution of access to education and the tendency after initial training to remain in areas where educational and occupational opportunities existed.

With regard to ATTC entry criteria, only two percent of the respondents had less than the minimum entry qualifications, thirty percent possessed more than the minimal admission qualifications. This indicates that the ATTC's level of technical training is extremely relevant to the requirements of Ghanaian workers and industry. Such findings validate Philip Foster's contention that students make a "remarkably realistic appraisal of the structure of occupational opportunities"[3]. Foster discounted the likelihood that shrewd students would scale down their aspirations and seek training for industrial occupations at the blue collar level. Yet this is precisely the type of training provided by institutions such as the ATTC. In contrast to the oft-repeated comment that students in technical and vocational education mainly enter such institutions because they cannot gain entrance to academic secondary schools, our findings indicate that less than one percent admit this type of motivation. Forty-seven percent recognize that their earlier education did not give them the necessary skills to gain (and hold) employment. Their report is a positive evaluation of the role played by the ATTC.

In his article of some thirteen years ago, "The Vocational School Fallacy in Development Planning", Philip Foster argued against the "concept of total mobilisation of the formal educational system in the direction of specific vocational training". Instead, he favoured the creation of "special vocational institutes [whose] endeavours can be closely meshed with on-the-job training and *actual* manpower requirements as indicated by the market for skills"[4]. This perfectly describes the role and functioning of the ATTC. The

fact that skilled workers comprise 45 percent of the employees in Ghanaian industrial establishments, by far the largest component, imputes great importance to the existence of trades-training institutions. The mass unemployment of school leavers in developing countries, predicted by Foster, Archibald Callaway and others because of the dysfunction "between the gross rate of schools output and the slow rate of expansion of occupational opportunities"[5]. has failed to materialise in the Ghanaian vocational educational sector. Economic growth and industrial expansion has continued to absorb the output of the ATTC and similar institutions as fast as they can be trained. Only 8.4 percent of our sample were unemployed. Of these, only one was an apprenticeship trainee, the remainder were pre-employment trainees. This is quite remarkable considering the economic and financial constraints, due to lack of foreign exchange, which are currently affecting Ghanaian industry. However, those who have not supplemented their middle or secondary schooling with industrial training do manifest high rates of unemployment.

When ATTC-trained workers were asked to indicate how their training differed from that of their work-mates, their first three rank-ordered differences were: equipment, workshop demonstrations, and practical exercises. These three common attributes of ATTC training recur in the responses of both the employees and employers. They constitute the major differences between the ATTC and other technical or vocational institutions. During the internal component of the evaluation, much of the writer's initial scepticism about the viability of a Saskatchewan technical school transferred to Ghana proved to be unwarranted. Generally speaking, the evaluation team, composed of three Ghanaians and three Canadians, found that the ATTC meets objectives set for it by the Government of Ghana. The institution functions extremely well when viewed by worldwide standards. It does, in fact, provide readily utilisable technical training which meets the requirements of industry and it meets the standards demanded by Ghanaian employers.

Its administrative structure is well organized and functional. Its staff are well-qualified with a high percentage having the appropriate background, particularly with industrial experience in addition to academic qualifications. Compared with technical-vocational institutions observed in other developing countries, its equipment, while somewhat damaged and ageing, is in an extremely good state of service. It was designed to accommodate only about 250 students; at present it is handling about 400 and we concluded that it could easily handle 500 with some minor additions and modifications. This implies that originally it was over-designed – not unusual for aid projects.

In most trades-training departments the original standards of instruction appear to have been maintained at a high level. In some, however, standards have fallen below an acceptable level. It is interesting to note that it was in these trades that several employers considered trainees inadequately prepared. The team made a number of recommendations for improving curriculum development, facilities and classroom scheduling procedures, skill-training, the use of teaching aids, lesson planning, and comparable things which would help the ATTC overcome its problems and maintain and improve its present levels of proficiency.

In addition to the report's conclusions and recommendations a comprehensive series of "action-statements" were produced. These were intended as direct inputs to the policy and planning discussions of the Ghana Education Service (Technical Division) to help them replicate this prototype evaluation in their other technical-vocational training institutions and weld them into a Ghanaian system of technical education.

Evaluating the Evaluation

How well did the adapted methodology which we have described perform when viewed in the light of published materials on evaluation? How relevant to the educational planning process is the evaluation process which we developed? We shall conclude this paper by considering these two questions.

The Phi Delta Kappa National Study Committee on Evaluation noted:

> Clearly, planning decisions are of fundamental importance to any program, and appropriate evaluation mechanisms should be maintained to provide information for the formulation of new objectives or the modification of existing ones.[6]

These observations indicate that the conceptual framework of the ATTC Evaluation Project (depicted in Figure 1) is in accord with current thought on evaluation. Why have few educational planners undertaken studies of an evaluative nature? In our introduction we noted that planners and policy-makers tend merely to pay lip-service to evaluation. One explanation given is as follows:

> Evaluation of program outcomes at the national level have not been of sufficient quality to justify their use as a major input in planning a national manpower program. This is . . . only partly due to the very large methodological problems facing the evaluator. More important as an explanation are two organizational factors: (1) Most programs and most agencies are reluctant to be evaluated; (2) If they must be evaluated, they will seek to find evaluation designs that have the greatest probability of supporting the status quo.
>
> But the evaluators themselves are also at fault. Too little effort has been placed on relating evaluation to the planning process. Too little concern has been given to identifying the decisions that evaluative efforts should be designed to clarify. Too often the evaluator has either chosen to, or by default had to, define his own evaluation objectives with little continuing interaction with the programs or agency. Too often the evaluation results in a final report whose summary and conclusions are read but whose data are left largely unanalysed.[7]

Judged according to the criteria implicit in this statement, the ATTC evaluation appears to have been successful because:

(a) it was intended, from its inception, to be a major input into national planning;
(b) the ATTC was willing to be evaluated and, moreover, did not seek to influence the evaluation design;
(c) a conscious effort was made to relate evaluation to the planning process;
(d) the evaluation objectives were decided upon in joint consultations between the Ghana Education Service (Technical Division) and CIDA, prior to the design of the evaluation;
(e) in addition to the data analysis contained in the final report, the computer printout of all data analysed was forwarded to Ghana for their own analyses.

According to the authors cited above, this evaluation might well be classified as an "impact-plus" one, most appropriate for "the early years of a program when adaptation is

taking place". They contrast the "impact-plus" and "impact-only" evaluations by noting that:

> Impact-plus examines a wider range of questions (in particular, what is working for whom) and consequently, it requires a longer setup time.
>
> The additional hypotheses to be tested mean that larger sample sizes are required, and with some survey designs these studies may require reductions in the number of sites examined and a reduction in the representativeness of the total sample examined.
>
> Results are more equivocal and subject to many differing interpretations and hence are likely to be more politically acceptable but possibly less effective in producing change.[8]

The ATTC evaluation certainly did examine a broad range of questions. It, therefore, took much longer than was originally envisaged. One of the foremost problems encountby researchers in Third World settings has been sample design. This evaluation proved to be no exception. However, since it was a prototype study, a great many valuable lessons were learned. We proved that a mail administration of questionnaires was feasible (contrary to the belief of the Ghanaian authorities), and that an institutional locus (in this instance industries) can overcome problems of conducting tracer studies in developing nations. Another point which the author would like to emphasize is that evaluation research is designed to answer the practical questions of decision-makers. The traditional formulation of evaluation research consists of five basic steps: (1) finding out the goals of the program; (2) translating the goals into measurable indicators of goal achievement; (3) collecting data on the indicators for those who have been exposed to the program; (4) collecting similar data on an equivalent group that has not been exposed to the program (control group); (5) comparing the data on program participants and controls in terms of goal criteria.[9]

This evaluation project met these criteria, with the possible exception of points four and five. The question of a control group was proposed during the projects' initial discussions but was not acceptable to the Ghanaians. However, many of the technical training questions on the trainee's questionnaires did provide data of a comparative nature. This was a compromise. The Ghanaians, for obvious political reasons, did not favour comparing the ATTC training to that received in other technical-vocational institutions, which had been built under other aid programs, or, for that matter, comparing the ATTC trained workers with those who possessed academic secondary school qualifications.

Carol Weiss' comments on the utilisation of evaluation are germane to this paper. About the application of evaluation results she notes:

> We can differentiate three major types of use. First is use within the ongoing program, to improve its operation as it goes along. Although this is the type of use that program administrators often expect, it calls for a special kind of short-term, limited-effect, quick-feedback study, and is not always compatible with the evaluation design and schedule that researchers develop. The second use is also at the original site of the program, but occurs at the completion of a total cycle of programming, to decide whether to terminate, modify, or restructure the program, or

> to continue it and possibly carry it over to other units of the organization. The third use is in outside settings – by agencies operating similar programs, by standard-setting or granting bodies or by policymaking units at federal, state, or local levels.[10]

These three uses of evaluation are compatible with the role which the writer envisages for the evaluation component of the educational planning process, as depicted in Figure 1. Weiss also makes the point that, "institutions often do not change their activities in response to evaluation". From this we would conclude that the *initiative* for the use of evaluation should be the planners' and policy-makers'. Regarding initiative, Henry Riecken suggests that evaluation be built into programs at their inception, for the following reasons:

> By being present at the beginning, the idea of evaluation is less threatening to the action personnel, both because it is less likely to be seen as a hostile or threatening act, and because personnel come to feel that they have had a hand in planning the evaluation.
>
> If evaluators are an integral part of the planning phase of programs they can often help to clarify objectives, since their attention is focused on measuring program achievements.
>
> Evaluators may be able to contribute substantively to planning by drawing on established findings of social science or their own experience with similar programs. They may be able to suggest methods of known effectiveness and point out known difficulties in operations that action staff may conceive.
>
> Above all, if he is present at the start of things the evaluator can follow the entire program through planning, pre-testing and full-scale operations, thereby enabling him to secure information and keep records of actual happenings which are rarely recalled in full detail by action staff at a later time.[11]

It is the writer's hope that this type of evaluation of education projects by technical assistance agencies can have an impact on the process of planning projects in the future. It is encouraging to note that CIDA, UNESCO, The World Bank, SIDA and other international technical assistance agencies increasingly are discussing evaluation in the context of planning educational projects and institutions.

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Bobby Stacy*

THE CONTINUING PLAN FOR PUBLIC EDUCATION IN MISSISSIPPI

The model to be discussed is a plan designed by personnel within the Office of Planning and Evaluation to evaluate student performance in the public schools of Mississippi. The plan consists of five phases not all of which have been undertaken as yet. They are needs, goals and priorities, objectives, implementation, and evaluation.

The first three phases

In July, 1972, a publication entitled "General Educational Needs Assessment in Mississippi" was completed and disseminated widely in the state. This study was the first phase of the program known as "The Continuing Plan for Public Education in Mississippi". Four major sources had been used to identify educational needs: (1) a survey instrument which was circulated to 3,990 individuals; a two hundred and seventy-six item, seven-page questionnaire, it yielded a list of identified needs which ultimately were ranked in order of priority; (2) the results of a state testing program which involved 67,857 students in grades 5 and 8 taking tests in reading, mathematics, language arts, and spelling; (3) analysis of selective service records based on the reports of local draft boards of each county in Mississippi; and (4) analysis of statistical reports of the Mississippi State Department of Education. These four sources documented the needs of the public elementary and secondary schools of Mississippi. A general educational need was defined as "the lack of something requisite, desirable, or useful".

In July, 1973, a report entitled "Goals for Public Elementary and Secondary Education in Mississippi" was published. The study thus reported was intended to: (1) develop goal statements pertaining to the previously identified educational needs of Mississippi; (2) adopt, by public opinion, goal statements pertaining to public elementary and secondary education in Mississippi; and (3) establish a priority order of adopted goal statements. The goal which emerged first, when ranked in an order of priority, was for students of the public elementary and secondary schools of Mississippi to acquire cognitive (intellectual) achievement in such basic academic skills as reading, mathematics, language arts, etc. and/or such basic vocational-technical skills as woodworking, welding, drafting, etc. With the formal adoption of the goals the second phase of the plan was completed.

Phase three of the plan involved the development of specifically stated objectives designed to accomplish the adopted goals which were identified by phase two. In this reference, objectives are defined as precise descriptions of an educational goal which contain at least one component of each of six variables determined by answering the following questions:

- Of whom is the behaviour or performance expected?
- What behaviour is desired or expected to occur?
- To what activity will the behaviour be related?

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- How will the change in behaviour be specifically measured?
- What period of time is needed to effect the expected change of behaviour?
- To what proficiency level is the change in behaviour expected?

One part of this phase resulted in the development of catalogues of competencies (precise expectations of students), for each grade level, in mathematics, reading, language arts, science, and social studies. This compilation of competencies represents what the public school teachers of Mississippi who teach in these fields of study indicate as *desirable* for their students. It is intended to be a rather exhaustive listing, not a minimum listing of items for students to achieve.

The final two phases

Using the results of the first two phases of the plan and a part of its third phase, a plan has been proposed for implementing accountability legislation. This involves determining common competencies, measuring performance, analyzing the data, and reporting the findings.

Determining common competencies. In 1974-75 academic year a survey mailed to teachers asked them to react to the proposed competencies in three ways to: (1) indicate whether they agreed (or disagreed) that each competency was a desirable expectation of their students; (2) suggest revisions of the terminology used or the content of the listed competencies, and (3) insert such additional competencies as they felt should be included. The competencies which teachers of science, language arts, mathematics, reading, and social studies selected as desirable in 1974-75 will be distributed again (in 1976-77) to every teacher of selected grades and subjects in the public elementary and secondary schools of Mississippi. These teachers will be asked to indicate only the competencies which they feel should be considered as *minimally* requisite for their students before being permitted to move on to the next grade level or subject area.

After this task is completed, it is proposed that the list of competencies identified as being minimally necessary should be processed by computer to yield, through a high frequency distribution, those which are not only common for local districts, but also for the entire state. Computer printouts of these results will be made available to every local school district in the state.

Measuring performance. Having identified the common competencies in this manner, it is proposed to make available to a testing company (on a contract basis) those items identified as common. The company will develop test items to measure student performance on the common competencies, will develop procedures for administration of the tests, and provide specified analyses of the scores.

Analyses of data. The proposed plan involves evaluation of the test data. Ultimately, the evaluation process will be composed of three separate analyses of the test results. The first would be the application of prediction models to predict the mean score of a test given in a school district, based upon factors which have been shown to have an effect upon learner achievement. The first step in applying the prediction models would be to identify the achievement-related factors. These factors are divided into community-socio-economic variables, instruction variables, staff variables, school district structure variables, and non-instructional expenditure variables. In the second step by statistical procedures (such as step-wise multiple regression, curvilinear regression, and discriminant

function analysis) the variables and combinations of variables which accurately predict a mean test score for a school district will be determined. The third step will apply the prediction models to the test results to yield, for each school district, a predicted mean test score. Comparison would then be made between the predicted score and actual score of a school district to show significant differences in residual. The second analysis would be a determination by school district of the number of students at a given grade level in a given subject who achieved given percentages of the common competencies tested. The third analysis would involve an item analysis of each test by school district and state in order to show at school district and state levels which competencies are being achieved and which are not being accomplished.

Reporting procedures. It is intended that a statewide annual, written report be submitted. It will show the overall achievement level of learners in the selected grades and subject areas of selected disciplines in relation to the common competencies identified by teachers. Achievement levels would be reported in terms of statewide and school district results in comparison to the factors identified as affecting learner achievement.

Howard E. Wakefield*

PLANNING AND PRACTICE IN U.S. EDUCATION

Introduction

Today everyone has something to say about planning. While its need is intoned, there is speculation about its worth. Planners are busy setting apart a profession that is qualified and will be accepted. The public wants to use planning as a way of influencing the decisions which affect them. Decision-makers want to use planning to defend their decisions. Scholars offer definitions purporting to clarify the confusion about planning or call for a return to first principles. I have tried to resolve in my own mind many of these conflicts and questions by looking back through the years, searching for clues. My paper is in four parts: a section devoted to the policy-planning dilemma, one providing an historical sketch of three periods in U.S. history, a third giving some personal interpretation of the historical account, and a concluding statement.

In Thornton Wilder's *Bridge of San Luis Rey*, the main character is a priest in search of a pattern. The priest has witnessed the sudden and violent death of a half-dozen persons who were on an ancient foot bridge in the high Andes when it collapsed. For the remainder of the story the priest searches the lives of each of these persons hoping to find a common element which could have foretold their woeful end. That priest might be described as a planner, sifting through the data at hand, striving to pierce the veil and know the future.

His search for the pattern brings to mind Amy Lowell's poignant poem entitled "Patterns". In the poem a girl walks aimlessly in a neatly patterned garden, wearing a beautifully patterned dress and crying out in anguish at the senselessness of a pattern called war which has slain her betrothed.

Let me turn now to a publication by Jim McCamy, which contains guest lectures given at the University of Alabama some years ago.[1] In the lectures he describes the two worlds of science and public administration as historically antithetical, but with that antithesis being of less consequence in earlier years than it is today. He contends that the scientist feels he owns the word "reason" and the public administrator (or politician) thinks he owns the word "reasonable". That in itself would not be a matter of great consequence except that the public administrator prefers to be known as a man of reason rather than a reasonable man, and thereby hangs the dilemma. This is also the dilemma of the educational planner. He tries to be ruled by facts, he tries to approach tasks in a logical, step-by-step systematic way (the epitome of the applied scientist) hoping that his work will be accepted and used, that his advice will be unbiased and useful and that the advice will be taken. Some planners feel that any problem can be solved if one can just amass enough data. And yet they fret about their advisory role in educational organizations, hungering for the power to enforce their plans.

There is a touching scene in Steinbeck's *Grapes of Wrath.* You will recall that the grandparents did not want to leave Oklahoma, in spite of the ravaging dust storms; in fact, grandma was forcibly placed, rocking chair and all, in the truck when the family got

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ready to leave for California. Grandpa was sitting on the steps sifting the dust through his hand. Before leaving he made one comment about that silt and the land under it. He said, "It's no damn good but it's mine". That statement was not profane and it was certainly not proprietary. Grandpa was not so much interested in ownership itself, important as that may have been; he was expressing the age-old human instinct for self-determination which scarcely needs to be documented but about which we need to be reminded frequently.

Finally, to give this introduction some direction, I would like to mention the unusual dissertation of a man named Huffman in which he compares the outlook of Doxiadis, the internationally known city planner, with that of Niebuhr.[2] Huffman concludes that Doxiadis' view of the planner as the expert who sets the best goals for a relatively passive public is not as acceptable as the view of the planner as a person in regular communication with citizens whose destinies will be affected by his plans.

What do such references as the few I have described say to me? They say first of all that much of life is not as predictable as we would like; that human reason is a tool or talent which is not universally useful. Where self-determination (i.e., self-interest) and reason collide, the latter is the weaker force. Where hierarchies of self-interest are erected they reveal very serious flaws, the most glaring being the inequities that they introduce. Then the planner dons the white coat of the scientist and attempts to unravel hierarchies of self-interest with the aim of restoring social equity. Social equity has only recently become a goal of education. As a goal of public policy it presents formidable tasks to the planner. Its realization may even be impossible without some appreciation for, and understanding of, the historical relationship between educational planning and practice. I shall deal with these in terms of the United States.

Educational Planning: Precept and Practice

About a decade ago a large amount of material on educational planning began to appear in print. The material was replete with models, processes, concepts, steps, stages, systems and the like, each one promising to improve the practice of educational planning. Yet the practice of educational planning has shown no corresponding improvement and its results are rather meager. Consider the following three cases:

School district X is on the edge of a moderately-sized standard metropolitan statistical area (SMSA). The district has 2500 pupils and its population is a mix of people socially and economically. Two years' ago the board of education appointed a citizens' committee and commissioned it to prepare a long-range comprehensive plan for the district. Taking its mission seriously, the committee proceeded to gather much information about educational conditions in the district. It then organized and analyzed this information and formulated a set of policies to guide the district in its educational decisions. After the report was presented to the board, the information was set aside and no further use has been made of it. Disappointed by this inaction, the citizens' committee pressured to get the plans it had so carefully made laid before the public and discussed. The committee's position was not one of defending every detail of the plan as much as desiring its full consideration. To this date, no part of that plan has been implemented.

School district Y is a medium-sized industrial city with an enrollment of about 25,000 students. The board of education, on a split vote, recently employed an outside consulting firm to prepare a comprehensive educational plan for the district. Special attention

was to be given to program development aimed at such target groups as the non-college-bound students, students of minority groups, and those with special handicaps. The plans were carefully made. The consulting firm tried to involve in the planning all segments of the city's leadership and its residents. The final plan was made public almost a year after the work began. During that time a school board election had been held and the controlling majority had shifted. The report was received, the consulting firm paid, and the plan shelved. Recently an editorial appeared in the local newspaper which asked, "What became of the comprehensive plan for which we paid so much money?"

School district Z is a large industrial city with an enrollment of 125,000. In recent years it has committed a substantial portion of its administrative budget to planning. Much of this planning and plan implementation was recently disrupted by the sudden appearance of a court-appointed referee who was given a free hand to prepare and present to the court a desegregation proposal. The relationship of the proposal to existing plans was assumed to be antithetical.

It is tempting to reach out quickly for an explanation for these cases, citing politics, unrest, the struggle against authority, the struggle for authority, etc. The fact remains that a considerable amount of educational planning is being done in the U.S. today and yet its effect on educational practice is disappointing. I refer here to long-range comprehensive planning rather than to the short-term, detailed, recurring operational plans which are made about staff, budgets, programs, etc. in any enterprise. The explanation may be that an essentially rational process, planning, has been captured by an irrational process, policy-making in education. Alternatives are mapped very quickly by policy-makers. Planners are then enlisted to defend the desired alternative. The planner, at a time when his art seems about to flower, finds little comfort in the constricted circumstances in which he is asked to function. To search for a problem solution in this very confined framework is in fact not to search at all. The explanation lies not in what educational planning is today, but rather in what it has become over two centuries, and in what educational policy-making became during the same period of time.

Educational Planning in the U.S.: An Historical Sketch

It is the historic relationship between these two functions, planning and policy-making, which I shall now sketch. Time is obviously one dimension of the relationship and in that regard I have looked first at the colonial period and then at the constitutional period in two segments—prior to World War I, and since. Underlying the analysis is another theme, that educational development might be defined as providing better quality and more relevant education to a greater portion of the population. An interesting point about educational development is that in many countries today the opinion prevails that the proper sequence is first to democratize education, then improve its quality and, finally, improve its relevance to the country's social, economic and political framework. Historically, these steps were reversed in the U.S., and that explains much about the relationship between educational planning and educational policy-making. Public education began in colonial times with a high degree of relevance and moved in the latter part of the 18th and early 19th centuries toward improvements in quality. Since the mid 19th century, the drive to democratize education has become dominant.

The Colonial Period. There were no educational planners as such in the American colonies. Every colonial government prepared and put into operation plans for education

which were suited for the time. In Massachusetts, for example, the delineation of responsibilities was made quite clear by laws which were enacted almost as soon as the first settlers had appeared on the scene. Under this legislation, basic education was the obligation of parents, and advanced education the obligation of the colony. The plan was not prepared in great detail or compiled in a large document, nor was it illustrated with maps and demographic data. Yet it had the elements of a sound plan, with a vision of the future. The educational system was to be egalitarian in part; the principal burden was put on the parents and on the masters of apprentices to promote literacy, knowledge of English law, and a vocational skill. It was elitist in part, in that institutions were set aside for advanced study, preparation for college and study in college. The support pattern established the tradition for external control of education at all levels, since it was to be based upon repeated acts of current donation, e.g., taxes and gifts but no independent economic base or self-perpetuating income. While the educational elements varied considerably from colony to colony, education was relevant and aimed to some extent at the entire population, and due attention was also given to its quality. As an interesting sidelight, the colonists devoted a surprisingly large amount of time and attention to planning what they viewed as the appropriate education for the indigenous native population.

As the constitutional period emerged, several things happened which had long-range effect upon the relationship between educational planning and educational practice at the national level. The idea of a national university was debated and finally set aside, partly because there was little widespread feeling that education was crucial in the national context. In the U.S. the legal argument is sometimes made that the intent of the founding fathers was that education be a state responsibility and, therefore, it was deliberately excluded from the Constitution and covered by the Tenth Amendment. It is more reasonable to believe that local control had become so firmly entrenched in colonial America, and education was so closely related to home and church, that the matter was scarcely worth mentioning. Even the Land Laws of 1785 and 1787, which are sometimes cited as examples of federal interest and intervention in education, are not that at all. The presence of an educational benefit in those laws was little more than an inducement to promote settlement of the wilderness, without the full burden of education falling entirely upon the settlers. In due course each state made constitutional provision for public education. While there was no uniformity of purpose, or support structure, in each state the purpose, structure and public support for education were stipulated. The most prominent common element was local control. The two strong and common purposes, with regard to the role of education in the newly-formed republic, were responsible citizenship and national unity.

In colonial America educational planning was done by lawmakers; it was relevant to the time, qualitative in its results, and aimed at expanding its impact to the entire population. Institutions were set in place that would form the foundation for the development of a system of mass education unlike any the world had seen. Planning and policy-making were joined and the latter was the door to implementation.

The constitution period through World War I. Throughout most of the 19th century there was no systematic planning for schools; yet some of the rudiments of what is required for comprehensive educational planning began to take form. However, concurrently, other contravening elements were entering the picture; for example, the near

autonomy of local districts was gradually being challenged by the states. Moreover, obsession with the egalitarian goal as the supreme motive for publicly-supported education, and the appearance of a professional class of educational leaders, began to change the rules by which educational policy would be made. One cannot understate the role which Horace Mann and Henry Barnard played in the professionalization of educational leadership. They undertook massive surveys of schools in an effort to link together, for the first time, the planning and operation of educational programs, facilities and finances. They were especially concerned with the debilitating physical environment of many schools and the limited resources of very small schools – both of which, in their opinion, were having a profound effect upon the scope, quality, and effectiveness of instruction. Through their surveys and planning they laid much of the foundation of today's schools: the length of the school year, the school attendance ages, the equalizing of financial resources. Their efforts were monumental and have been well documented. The effect they had in separating the function of planning for education from that of making policy for education is less well appreciated.

The constitutional period since World War I: After the war a number of events and developments began which had compounded effects upon educational planning and educational practice. One such phenomenon was the school survey. It represents the first visible sign of educational planning (i.e., educational plan documents) and the first step in the creation of planning technology. At first it was built on a model largely derived from private enterprise. The surveys were carried out by prominent university professors. They were followed shortly by the research divisions in public school systems, agencies devoted mainly to investigation and planning activities, but the word planning did not appear; it was still considered less than respectable.

The years following World War II saw a sharp increase in citizen participation in the formulation of educational policy and the planning of educational programs. The movement began with a handful of citizen advisory committees in the middle forties and by the fifties had grown to more than 20,000 committees and groups. Since then, planning has become more refined and specialized with attention being given to the creation of models for allocating resources and predicting or simulating the effects of decisions. The first national educational plan of any scope was the Elementary and Secondary Education Act enacted by Congress in 1965. It representes the first major attempt of the federal government to set educational goals and push their accomplishment. As a result of such federal activities planning in the past decade has become less comprehensive and much more sharply focused. It has been done by people who are specialized in educational planning methodology. It is directed toward educational targets and alternative ways of achieving them set by policy-makers who are becoming more and more removed from the traditional patterns of control over public education. An interesting example of this shift is found in the authority exercised by referees appointed by federal court judges, referees whose task is to pursue federal educational targets in local school districts. So there it is, the greater the specialization of educational leadership in the area of planning technology, the further removal of policy-making from that leadership – which leads ot the paradox of highly developed planning having little or no impact on educational practice.

Perspectives of the Historical Account

It may be held that in the U.S. planning follows the procedures out of which it has evolved. Ignasias describes five stages, each of which is identified with a period of time in our history.[3] Goal-setting was the most prominent planning activity in the late 18th and early 19th centuries. Amassing suitable data for policy decisions became the major activity in middle and late 19th century. Diagnosis and analysis of learning and instructional problems received great emphasis in the early decades of the 20th century. The 1930s and 1940s gave more attention to the preparation and review of plans. Since 1950, attention has shifted to plan implementation and evaluation. Each stage, in turn, has received exaggerated attention. Only now can all elements of planning be said to have been fully developed.

Planning and policy-making in education have been formed out of administrative stratification or 'layering' and the specialization of function. These two developments produced a split between 'planning' and 'deciding'. Then, in order to correct that condition, corps of planners were mobilized and moved near (but not into) executive suites.

Milton Friedman sees the issue as related to the purpose and form of planning and by whom it is done.[4] Central planners must plan for others, an arrangement which casts planning in a superordinate role and restricts the use which can be made of the knowledge and wisdom of the masses. While there is a reluctance to recognize that common sense is indeed common, I am inclined toward the view so aptly expressed by Sandburg: "Everybody's smarter than anybody". De Tocqueville described centralization as a natural course and considered that the decentralized pattern emerging in the U.S. was a delicate flower which would demand much nurture and care. Hayek, an early spokesman against the temptation to covet European "efficiency", in *The Road to Serfdom*, sharply criticized centralized economic planning in complex organizations.[5] If this kind of planning is questionable in the economic world, it is certainly undesirable in a fragile social system like education. Doris Kearns, in a biography of Lyndon Johnson, describes him as wanting to help people. She claims that, by controlling others, he was acting in their best interests. But, the giving was on his terms, and he insisted upon secrecy and surprise for his plans.

To sum up: today planning in the U.S. is influenced in three ways. The first is by the enormous volume of data which can be readily mustered. The amount and disproportion of these data affect their utility. Much time must be invested in data management. As the volume of available data rises beyond the essential level of need, the ability of planners to make effective use of it deteriorates. Disagreement arises about what is the essential level of need.

The second influence is the sharp rise in organizational complexity. This is not related directly to changes in the purpose or function of organizations, but to the strengthening of organizational defense. That defense frequently has taken the form of a planning staff or department. With arithmetic increases in complexity have come exponential increases in planning staff. For example, where the levels of an educational system have tripled the planning staff has increased as much as nine-fold. The focus of their work then tends to shift strongly toward operations research and budget defense; and in the process, it moves away from forming the concepts and clarifying the nature of desired futures (on which to base plans) to technical preoccupation with preparing detailed plans.

The third influence has been that of the courts. Their intervention in planning has grown out of the insistence of aggrieved parties to push their criticisms and displeasure to the point of litigation. Adversarial procedures carried under the restrictions of judicial behaviour are a time-tested way of resolving clashes of self-interest. They offer the greatest promise of justice, but they may not be the best way to plan. Such procedures are entirely necessary where the elements being planned may "grieve". However, where the judiciary steps beyond the role of referee and takes on that of overseer for the preparation of a "plan", the consequences are deleterious to planning.

Conclusion

From an examination of history, then, comes a clearer picture of the planning-practice relationship in education in the U.S. In early years, planners and policy-makers were one and the same, the plans they made were balanced by quantitative, qualitative, and relevant goals; authority was apportioned and was commensurate with responsibility. As time went by, the planners and policy-makers became separated; one educational goal became dominant; and now we have the control of education widely contested. Today when planning calls for specialized knowledge and skill, planners find themselves more and more isolated from policy formulation, they are merely enlisted to defend and justify policies already chosen.

What is the lesson of history? The greater need is not for planning technicians or specialists. Their skills and knowledge should be taught to today's educational policy-makers. The unattractive alternative is for planners to struggle for the power to implement plans. This is not to denigrate the technical work of planning or to deny that it requires specialist training and knowledge. The world of education needs many artisans and their labour is honourable. But if we would be planners, we must search for a sense of the culture, not among mountains of data or by raising and defending organizational fortresses, but by going out among the multitude, and listening, listening, listening and thinking. If there is no place in an educational system for that kind of person, there is no place for planning.

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PROPOSITION DEVELOPMENT, CROSS-IMPACT ANALYSIS AND FUTURES HISTORY AS A PROLOGUE TO LONG-RANGE PLANNING

Recent developments in the theory and application of futures research may be found in the literature[1] so we shall not attempt to cover them here. The purpose of this paper is to present the background, context and methodology of a futures project in a rural Appalachian school district.

Background

The project described here should be viewed in the light of a broader dialogue which we have been having with officials of this school district for three years, and specific studies which have been in operation for the past fifteen months. The thrust of the cooperative relationship, of which this project is a part, is staff development as much as the development of a long-range plan. Through discussion and correspondence with the chief administrative officers and observers,[2] it became evident that unforseen, and as yet undefined changes were taking place in the district – changes which might be described and controlled – and that these should be considered as part of the larger futures study in the district. Wise county is located in southwest Virginia in the Appalachian Mountains. It has a population of approximately 38,900 (1975) with a school age population of just under 10,000 (1975-76). The main industry is coal mining, mostly strip-mining. The population of the area had reached 52,000 in 1950 and then declined steadily until 1971-72 when the downward trend was reversed. Presently the population is increasing slightly, but the rate of increase and the precise characteristics of the population are not known. There is some intra-county migration to the towns in the area, but its extent can only be estimated roughly. The population is culturally and ethnically remarkably homogeneous; there has been virtually no in-migration in the past three decades. It is less than three per cent non-white. With the focus on energy in recent years, the local economy is enjoying a minor boom even though much of its proceeds goes out of the county to large mining interests. The state road system is shortly to be vastly improved; the impact of faster and easier transportation has not yet been assessed.

All central office staff and all principals of county schools (total, 29) participated in all phases of the study, with the exception of this particular project which included only 15-17 of the group (all volunteers). The four chief school officers were born, went to school, and worked (except for one) their entire professional career in Wise or an immediate adjoining county. The other administrators had to a lesser degree been drawn from, or spent all their professional lives in, the area. The over-all picture is one of an exceptional degree of localism. This project, then, involved a group of professional personnel most of whom (1) had worked together for many years and (2) had intimate knowledge of the county for a lifetime.

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Project Design

Within this broad context we, together with three graduate students and the school authorities, developed a procedure for studying the future. This was intended to satisfy the staff development thrust of the main project, incorporate some historical extrapolation while avoiding the weaknesses of technical forecasting, and construct 'knowledgeable judgments' of the future state of the nation, the state and the local area. Our prime immediate objective was to develop a set of propositional statements relative to the year 1989. It was understood from the outset that these would lead to the writing of 'futures histories', to goal and policy formulation, policy planning, and eventually to a long-range plan for the district. For this purpose, the future was designated as the next thirteen years (i.e., from 1976/77 to 1989/90). Such a time span is not too long to be unfathomable[3] nor so short that the immediate future (the present for planning purposes) would predominate. Moreover, thirteen years makes sense, intuitively, since it is the school life-cycle of a child.

The project incorporated the concept of participatory planning[4], and was designed with specific reference to the Houston project[5] and the group process model of Delbecq, Van der Ven, and Gustafson[6]. Though there were propositional statements extant, which had been developed for a number of studies, it was decided to develop statements specifically applicable to Wise county. These could later be directly related to the planning phase of the study and would serve as an important staff development component, with direct implications for subsequent implementation. The project design had seven phases: review of futures research concepts; intuitive writing of propositional statements; exploration of knowledge and then wide-angle writing of propositional statements; extrapolation and then the writing of propositional statements based on local data; initial assessment of the propositions; revised assessment of the propositions; and, finally, the writing of futures histories. The study leading to the development of a long-range plan is still underway; it will be completed only by June 1977.

The Progress of the Project

Review of futures research concepts

In order to familiarize participants with the general intent of the project and the type of outcome desired, three views of the future – deterministic, romantic and rational – were prepared as background for the assumptions about the future. This was followed by general discussion of the technical and intuitive methods of futures research, and the importance of fitting the methodology to both the task to be accomplished and the environment.[7] Other techniques were discussed in terms of the information they generate and such criticisms as their sometimes "simplistic modelling of human nature", "arbitrary starting states and interaction rules", "extrapolation from an existing state" (which tends to support the status quo) and suggestion of the "single correct" view.[8] The usefulness of intuitive methods to get a general 'feel' of opinion relative to the future was explained, as well as the criticisms that they often yield vague and general information limited in its use and directly dependent upon the "gut feeling" of respondents whose basis of information is unknown. This study would involve intuitive judgment, informal knowledge, data collected from a variety of sources and extrapolation. The procedures to be followed and their rationale were reviewed in a one and one-half hour preliminary session.

Intuitive writing of propositional statements

Using the nominal group technique, participants were asked to write statements as to what 'can be', 'will be' and 'should be'[9] in Wise county and in Wise county schools by the year 1989. They were instructed not to bother with specifics of time, likelihood, impact or desirability; they were just to include anything that came to mind. Each participant listed from three to nine statements. The nominal group technique was intended to stimulate thinking about the future without prohibitive barriers being erected by strong personalities. Moreover, the homogeneity of the group and their long experience, personally and professionally, in the county and its schools seemed to justify using this procedure. The separation into two areas, schools and non-schools, was designed to focus their attention upon the inside and outside environment of the schools. The lists were signed so that the individual responses could later be traced. In this phase 77 statements were written and delivered to the design team.

Knowledge exploration and wide-angle propositional statements

In this phase participants explored what others were saying about the future. A variety of readings were made available and four of the Columbia Broadcasting System's 21st Century films[10] were shown and discussed. The fact that some forecast events in the films were already history and that others seemed naive, if not wrong, provided an opportunity to discuss the precarious nature of forecasting. In addition, the 184 items of the Dallas-Fort Worth Metro Project[11] were duplicated and given to each participant for review. This all took a session of approximately five hours, in addition to three weeks for reviewing duplicated materials and reading books and journals. Then participants submitted signed statements based on the information provided. No restrictions were put on the type of statement, except that desirable, even if not probable, events or outcomes should be considered. Seventy statements were received.

Extrapolations and propositional statements based on local data

The local data which were gathered accorded with the suggestions made by a number of sources, particularly "The Basic Data Needed for Educational Planning" by Chesswas[12] and a North Carolina study, "Areas of Information Required for Educational Planning".[13] School and non-school demographic statistics and data about the formal and informal political structure, manpower and employment, costs, finance and the general economy, the production and reserves of coal, and educational services (programs, teachers, services, organization) were all provided. The studies began with data for 1950 and came down to the present; projections to 1989 were then made. The local data file was built at this juncture in the project in order to introduce the concept of political, economic, and educational feasibility into the study. There was the risk that this might rule out desirable, but not apparently feasible, future developments. This we countered by continually stressing the importance of the desirable. It must be noted, however, that the administration did not feel comfortable only with intuition and dreaming. Nothing in the past or the forseeable future seemed to call for a dramatic change. Certainly values appeared to be as stable in the long-range view as in the short-range (13 year) future.

The project data were gathered for the participants from existing sources.[14] Then when the participants had been divided into study groups, additional data were sought to put the project data into a usable form. This became a very meaningful in-service activity.

For example, community power was analysed (many participants could describe the power of a single area, but not for the county); school statistics were aggregated by attendance areas (pointing up future facility needs as well as stablized patterns); and revenues were analysed by source (over 20 percent from Federal sources; there was probably need for a much higher property and coal tax). The danger of extrapolating from a single source was illustrated by the great variance in the population estimates of various state agencies, and the employment projections of the state agencies which were approximately half as high as those of private employers*. Participants found it difficult to deal with ambiguity in establishing trends.[15] This phase required nine hours of meetings with participants and an undetermined number of hours with study groups.

At the close of this phase, each study group presented its findings for discussion. The intent was not to make all participants equally knowledgeable in all areas, but to raise the level of understanding and permit inter-group questioning, particularly on cross-impacting items. The instructions for writing were similar to those given earlier and note was taken to make certain that the desirable, even if not probable, was to be included. Fifty-eight written statements resulted from this exercise.

Initial propositional assessment

The three rounds of statements were then reviewed by the university design team. They were sorted by county or school reference and then into sub-areas of applicability (for the county – political, economic and demographic; for the schools – political/organizational, economics/finance and curriculum/education services). Nine statements were eliminated as unmistakeable duplications, leaving a total of 196. The statements were copied, without revision other than the deletion of the contributor's name, into a response format for the participants. The Dallas-Fort Worth and Houston format, which had included assessment of likelihood and impact, according to a five-point scale, was expanded to include a desirability assessment. We also followed the Turoff suggestion that a "don't know" category be included so that participants would not feel compelled to make an assessment in an area not known.[16] Definitions and directions for the first round assessment are shown at the end of this paper.

Participants were given three days to respond to the items and return the signed form. Responses were coded on a 'likelihood/impact' grid for the purposes of (a) viewing the distribution of each individual's responses and (b) coding and posting responses on a large poster-type grid for the use of discussion groups. Each discussion group included at least one representative from each of the local data study groups and persons with diverse distributions of responses on the 196 items. The responses were coded by likelihood-impact cell with the desirability item following the number. Item 57, for example, was responded to by one participant as likelihood 3, impact 4 and desirability 4. Responses tended to follow patterns or clusters. For example, one respondent had 90 responses in the 5, 5 cell on likelihood and impact, another had 87 responses in the 0, 0 cell. The one-page coding sheet with 36 cells was too small to handle such a response pattern. Nor could the large poster board handle the total responses from the 5-6 respondents of a group, so it was not used. Group discussions, therefore, had to proceed without the benefit of an over-all posting of distributions.

*One problem with employers' estimates of manpower is that there is considerable double counting, each enterprise enhancing its estimated "share" of the market.

Revised Propositional Assessment

Each study group, was directed to attempt to narrow the list to 50 items, by discussion and consensus on each item. The items could be either kept intact, deleted, combined with others, or reworded. Many were deleted as overlapping, others were deleted because they were judged to have low likelihood or low desirability. High likelihood items tended to survive, regardless of impact or desirability; high desirability items tended to be deleted, regardless of impact, if they were not accompanied by at least moderate likelihood. High impact items were deleted very rapidly regardless of desirability if they were not accompanied by moderate likelihood.

This process, recorded by a member of the design team, produced the agreement of all groups on six items, of two or more groups on 27 items and of one group on 59 items. All participants were assembled to discuss the results which were displayed on three large boards. It was found that many items listed by two groups, but not a third, appeared in a slightly different from on the third "single consensus" chart. It took approximately two hours to reach consensus (generally through combining and rewording) on a final list of items, and the entire process required a full day. During this time many of the original items lost their identity, so that it was difficult to trace them to the submitting individuals, group or 'round'. However it was clear that 18 of the final items dealt with the county environment and 21 with schools *per se.*

A revised list of items has been delivered to the district for general response. All the other administrators will react to it and it has been suggested that responses also be solicited from a wider audience of teachers, school board and community members. There seems to be reluctance to take this step, although reasons for the reluctance are not entirely clear. In any case, whatever responses are received will be coded, by item, relative to frequency (0-5) of response on likelihood, impact and desirability. Then they will be returned to the district. The next discussion session will take place in early July. It will involve all administrators and take half the time of a three-day retreat. All responses will be discussed in a plenary session in order to clarify, modify, delete and choose areas associated with the items. For these 'futures histories' will be written by individuals and groups.

Prior to the actual writing the various items will be subjected to cross-impact analysis. The purpose of this step is to develop awareness of intrafield and interfield relatedness.[17]

Futures histories

It was felt that scenarios, as generally defined, are too broad and far-ranging for our purpose and that goal histories would be too narrow. Futures histories, should provide a suitable framework in which show the scope of the areas associated with the items identified. Participants will be given an explanation of futures histories, their anticipated use in formulating goals, criteria for writing about the future, and an example of one or more such histories. They will then be read by all the administrators and assessed for feasible and desirable goals for the district. These will be identified and written-up for a subsequent session, after which policy impacts will be assessed and the various steps of long-range planning will begin.

Conclusion

We have observed several positive effects on the school districts of the entire study and of this project specifically. The development of staff, which will be measured formally at a later date (in terms of both attitudes and skills), can already be seen through comments made during and after sessions. Participants see the project as exciting; individuals are coming to understand each other in a new way. The project has forced participants to assess their own views of the future as well as check specific futures for Wise county by a variety of indicators. At a later date the substantive aspects of the study will be assessed; it has not yet moved to the point of goal formulation. The planning and implementation phases are still in the future. But for this project at this point we can only point out the logic of the process and the fact that it is moving forward. It is not too early to note that some activities should have been organized differently. More in-depth study should have been undertaken with participants before developing the second and third round propositions. More thoughtful and comprehensive statements could then have been expected. Equally important, the participants would have gained more insight into alternative futures and have started with a better grasp of the environment of their county. More time might have helped, but the key seems to be the commitment that busy administrators can give to this type of project. The design team has no way of controlling this factor, other than to try to generate interest and then not allow the 'head of steam' to get dissipated. The design team probably should have reduced the number of items on the initial assessment. We wished to stay uncompromisingly a group process, but a number of items could have been combined without seriously sacrificing this principle. This, in turn, would have allowed for easier and more meaningful grid coding and more subsequent in-depth discussions of the items.

The project designers probably erred in not deliberately feeding into the process some of the on-going operations of the district. Substantive aspects of an earlier joint organizational analysis project and the state-mandated five year district plan should have been brought in as a written part of round three. We thought there was danger of the descriptive becoming normative[18] if these areas of vested interest were introduced; now we are not sure that the risk should not have been taken. So these materials will be included as elements in the cross-impact analysis. Then they will be reflected in the futures histories.

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Propositional Assessment

The statements which you have written concerning the future of Wise county and Wise county schools are listed on the attached inventory. You are requested to assess each statement in terms of IMPACT, LIKELIHOOD and DESIRABILITY. Please review the definitions and scale below before proceeding.

IMPACT: The importance of the item to the future.

0. Not applicable or don't know
1. Low impact – no measurable effect, no relevance or priority.
2. Moderately low impact – little importance, not a major determining factor.
3. Medium impact – some relevance but slightly indirect or tangential.
4. Moderately high impact – relevant to the issue, must be taken into account after other items are treated.
5. High impact – direct relevance, of major importance to the issue.

LIKELIHOOD: The degree of probability that an event can occur.

0. Not applicable or don't know.
1. Low likelihood – 0-20% chance
2. Moderately low – 21-40% chance
3. Average – 41-60% chance
4. Moderately high – 61-80% chance
5. High likelihood – 81-100% chance

DESIRABILITY: The value or positive effects of the issue.

0. Not applicable or don't know.
1. Low desirability – very negative effect, harmful, not justifiable.
2. Moderately low desirability – negative, harmful but can be justified as a spin-off of a highly desirable outcome,
3. Medium desirability – neither highly negative nor positive, justifiable, but a third order priority.
4. Moderately high desirability – justifiable in its own right, but of second order priority, little or few negative effects.
5. High desirability – of first order priority, very positive effect, highly beneficial, minimal negative effects.

Please rate each item by each criteria using the scale 0 - 5.

Example:	Impact	Likelihood	Desirability
Populations will cluster around Big Stone, Norton, and (town of) Wise.	4	2	3

The sections entitled WISE COUNTY should be assessed as Impact, Likelihood, and Desirability of event on the County.

The sections entitled SCHOOLS should be assessed as Impact, Likelihood, and Desirability of event on the Schools.

PLEASE respond to all items. Our next session will involve the first phase of the propositional analysis.

Diana J. Ashworth*

SOUTH CAROLINA: STATEWIDE ASSESSMENT OF EDUCATIONAL NEEDS

In recent years, considerable attention has been given to the use of planning to bring about improvement in all aspects of life, including education. As an ever-increasing rate of change continues to impose new demands on the educational system, and as emerging trends indicate that future resources will be limited and public demand for services will be high, the need for systematic, continuous planning increases. Planning in the public sector is innately different from that in the private sector because, by its very nature, it involves public decision-making. Production and growth goals can be established by private business without involving individuals outside of the organization; however, the operation of the public's business, especially the establishment of goals, implies public involvement. This involvement may range from individual participation at a town meeting to representative decision-making.

In the democratic society in which we live, planning in the public sector is a part of the political process. Whereas the profit and loss statement is an appropriate means of ascertaining the effectiveness of a private organization, organizations in the public sector traditionally have been judged by their judicious use of public funds. Since public resources are limited, their distribution must be determined by weighing available resources against competing demands in the public decision-making arena.

The conduct of public affairs through the political process is executed through a series of decisions that tend to be incremental and reactive in nature. These incremental adjustments, designed to resolve specific problems, also serve to maintain the stability of the organization. To complement decision-making which, of necessity, often must be incremental and/or reactive in nature, the decision-making process in the public arena must be "proactive"† and designed to bring about systematic change. Present-day problems generally are complex. Their solutions require emphasis upon ends as well as means. This dualistic approach to decision-making obviously applies to the governance of education. Change will continually be brought about in the educational system as a result of reacting to existing problems. But educational policy-makers must also be proactive by identifying educational goals and structuring educational programs to meet identified educational needs and priorities.

In the United States education is a state responsibility. States acknowledge this responsibility by establishing publicly funded systems for meeting the educational needs of their citizens. This responsibility implies that each state should look ahead to determine the future requirements of its system of public education and establish systematic procedures for meeting these needs. Planning for the improvement of educational service

†"Proactive" as contrasted with "reactive" – i.e. showing initiative, having far-sighted, imaginative and enterprising qualities.

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is an essential element in the governance and operation of a public educational system. Throughout the United States the people chosen to govern the system of public education are selected democratically to serve on state or local boards of education. Each board must determine its role in the planning process according to the unique requirements of its jurisdiction.

State boards of education play a unique role in our system of public education; each state board of education acts on behalf of the people to determine educational policy for the state. The South Carolina Constitution declares that the State Legislature "shall provide for the maintenance and support of a system of free public schools open to all children in the state and shall establish, organize, and support such other public institutions of learning as may be desirable". In keeping with the primary goal of providing a system of free public schools, the State Board must so govern public education in the state as to provide "adequate educational opportunities and facilities", while working with the State Superintendent "to the end that the state system of public education may be constantly improved".

The South Carolina State Board of Education has affirmed that it should insure that educational needs are periodically assessed, and that policies are adopted and programs are developed to meet the identified needs. Its statement of educational philosophy, adopted in 1967, indicates that the State Board of Education defines its role in these terms:

> The Board believes that the continuous upgrading of education requires careful planning, prudent use of the State's financial resources, and continuous leadership . . . The Board, therefore, believes that there should be a five-year plan for educational improvement developed by the Superintendent and approved by the Board after open hearings on it. This five-year plan should be updated each year . . ., and it should constitute the Board's primary means of communicating its program and financial costs to the public and the Legislature.

Such a philosophy requires the board to play a significant role in educational planning. The basic components of the educational planning process are to formulate goals, assess needs, develop objectives, examine alternatives, establish priorities, allocate resources, implement programs to meet objectives, receive feedback on the implementation process, and evaluate how well the objectives are being met. The board's responsibilities in this process centre on establishing the goals of the system, establishing priorities among goals, advocating the appropriate allocation of resources to reach these goals, and reviewing the evaluation data to determine the degree to which the goals have been met. The South Carolina State Board of Education, through the State Department of Education, has been involved in systematic planning efforts since 1968. In that year, a comprehensive educational needs study was initiated. Eventually the study led to the development of a set of proposed long-range educational goals for the state. These were adopted by the board in 1970.

These goals, or major objectives, were based upon the findings of the statewide needs assessment study. They, therefore, reflect areas of common concern for the state's educational system. They call for measurable progress in reducing dropouts and first grade failures; improving the basic skills of students; increasing enrollment in occupational

training, adult education, post-high school instructional programs, and programs for the handicapped. The remaining objectives call for a statewide program of public kindergarten, programs to provide adequate and qualified professional personnel to staff the educational system, implementing at least a defined minimum program in each school district, and developing and maintaining a system for the continuous evaluation and upgrading of education.

After the objectives had been adopted, plans were developed which specified the activities, resource requirements, and evaluation strategies necessary to achieve each objective. Yearly evaluation reports indicate that substantial progress is being made toward meeting the needs identified by the eleven major objectives. Now, five years after the first yearly plan was developed, the majority of the goals have been met as originally scheduled. The others, because of financial constraints and other factors, will require additional years before the goals can be achieved.

Because the State Board of Education and the State Department of Education were convinced of the value of a five-year plan for educational improvement, in May 1975 the board had the department initiate a formal reassessment of educational needs so the board's long-range plan for educational improvement could be updated. This assessment was designed to generate a revised listing of educational needs. It included an examination of national priorities and educational issues; a review of state quality-of-life indicators, economic studies, and population projections; an analysis of existing educational data collected at the national and state levels; and a sampling of opinion from the general public, professional educators, and high school seniors regarding the present status of public education. The design of the needs assessment project was influenced by current research generated by the social indicators movement, futures studies, the national assessment of student and adult performance, quality-of-life studies, and public opinion polling. The needs assessment model was based on the belief that reassessment of educational needs should include, but not be limited to, the assessment of student performance. Since the South Carolina Constitution requires the "maintenance and support of a system of free public schools" the state assessment of educational needs focused on system needs as well as student needs. The accelerating rate of change in the state, in terms of economics, population, and societal expectations, and the impact and potential impact this change would have on the educational system, were explicitly recognized in the model design.

The model contains five major components:

- National indicators
- State context indicators
- Perceptual indicators
- System indicators, and
- Update.

Data items from each were identified, and inter-related in as many cases as applicable in order to obtain multiple readings from different sources for the same or similar data item.

The national indicators component contained an examination of futures studies and the potential impact of alternative futures on education, review of educational issues as expressed by leading educators and as espoused by major professional organizations within education, analysis of the legislative priorities in the field of education at the state and national level, analysis of the trends revealed by the Gallup Poll on Public

SOUTH CAROLINA NEEDS ASSESSMENT DESIGN

NATIONAL INDICATORS

- Futures Studies
- Educational issues consensus
- Legislative priorities
- Public opinion polls
- Statistical data

STATE CONTENT INDICATORS

- Population characteristics general and school
- Economic characteristics general and school finance
- Organization and governance of school districts
- Quality of Life, state-of-the-state studies

PERCEPTUAL INDICATORS

information

attitudes

goals/needs

- Public opinion poll
- Professional opinion poll
- Senior opinion poll

SYSTEM INDICATORS

INPUT	PROGRAM	OUTPUT
Defined Minimum Program	Instructional Program Opportunities	Student Achievement
Professional personnel Certification Characteristics	• Kindergarten • Elementary • Middle • Secondary • Vocational • Handicapped • Adult Education	Self-Concept Dropout rate Retention rate Graduate follow-up
Facilities		

UPDATE

1968 Needs Assessment Study | Five Year Plan | State Board Philosophy

Attitudes Toward Education (which has been continuously conducted since 1969) and a statistical report of educational data collected and reported by the National Center for Educational Statistics and the United States Census Bureau.

The state context indicators component contained statistical data related to the population and economic characteristics of the state, a summary of the organizational and administrative structure of school districts, and a review of quality-of-life and economic studies.

The perceptual indicators component examined opinion on the status of education within the state taken from a sample of the public, professional educators, and high school seniors. By questionnaire the respondents were asked to identify the strengths and weaknesses of the system, its current unmet needs, and appropriate future goals. Each opinion survey was conducted, on contract, by nationally recognized firms.

The system indicators component primarily used the data banks of the department. Input, program, and output data were examined in terms of established criteria, and a discrepancy analysis utilized when possible. The program needs of the next five to ten years in kindergarten, elementary, middle, secondary, vocational, handicapped, adult education, were identified by appropriate department staff. This listing of needs was based on best professional judgment.

The final component, update, examined the needs which had been identified in the 1968 study to determine the present status of these areas, it reviewed the status of the eleven major objectives specified in the original five year plan, and analysed the board's statement of philosophy.

Throughout the 1975-76 school year reports were prepared for each indicator component and presented to the board. As a result of the needs assessment study, twenty-five educational needs were identified for board review. After extensive study, the board selected fifteen objectives as the most critical at this time. They were approved for public review in July 1976.

During October 1976, the board held eight public meetings to allow school administrators, other members of the public education community, state officials, and the public at large to review and comment on the proposed fifteen objectives. The meetings held in eight regions of the state were attended by approximately 1,000. A meeting was also scheduled for representatives of related educational organizations and interest groups to disucss the objectives. It was attended by representatives of the South Carolina Education Association, South Carolina School Boards Association, South Carolina Association of School Administrators, South Carolina Congress of Parents and Teachers, American Friends Service Committee, and the Office of the Governor. The board plans to review the comments received during these meetings, as well as those which have been received by mail, and at its January 1977 meeting adopt a final list of objectives for 1980-81. When the objectives have been formally adopted the department will initiate a planning cycle to develop plans for each objective. These will specify the annual targets, strategies, activities, and resource requirements.

Planning is an established and on-going function of the South Carolina Department of Education and it has the support and commitment of the State Board of Education. In developing a model for the 1976 needs assessment study, several factors were taken into consideration: (1) the unique requirements of planning in the public sector and public

policy making; (2) needs assessment strategies and models of other states; (3) the constitutional provisions, state statutes, and board policy concerning education which are unique to South Carolina; and (4) resource availability in terms of time, money, and people. The study included assessment of student performance as well as system needs, and recognized the unique characteristics of education in terms of its impact on society and the influence which societal change has upon education. It is obvious that study of the educational system must be viewed in the context of society as a whole. The identification of existing and emerging educational needs requires understanding of present conditions and consideration of trends. The examination of alternative futures and the prediction of changes to be expected in the next decade have relevance, and indeed are significant, to an assessment of educational needs because consideration of the future must always be evident in the formulation of policy and in the adoption of educational goals.

Koji Yoda*

A NONDETERMINISTIC RESOURCE PLANNING MODEL IN EDUCATION

Introduction

Spiralling costs, dwindling resources. the demand for public accountability and a commitment to greater educational opportunity seem to characterize the current operating conditions of school districts throughout the United States. Among the various public institutions education has been accused of being the slowest to adopt new management tools. Recently, however, drastically changing economic conditions have brought about increased awareness of the dire need for modern management techniques upon which to base rational decisions. If the educational planner or researcher is to identify and evaluate alternative system futures and single out the optimum one, if scarce educational resource allocations are to be made in a systematic manner in order to assure the effective and efficient operation of the school district, then it is of the utmost importance that suitable information be provided to facilitate the decision-making process. Thus, the major objective of an information system is to facilitate managerial decision-making by generating information that is valid, complete, reliable and timely. The evolution of management information systems (MIS) in educational organizations started with the application of automatic data processing to routine, operational functions such as the monthly payroll and accounts payable preparation. Today in most large school districts, the computer is an integral component of the MIS. With the computer, it is now feasible to provide educational managers with more and better information than ever before.

This paper discusses a simple technique for stochastic resource planning which, when computerized, can assist educational managers in the process of quantifying the future uncertainty, thereby, helping them make better decisions. Most problems in education are not solved in a strictly deterministic (non-probabilistic) manner.[1] In fact, many decisions in all areas of resource allocation (e.g., manpower, material, financial) in education are made based upon stochastic or nondeterministic information. The stochastic resource planning process entails two basic steps: First, a quantitative model is built; and second, the model is automated. Then educational decision-makers with no specialized technical skills should be able to obtain information expressed in probabilistic terms through a willingness to express the uncertainty about major planning variables.

Initially, the task for the educational operations researcher in preparing for stochastic resource planning is to determine which resource planning areas shall be included as a part of the integrated MIS. This presentation singles out one specific area of resource planning (food service operations), although this general approach may be applied to almost any type of resource planning process.

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The school lunch program has been the largest non-profit feeding service in the world and, therefore, many food service administrators experience unwieldy problems. According to USDA Consumer and Market Service, the chief problem which school lunch managers face is limited budgets which require constant stretching of resources to provide non-profit, nutritious lunches at low cost. Although the principle of non-profit operation seems to prevail, there are numerous school boards which encourage nominal sums of net profit which could be expended to replace some of the lunchroom equipment or to procure additional supplies to the bare essentials provided by the central office food service division. A non-deterministic approach to the resource planning assists these managers to quantify future uncertainty and helps them make sounder decisions.

The Model

The mathematical model to be created must represent the revenues and costs associated with the accounting involved in food service operation. It can be built on very rough and simple assumptions or on super-meticulously-thought-out assumptions.
Even a very simplified model, however, must be predicated upon detailed cost analyses of empirical operational data as illustrated in this article. The model shown in Table 1 indicates revenue to be a function of the meal portion price and the number of portions sold. Although food service administrators can control the portion price, the number of portions which can be sold at that particular portion price normally is known only in terms of probability. An asterisk in the model indicates that administrators must provide data inputs for that particular variable, based upon their best judgement.

Table 1 SIMPLIFIED FOOD SERVICE OPERATION MODEL

Revenue:

Sales = Portion Price* x Portions Sold*

Cost of Meals Prepared:

Raw Food Cost = Variable Raw Food Cost
Per Portion* x Portions Prepared*

Direct Labor Cost = Variable Direct Labour Cost
Per Portion* x Portions Prepared*

Overhead Cost = Variable Overhead Cost
Per Portion* x Portions Prepared* + Fixed Overhead*

Operating Cost:

General & Administrative Expense = Variable General & Administrative Cost
Per Portion* x Portions Prepared* + Fixed General & Administrative Cost*

Net Income:

Net Income = Revenue - Cost of Meals Prepared - Operating Cost

*data input to be provided by educational managers according to their best judgements

The cost section of the model incorporates the standard variable and fixed dichotomy between cost components. Some cost items, such as direct labor, involve only variable costs while others, such as general and administrative cost, have both fixed and variable components. In most cases to be realistic, administrators should break some costs down into different, more fundamental components. For example, variable overhead and fixed overhead costs might be broken into such subcomponents as: (1) repairs and maintenance of equipment, (2) repairs and maintenance of refrigeration, (3) equipment purchased, (4) supplies, (5) warehouse expense, (6) service charges, (7) administration, etc. Variable raw food cost per portion, in a real-world model, should be computed for each ingredient and the "n" variable raw food costs per portion should be incorporated into the overall raw food cost. The exact form of the model does not matter as long as it incorporates all relevant revenue and cost items. It should be created in such a way, however, that educational management can easily supply the required data inputs.

Required Data

Required data inputs in the process of operationalizing the stochastic resource planning model differ only slightly from those of the more conventional deterministic models. Usually supervisors who are most knowledgeable in their own domains of operation make the needed estimates. In the author's opinion, however, the concept so successfully used in Program Evaluation and Review Technique (PERT) can be combined with this stochastic model in addition to the "most likely" estimate required in the more common deterministic models, the supervisor is asked to make a "most optimistic" and a "most pessimistic" one. In the model being described, administrators make estimates for costs and revenues.

To illustrate: a manager in the procurement area might feel that the best single estimate of raw food cost per portion is $.11. His experience, however, tells him that a pessimistic estimate could run as high as $.16. Should everything turn out smoothly, and with a bit of luck, his optimistic cost estimate could be as low as $.08. He admits that per portion costs might fall outside of this range, but a strong hunch tells him that cost figures below $.08 or above $.16 are unduly optimistic and pessimistic in light of his experience and expectations of the planning period under consideration. This illustration can be summarized by Figure 1. A positively skewed distribution f(x), known as the log-normal distribution , has been suggested by various authors to describe management's expectations of the shrouded future.[2] Others suggest the employment of the triangular distribution.[3] On the horizontal axis are entered possible values (x's) for the variable at issue. The likelihood of occurrence for the raw food cost per portion figure is reflected on the height along the vertical axis.

Analysis

Regardless of the shape of the curve which indicates the pattern of the probability distribution supposedly representing the actual statistical universe, in order to perform the probabilistic analysis a function F(x), called the cumulative distribution function of x, must be defined. This indicates the probability that a random variable X (e.g., variable raw food cost per portion) takes on the value of x or less. The log-normal density function, as shown in Figure 1, must be transformed into a cumulative probability curve. Figure 2 shows the cumulative probability distribution F(x) for the independent variable, raw food cost per portion. The ordinate of the cumulative distribution function denotes the

Figure 1 DENSITY FUNCTION OF VARIABLE RAW FOOD COST PER PORTION (IN DOLLARS)

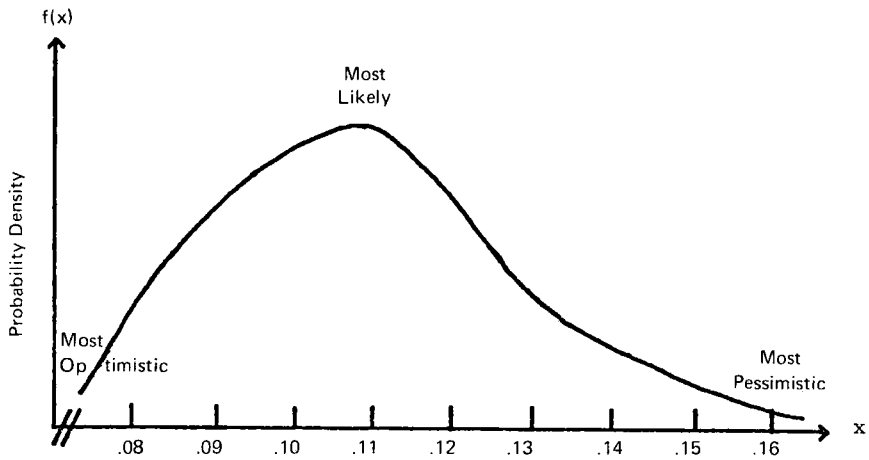
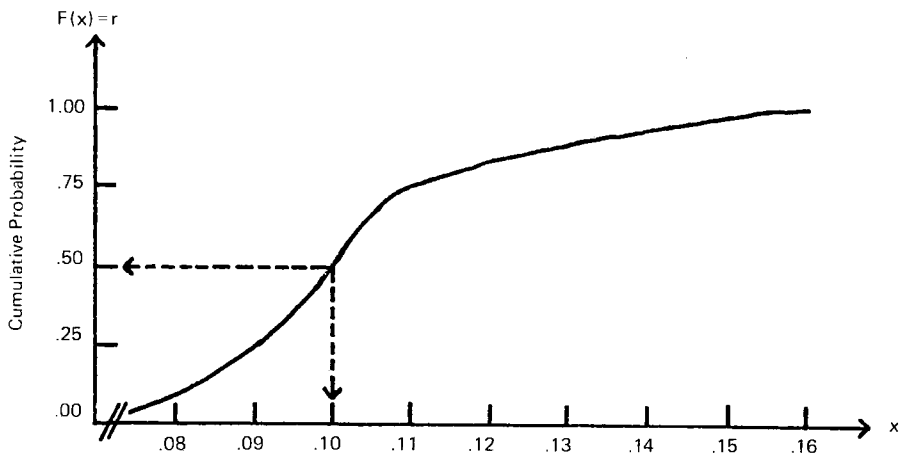


Figure 2 CUMULATIVE DISTRIBUTION FUNCTION OF VARIABLE RAW FOOD COST PER PORTION (IN DOLLARS)



probability density of observing that particular value (x) of the independent variable, raw food cost per portion, by associating a randomly drawn number to the cost on the horizontal axis and, in turn, correlating that value with the cumulative probability indicated on the vertical axis.

For the purpose of generating the random numbers, a sampling technique called the Monte Carlo will be used.[4] The Monte Carlo process has become a synonym for simulation of stochastic process. With a view to simulating the outcomes of actual stochastic events, Monte Carlo simply uses such random devices as a roulette wheel, spinning pointer, or pair of dice. When a large number of trials are to be performed, reliance on such mechanical devices proves time-consuming, and at the same time, the random numbers generated might not fit into a certain pattern of the probability distribution which should closely describe the actual statistical universe. In order to circumvent these problems random digit-tables, such as those found in the appendix of most statistics texts, are used to simulate a random device. The fastest and most reliable results, however, can be achieved through the use of a digital computer.

The Monte Carlo process involves the generation of random numbers, x's, from a certain assumed population whose density function is expressed by f(x). The cumulative distribution function F(x) then must be obtained. Obviously, F(x), as seen in Figure 2, is defined over the range of .00 to 1.00. By generating uniform random numbers and set F(x) = r, it becomes clear that x can be uniquely determined by r =F(x). We can, therefore, draw a uniform random number, r, such that $.00 \leqslant r \leqslant 1.00$, and find the value of x corresponding to the r. In the present example, assume that the computer generated the random number of .50. This number then can be associated with $.10 per unit (or per portion) of that particular independent variable, raw food cost per portion, as illustrated in Figure 2.

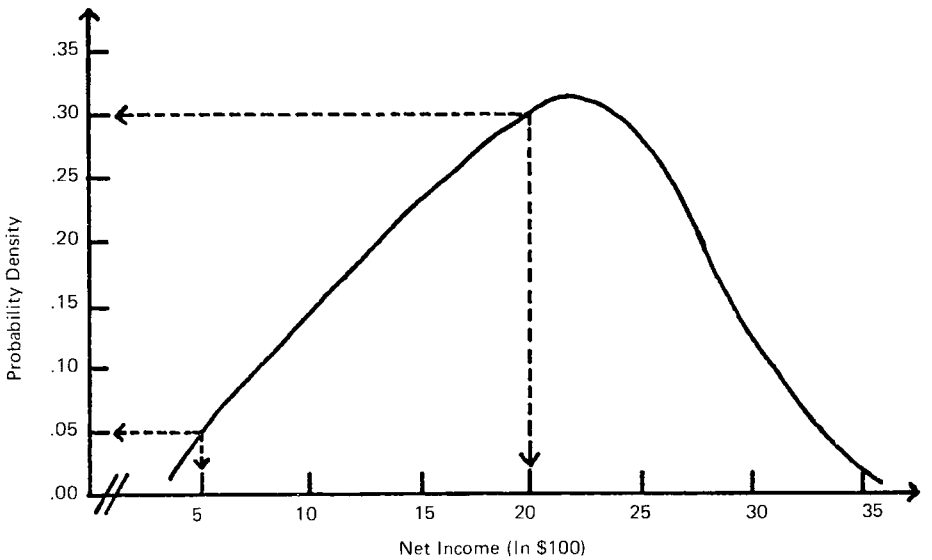
The mathematical model presented in Table 1 indicates that the number of portions prepared must be determined in order to estimate the raw food cost. A sampled value for portions prepared can easily be determined by an application of the Monte Carlo process to the cumulative probability density function for the variable, portions prepared. Suppose that the random number .25 was generated and that this number was associated with 1200 portions prepared. These sampled values for variable raw food cost per portion, and variable portions prepared (i.e., $.10 and 1200 respectively) can then be used in the model to estimate the dependent variable (raw food cost).

Raw food cost = Variable raw food cost per portion* x Portions prepared*
= $.10 x 1200
= $120

Similarly, once cumulative probability distributions have been obtained for all the independent variables in the mathematical model, the computation of estimates for all the dependent variables becomes straight-forward through the use of the Monte Carlo process. Each repetition or iteration calls for: (1) generation of a random number for each independent variable having an asterisk, (2) determination of the corresponding values of independent variables, and (3) determination of the value(s) of the dependent variable(s) in accordance with the mathematical model. To achieve reliable estimates of dependent variable(s) it is necessary to perform many iterations. Then the resultant estimates of the dependent variable(s) are plotted in terms of probability distributions; thereby enabling management to make probability statements about alternative system futures. In the present instance, the distribution of estimates for the ultimate dependent variable, net income, could be plotted. A total of 1,000 iterations, for example, might result in the probability distribution shown in Figure 3.

Upon completion of the stochastic analysis, the administrator is placed in a position to assess quantitatively his uncertainty about the future net income from the food service program. To illustrate: according to the probability distribution function of net income estimates shown in Figure 3, the likelihood of observing a net income in the neighbourhood of $2,000 is approximately .30. By the same token, the probability of observing a net income below $500 is about .05.

Figure 3 PROBABILITY DISTRIBUTION FUNCTION OF NET INCOME ESTIMATES



Conclusion

Probabilistic/stochastic resource planning is within the scope of any school district that has access to a digital computer. The major advantage of this approach is that it enables non-specialized educational administrators to quantify their collective uncertainty about the future. A numeric analysis which utilizes stochastic simulation techniques, such as the Monte Carlo, simply replaces many difficult mathematical and statistical operations with a very large number of simple iterative computations. The advantage of this type of problem-solving method is that it can be easily understood and used.

The model used to illustrate this paper must be modified rather extensively into a more sophisticated one in order to be a more realistic representation of reality. However, the benefits of added sophistication must be weighed against the costs of time, and understandability. Integration of this type of resource planning into the existing MIS seems to offer unlimited potential in assisting educational administrators to make better decisions.

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C. Lloyd Shubert*

OVERCOMING BARRIERS IN COOPERATIVE DECISION MAKING

Introduction

Often the overlooked topic is best approached through the practical. Let us start with one or two person to person examples:

A vacant lot was used by small boys as a sand-lot ball park. A retired business man kept a first class garden just across the fence. Often the ball would fly into the garden. Before the neighbour could retrieve it and toss it back, a half dozen boys would trample the garden looking for the ball. One day the man approached the fence during a lull in the game; called the boys, and with some ceremony presented them with a new ball. One of the group asked, "Why the gift?" "Well", the man replied, "I like ball-games and gardens about the same. It's hard for me to say which I like better. I thought that if you had two balls in place of one – then when you lose one out here, I can find it and toss it back. That way I can sort of be part of the game and you can get on with the game sooner. That way, too, my garden doesn't get trampled so much."

A more forceful approach to cooperative decision making, but quite as effective, was that of the aging parishioner and her young pastor. The lady called on the young man and pointed out that, for more than a year, she had noticed a large stack of bricks and stone at the back of the church. She was concerned; children might get hurt playing there. The pastor interrupted to explain, but no explanation was necessary. Some men of the congregation were going to volunteer to make an out-door fire place. "At least their prayers are better than their promises," she said, "but I want action. I'll write a cheque for the cost of the construction as soon as you get two estimates from reputable brick-layers. If the men are still willing to do the work and do it on time, you can transfer the money to some other needed cause." The volunteers did the work on time; the money was used for children's play equipment for the project. The lady had double action as a result of her bit of strategy.

If you would like a more elaborate and scholarly discussion of the process I have illustrated, I refer you to a book entitled *Intergroup Relations and Leadership.*[1]

Social Climate of Decision Process

Working with people perhaps depends more on the social climate than we have supposed. The setting of this social climate begins with people.

Fundamental attitudes: Fundamental to cooperative attitudes is the confidence of leaders that people would rather cooperate than be uncooperative. Two aspects of this are vital. The first is that most of us have some ability, and most people (I would say all) really want to share their skill. The key is that generally they expected something in return. Some people have not only skill but also accumulated wealth to share – for

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something in return. The return need not always be something material. Such intangible returns as status, belonging, a feeling of worth, an extension of self, or even a sense of immortality, are important.

A second key to attitude is that many, if not most, people are genuinely altruistic. They are not altruistic about all things or even most of the time, but they often feel altruistic – however, overly competitive situations mask it. For the thesis that people are basically cooperative in nature, see Ashley Montague's, *On Being Human.*[2]

Discovery of human potential: One of life's most exhilarating adventures is seeking particular and unique abilities in people. This cannot be put on; it is no game of pretend. Leadership must thrill with the prospect of discovering people's skills and abilities. A rich storehouse of potentials is waiting to be developed.

Inclusiveness is vital to process: Comprehensiveness in seeking the response of people is the very bedrock for building an environment in which cooperative decision-making can take place. We tend to assume that representatives and leaders from diverse agencies will sit down together. Often the process mires down. They have come to share and find instead that they are expected only to listen. All personnel, to the greatest possible extent, must participate in making decisions. Furthermore, all those affected shall have representatives who also must participate. The highest levels of cooperation are achieved only when those responsible for execution, and are affected by it, are involved in the process from the beginning.

Questions of representation and of the conditions underlying group conflict, must be studied at length. The extended conference, retreat, or research in centres for group dynamics or conflict resolution can be most helpful. Surely this is a decade in which most of the written procedures of the past must either be drastically overhauled or discarded. Written procedures of themselves do not ensure satisfactory decision-making. Nevertheless there must be clearly defined procedures workable within a legal or institutional development. We are not talking of procedures followed like ritual to the letter, but ones which create conditions for constructive cooperation.

Within the current framework: When there is need for a decision, it is well, first, to see if it can be made within present arrangements. Is someone charged with this kind of decision? If this individual is made aware of his responsibility, will he act? If he or she will act, it is an easy decision, *and* if most of the constituency will respect the decision, then there is no problem. These are big "ifs". In many cases, decisions cannot (or should not) be made by one person. Help should be offered by those concerned and others who genuinely want harmony to prevail. These persons do not presume to make the decision; they stand by to shed some light on conditions and the possible consequences of alternative decisions. The decision itself can still be made by the individual charged with responsibility for it. This leads to consideration of a special kind of committee which has grown in use in recent years – the *ad hoc* committee.

The ad hoc committee: Although frequently set up for one specific purpose, such a committee has more than one use, particularly in periods of sharp transition. It can help a leader probe for open and forthright responses, especially where there is suspicion and official responses are likely to be diplomatic or politique. The ad hoc committee may grow out of the unofficial leadership, thus alerting official leadership to cases where there is unmet need for decision. This kind of committee is most effective for organizing creative new thrusts or taking bold approaches to old problems. In recent years in the

U.S. the ad hoc committee has been used in planning for 'equality of educational opportunity', for 'affirmative action', for the development of 'cooperative service units', etc.

Sustained Framework for Cooperative Decisions

It is within a sustained, long-established program that most effective decisions can be made. It is obvious that decision-making is a complex subject and we do not mean to imply that it can be dealt with in a few capsule remarks. Nevertheless, mention of a few related topics may be appropriate here. One barrier to decision-making is the arrangement of offices and groups. A structure which provides convenient specialization by task is often a very real barrier to decision-making by the whole system. Who has not seen cliques and even animosities develop in closed groups or departments? They are not consciously fostered, they just grow out of practice. And when an individual is transferred to another section of the organization new associations are established, new alliances formed and the old barriers gradually disappear.[3]

The pilot program: One long established device for development is the pilot program. It should be made clear from the beginning that this is a trial run; it will be fairly evaluated; and unless widely approved, it will be ended. Such a program makes possible the testing of assumptions, adjustment of procedures, and exploration of goals. It may focus upon unexpected situations and conflicts, and it often produces unexpected spin-offs. The pilot program has definite constructive qualities. It lowers resistance to change because the rest of the system assumes that the change will be temporary. It gives time for 'test-runs' of the change, time for the adjustment of procedures, and for public attitudes to change.

Occasional invited visitor: Sometimes the guest from another agency or institution can informally bring about receptivity to change. He need not be an 'expert'. A visitor who has had experience of facing the same type of problem can spot trouble merely by sitting in and observing. Such a person can see the situation whole. Often a consultant can make the type of recommendations that an in-house observer cannot put forward without causing trouble.

Small group challenge: This is a process usually involving five to seven people in two or more small groups. Different suggestions for direction or decision are made. Each group is then asked to discuss one of these and report back with the most serious support they can supply. All members listen to each supportive report.

After listening to this discussion of the merits and possible long-range effects of each position, decision on one is taken. If this process does nothing else, it provides detailed information on the good aspects of each suggestion. It also provides general discussion which airs the disadvantages of each, and it has the very beneficial effect of lowering barriers to whatever course is finally taken.

In setting up such groups it is useful to spend some time in an informal exploratory session, where one or two immediate goals can be tackled. Let each group formulate carefully a particular direction or perspective and relate it to the others. Then, after reporting with a brief written statement, each group might list at random the ideas which surfaced during their first interaction together. Later these can be summarized and analyzed. After a few such initial experiences, a spokesman from each group states, as clearly as possible, the immediate hypothesis which then is seriously examined.

Conference feedback: Sometimes when a decision is to be made related to planning, the availability of a conference can be important, particularly a conference covering the same type of problem in a wider context or a different region. Someone should be delegated to attend and report viewpoints and case histories. Much more could be gained from conferences if there was a schedule of regular attendance, and then (on return) reviews of proceedings and discussions of the utility or applicability of the papers. Most conference-benefit is lost. Much of this can be prevented if there is some continuous informal grouping for reporting and discussion. Conference going should be constructive so that when decisions must be made, it becomes natural to make use of a wide scope of learned opinion. For explicit help in the use of the small group conference/decision process see *Group Dynamics: Key to Decision Making*[4] is helpful; helpful approaches are also described in *Group Centered Leadership*[5] and *Learning to Work in Groups.*[6]

The retreat: This highly promising vehicle is the most misunderstood instrument for cooperative decision-making. It can really lower the barriers between groups in an organization, but it has semantic problems. It suffers from the connotations (military=failure; religious=isolation) of the word. The public misinterprets the purpose of a retreat and they have little knowledge of its use in problem solving. A lengthy meeting conducted in a residential setting away from the customary site of business serves many purposes. It provides the informality and uninterrupted privacy. It enables participants to focus exclusively on the larger issue without assuming (trying not to be burdened with) the gritty details. It can be considered a social laboratory, if you will. The retreat should have a specific purpose and theme. It should be used to gain new perspective on a problem, to review new guidelines or controls, explore an area of new funding, design the framework for a new type of curriculum, develop a new service agency etc.

Lowering resistance to immediate decisions: Few people have the happy facility of making changes which affect many, in such a fashion as to produce little backlash from those affected. One such person of my acquaintance was Roland Haynes who for some years was president of the University of Omaha. Via a personal and seemingly casual phone call, staff members were invited to lunch in a certain meeting room. Lunch in room 100 meant that a problem was to be aired. After a cheerful and easy lunch, the president had two or three persons briefly outline a situation. He then asked (and elicited from others) questions and clarifications. By the end of the session he had made it clear that a reasonable decision had to be made very soon, that he would appreciate suggestions as to how to proceed or the effects of proceeding in one or other suggested direction. The entire discussion was in low key, with little fuss and no rancour. The unmistakeable impression was conveyed that time was running out for some, but a decision would be made with all things having been considered. His follow-up usually was quick and judicious. Individuals or groups might be asked to do specific things – things which were possible, even palatable, and reasonable. It is probably not possible to teach such leadership, but it should be possible to foster administrative talent or at least heighten the self awareness of administrators who are maladroit. Whatever the device preferred, the process should exhibit certain features. It is tactful, without anger, rancour or bitterness. The problem, its effects and possible solutions should be portrayed from more than one viewpoint and more than one source. The sources will emphasize different things, provide different explanations or solutions. Their accounts should be open, brief, factual and dispassionate. The impression to be conveyed is that the situation must be resolved quickly, that it has been reasonably well reviewed, that authority will take responsibility for a decision and it will be carried out.

Group approach to immediate decision making: One usually associates group decision-making with slow process and long-term, general kinds of policy decisions. Skilled leadership can use groups even for immediate decision purposes. An article in *Kansas Studies in Education* describes a unique kind of group which served in making such decisions. The Kansas city curriculum team decided to use so-called advocacy groups to "generate and access apparently viable program alternatives and to determine their comparative value".[7] The article discusses the guidelines they used and the results they obtained.

Extant organization for cooperative services: This paper has been concerned with cooperative decision-making, but before we finish we should note that there are also cooperative service arrangements in education. We report this because they grow out of, and constantly depend upon, lowered resistance to the cooperative decision process. There are many examples. The few mentioned here by no means exhaust the list for the U.S.: In Tucson Arizona, the county and district cooperate for school parks and school services. There are strong county support units found in such states as California, Florida, and Georgia which provide examples of cooperation between authorities. In Georgia there are Cooperative Education Service Agencies (CESA) units. In New York State the state education agencies make great efforts to get local school leaders to speak directly with legislators, and there is an intricate mesh of influence toward cooperative decision and final legislation.

Conclusion

Experience reveals beyond question that there are no perfect situations, no perfect solutions and few geniuses who can proceed to faultless conclusions. This is both cause and justification for cooperation. It is not only necessary for harmony, it is necessary for survival. Better decisions can be made cooperatively than in any other way. The best committee chairman is the one who comes out of committee with something quite different (and hopefully better or at least more workable) than the idea he took in. Of course it is absolutely necessary to gather data, analyse them, sift them, re-analyse them; set up hypotheses; define basic guidelines; and consider more than one set of assumptions and alternative directions. One should pit groups and interests against one another and make them demonstrate the logic and reasonableness of their desires and proposals. But, finally the decision makers must move. The problem of timing the decision for action is vital. Here we have laboured the points of caution, care, cooperation and participation. This is not to deny that decisions must be made, and that generally the price of not making a decision is greater than that of making it. Let us bear in mind that all decisions, even great ones, are made on incomplete evidence. We are not suggesting that you should not make constant effort to improve procedures and communication. But there is no substitute for face-to-face, inter-personal and inter-group communication. It is vital. Here we have been stressing the need for improvement in cooperation between those who do not differ greatly on the large basic issues, indeed we hold much in common.

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Belle Ruth Witkin*

FAULT TREE ANALYSIS AS A PLANNING AND MANAGEMENT TOOL: A CASE STUDY

The planning, management, and monitoring of large scale research and development projects present some problems that differ from the planning activities of an operating system or organization on planning the small scale research projects which are typical of much work in universities which does not involve product development. In large R&D projects especially those developed in the United States under government funding a product must be produced and field tested under carefully controlled conditions, while adhering to strict deadlines and managing the logistics of involving many people who have responsibility for different aspects of the project, but who do not have full accountability. In such cases Murphy's law may very well apply: Anything that *can* go wrong, *will.*

In recent years a technique has become available for planning and managing such projects. In includes some interesting new elements and has certain predictive characteristics that make it useful for project monitoring. The technique is known as Fault Tree Analysis (FTA), and in this paper I shall briefly describe its methodology and illustrate how it was applied in the third year of a large and complex project, *Reading Improvement through Auditory Training*, of which I was the director. The sponsoring agency was the Alameda County Schools Office in Hayward, California; several school districts in the county served as participants and sites of the pilot and field tests.

Background

FTA is an operations research technique used to analyse the most probable modes of failure in a system, in order to redesign or monitor the system more closely in order to increase its likelihood of success. It was first used in the Bell Telephone System, and later developed in considerable depth by the Boeing Aircraft Company.[1] The latter demonstrated the predictive features of FTA when it was used to prevent inadvertent launches of Minuteman missiles. For several years it has been an integral part of safety engineering on large aerospace projects. It has also been applied to other accident prevention systems.[2]

Until 1967, FTA had been considered useful only for hardware systems. In the past eight years, however, its basic qualitative features have been successfully applied to educational and social planning, and modifications have been made in its quantitative methods that make it suitable for non-deterministic systems. The educational adaptations were carried out jointly by Kent Stephens and the author. Stephens has been responsible for the quantitative analyses and the computer programming which makes it possible to handle very large trees.[3]

FTA has now been applied to the analysis of vocational education systems, adult education, bilingual education, a model experience-based career education project, a university special education-instructional television project, and numerous social problems. The doctoral program in educational administration at Brigham Young University in Utah has produced a number of dissertations on the subject.

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The FTA Methodology

Qualitative fault tree development

A fault tree consists of events, interrelated by "logic gates", which are formed into sequences of potential failures. The analysis begins with a precise statement of an undesired event (UE) of critical importance. It may be the failure of the entire system, expressed as failure of the mission; or it may be a failure identified with some subsystem or component. In any event, the UE stands at the top of the tree, and the analysis proceeds downward. Inputs to the UE become contributing failure events in a perceived cause and effect relationship.

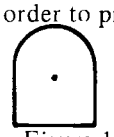
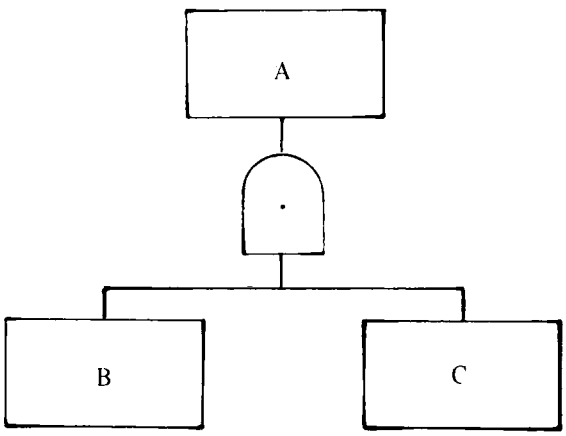
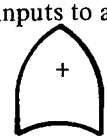
Before discussing the nature of such events, however, it is necessary to clarify the concept logic gates. The heart of the fault tree approach, that which differentiates it from other forms of analysis, is the use of logic gates to show the relationships among events. There are two principal kinds of logic gates, the AND gate and the OR gate; all other gates are derivatives of these two. The AND logic gate is used when two or more events must coexist in order to produce the more general event. It is symbolized graphically by the symbol  In the fault tree, events related by an AND gate are depicted as in Figure 1. Figure 1 reads: Events B and C must coexist to produce Event A; or, the output can occur *only if* the inputs B and C coexist. Expressed algebraically $A = (B \wedge C)$. In behavioural systems, this relationship most commonly exists when a subsystem or component *and* one or more backup systems or components exist, or are possible within the design of the system. This situation occurs much less frequently in behavioural than in hardware systems. The implications of this will be considered later in this paper.

Figure 1 THE AND GATE



The OR logic gate is used when, of two or more possible inputs to an event, alone could produce the output. The graphic symbol for the OR gate is 

. In the fault tree, events related by an OR gate are depicted as in Figure 2.

Figure 2 THE OR GATE

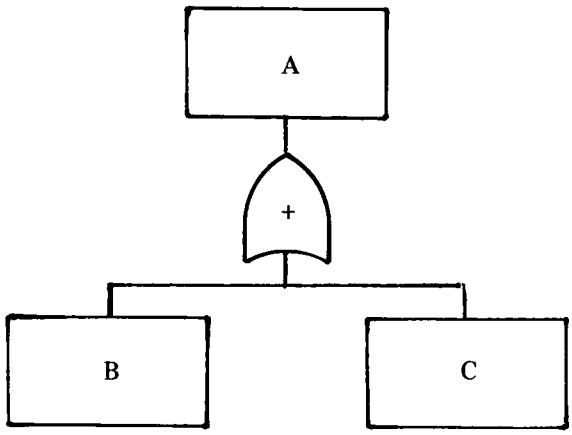
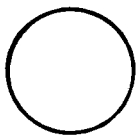
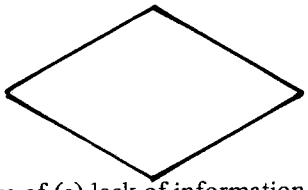


Figure 2 reads: Either B or C alone will produce Event A. Expressed algebraically A = (B V C). There are two general kinds of OR gates -- the INCLUSIVE and the EXCLUSIVE. In the INCLUSIVE OR either B or C or both could result in Event A. In the EXCLUSIVE OR, either A or B could produce C, but both A and B could not occur simultaneously. With the AND or OR gates, more than two inputs may exist. Variations of the gates allow for the specification of complex relationships – there are inhibit gates, priority AND gates (which specify the sequence of events), matrix gates etc. The analysis thus provides precise description of conditions as well as modes of relationships, all of which can be expressed mathematically and quantified.

Other basic symbols used in fault tree analysis depict the types of inputs or events. Input and output events can be classified according to their nature. The most commonly used symbols are:

Rectangle:  which identifies an event resulting from a combination of less general fault events through an associated logic gate. All events symbolized by rectangles have additional development in the fault tree.

Circle:  which identifies a basic failure event requiring no further development. This could occur when the definition of an event is sufficiently explicit to satisfy the purpose of the analysis.

Rhombus:  which identifies an event not to be developed further because of (a) lack of information, (b) very remote likelihood of occurrence, or (c) time, financial or other constraints.

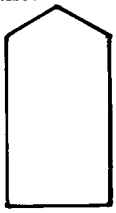
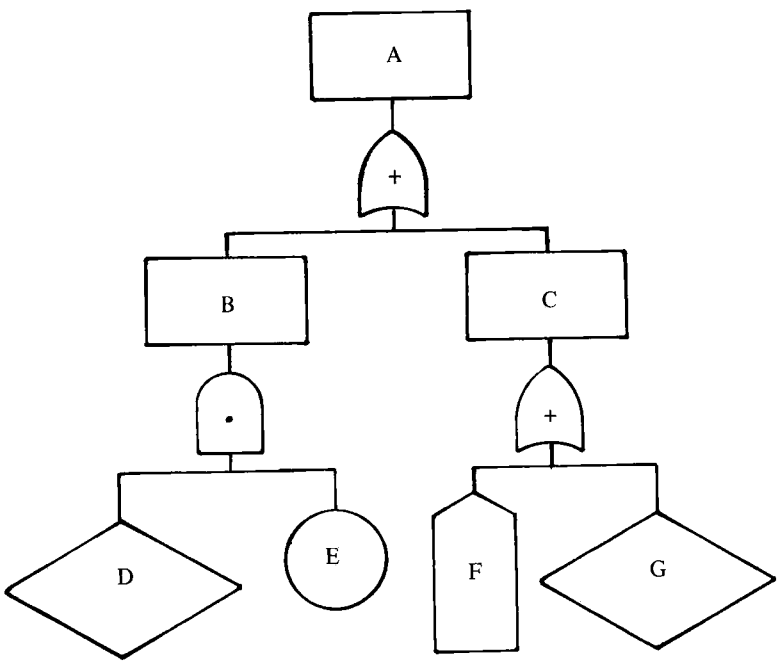
House:  which identifies an event normally expected to occur in the system as defined. When combined with other events, however, it might contribute to a failure event.

Figure 3 shows a rudimentary fault tree, which is read as follows: Event A can be produced either by Event B or Event C or both. Event B can be produced only by the coexistence of Events D and E. Event C can be produced either by Event F or Event G or both. Event E is a primary or basic failure event, and Event F is an event that normally occurs in the system, but which can contribute to Event C. Events D and G are not analyzed further in this tree for reasons beyond the current scope of analysis of the tree.

Figure 3 ILLUSTRATION OF A FAULT TREE BRANCH



The "bottom of the tree" for any branch always will have events depicted by the circle, rhombus, or house. In this example, there are two branches and three levels of analysis.

FTA is usually accomplished in four stages: (1) identification of the UE to be analyzed, (2) qualitative analysis of possible modes of occurrence of the UE, (3) identification of strategic paths (most probable modes of occurrence) through quantitative analysis, and (4) recommendations for system redesign or monitoring. Although it may be used to analyze causes of failures that have already occurred, FTA's most powerful use is concurrent with the system design or when there is still some possibility of system redesign. Therefore, it is desirable to complete the analysis before the project is underway or in the early stages.

For demonstration, we shall assume that a complex project is to be analyzed. The project manager, who is both responsible and accountable, works closely with the FTA analyst to give imputs at all stages. Information is also obtained at all stages from other people with varying responsibilities for the project, at different levels of management and operation.

The identifcation and specification of an undesired event is made jointly by the project manager and the FT analyst. The manager may already by aware of some potential weakness in the system or a sub-system which he wishes to have analyzed. Or a preliminary Fault Hazard Analysis may be used to identify the UE. In either case, since FTA is most powerful when applied in the context of systems analysis at this stage a mission and function analysis is usually performed. Later on, the inputs to the tree will be related to the functions and tasks to be performed in the project. After the UE has been clearly stated, the scope of the top of the tree is defined by stating the general classes of events most likely to lead to the UE. At this level there are likely to be three, four, even five branches, reflecting the failures of functions specified in the mission analysis. Inputs to each branch are then systematically generated according to FTA rules which may be found in the 1973 publication of Stephens and Witkin.

Quantitative fault tree development

The quantitative FTA involves four basic judgments:

- Starting with the top UE, each of the failure events leading into it is ranked in order of relative contribution or importance. Then for all of the inputs through a given logic gate to a more general event, the percentage contribution made by each event to the general failure event above it is determined. Percentages should sum to 100 for each event.
- Confidence in the percentages (strong, moderate or weak) is determined.* The above steps for the inputs to each failure event are repeated, working systematically down through the tree.
- The appropriate frequency rating for each event at the bottom or lowest level only for each branch of the tree (rarely, periodically, or frequently occurring) is determined. That rating for each input to an event is determined independently of the other inputs for the event.

*These measures, which are used as weights on the importance and frequency ratings, have been added to the methodology since the case study described in this paper.

- The rectification for each event (permanent damage or impossible to rectify, difficult to rectify, and easy to rectify) is determined.

These judgments are combined through formulae derived from Markov processes and boolean algebra to yield strategic event values in order, by inspection, to identify strategic paths of interest. Although there is a computer program for deriving strategic paths, as well as for drawing the tree, the computations can be done by hand. On trees of more than 300-350 inputs, however, the hand process is too time-consuming. Even without completing the quantification much valuable information regarding the operation of the system can be gained from simple inspection of the tree.

For most of the team members engaged in qualitatively constructing the tree or in quantifying it, it is not necessary to know more than the rudiments of FT principles. The main requisite is a good working knowledge of the system under analysis. Team members should represent many different levels and functions within the organization. The "levels of visibility" afforded by different personnel lead to perspectives which differ in important respects. These perspectives are dealt with directly in the quantification process. Experience has shown that wide divergences of opinion can be reconciled; the technique uses both hard data and expert opinion. The final step is to make recommendations based upon the strategic path analysis. These may suggest reallocating resources, installing backup systems, monitoring paths with high failure potential, redesigning subsystems, or any other corrective action. Displaying the fault tree and discussing the strategic paths and their implications with the personnel of various levels of the organization often yields excellent suggestions for improvement; it increases the cooperative work toward organizational goals and is an excellent non-threatening approach to giving visibility to needs that have been identified.

The use of FTA in the APT Project

The auditory perceptual training project had as its purpose the development and field testing of an audio instructional program in specific listening skills for elementary school children. It was funded during 1970-73 under Title III of the Elementary and Secondary Education Act – the section designed to promote innovation in education. In its first two years a staff of consultants in the fields of speech pathology, audiology, and speech science had written lesson scripts, tape-recorded them under high-fidelity conditions, designed and produced student response booklets, written manuals, and pilot-tested the lessons in regular classrooms as well as in learning disability clinics. This was not the usual curriculum development project. It was an attempt to synthesize a variety of concepts drawn from research on immediate, short-term auditory processing and package them for direct delivery to children in a classroom training program. The processes (discrimination of speech sounds, auditory figure-ground discrimination, temporal sequencing, analysis, synthesis, phonemic closure, and certain receptive language processes) are usually taught individually by speech and language clinicians. The APT project made it possible to teach them in groups or in individual listening centres, without teacher assistance or intervention. Lessons could be scored, and students received immediate feedback on their responses.

As the project entered its third year the instructional materials had received their final form; a criterion-referenced diagnostic test* had been developed for group administration, evaluated for reliability and validity, revised, and normed for grades 1-3; and seminars in auditory perception were planned for project teachers. Third-party consultants had developed an evaluation design using a modified Solomon four-group design, and data were gathered from pre-, mid-, and post-tests in auditory perception, and reading comprehension, and mid-project tests in short-term memory. The auditory tests were taped and administered under standard conditions by project staff. The reading tests were group tests administered by the classroom teachers. Since the reading tests were part of the required yearly state testing program, school staff insisted on local administration by the teachers, with no project staff involved. The 39 taped auditory lessons were administered by the teachers, or learning disability clinicians, over a six to seven month period, usually twice a week. Periodic meetings were held by the director with the teachers in the treatment classes, but not with those in the control classes, except for one orientation session.

For a project of this type it was impossible to assign students randomly to treatment and control conditions. Therefore, for the evaluation design, schools were selected which had at least two second grade classrooms; and intact classrooms were assigned randomly to the treatment and control conditions, paired within schools to maintain equivalent socioeconomic and environmental characteristics. For the mid-project evaluation, control classrooms were chosen from other schools with similar characteristics to the project schools. The summative evaluation was limited to second grade classrooms, since the lessons had been designed using research with norms based on second graders, although they could also be used in grades 1-3.

When the project was first conceived, it had been based on the (somewhat limited) research evidence that certain students with learning and reading disabilities benefited more from auditory than from visual perceptual training. Visual perceptual training methods had been highly developed and were widely used by teachers and reading specialists, but very little was available to improve auditory perception. Teachers usually did some work in consonant discrimination in relation to phonics. But the other processes required trained clinicians working with children individually or in small groups. At the time of this project only a couple of programs covering these other processes had been published, and none with the research base of the one here described, or with its auto-tutorial characteristics. In the first year of the project, lessons had been incorporated which provided a direct transfer of certain auditory skills to reading decoding. However, after the pilot-testing and much interaction with students and teachers, the consultants expanded and refined the auditory lessons and eliminated the direct teaching of reading skills. Thus in the final year the emphasis was solely on auditory and receptive language processes. The project teachers, however, developed branching lessons of their own through the seminars. In some cases these applied the auditory processes to reading decoding and comprehension.

At the beginning of the third project year in the summer before the opening of the school year, it was decided to incorporate FTA in the planning in order to accomplish three things: (1) anticipate and correct problems in project design, in order to increase the likelihood of success; (2) use it in formative evaluation of the project, since the most critical paths could be used for monitoring and revision; and (3) involve the staff, con-

*Composite Auditory Perceptual Test (CAPT)

sultants, and teachers in communication about the project which would make visible the roles and functions of each in making the project a success. The analysis was incorporated in the procedures used by the external team doing both the formative and summative evaluation. The qualitative analysis was done by Kent Stephens, a member of the team, and the author, the project director. Stephens also performed the quantitative analysis and consulted with staff and teachers throughout the year.

The principal project objectives for that year had been specified: to produce the final program product according to high-quality specifications, and improve the listening skills of students in the treatment classes. Two other objectives were also incorporated: ESEA Title III funds were designed to provide seed money. A project normally ran for three years; then it became the responsibility of the educational agency, which had received the grant, to continue the program with local funding. However, if a project demonstrated high quality, it could obtain an incentive grant for a fourth year, through recommendation of the state educational agency; then it would receive statewide and possibly national dissemination. Since this project was administered by a county schools office not a school district (although several districts were in the field test), special effort had to be made to ensure that local agencies would use the materials and the program after the funds were phased out. Therefore, the third and fourth objectives were: that the APT program would be accepted by at least eight districts after federal funding was withdrawn, and that we should determine the optimum program adoption methods.

Prior to the development of the tree, an extensive function analysis was performed, which was converted into an operations map which displayed five major paths, with serial and concurrent events time-lined over the school year. This chart was displayed in the project office and was used together with the fault tree to monitor the progress of the project.

The UE chosen was the following:

> Failure of the APT program to demonstrate a significant increase in auditory perceptual skills of elementary school children, *and* to be implemented in at least eight districts after Title III sponsorship, *and* to determine optimum program adoption methods.

Since the UE was based on the mission objective, the tree had three major branches, related through an AND gate: one dealt with failures of increase in auditory perceptual skills, one with failure of the program to be implemented in at least eight districts, and one with failure to ddetermine optimum program adoption methods. Inputs to each branch and their logic relationships were determined first by the project staff and the analyst, largely by working backwards through the operations map. The first drawing of the tree was reviewed and validated by the project teachers, the professional and clerical staff, and the graduate assistants. Then it was modified and enlarged. The final tree had some 450 events, extending on some branches to nine levels. Figure 4 illustrates the first level analysis for the first branch (1.0). The triangles indicate that each of the input events is analyzed further, and in fact this branch had the most complete analysis both in depth and breadth. Figure 5 illustrates the second branch (2.0). Four of the events were analyzed to additional levels. The event designated by a rhombus was not analyzed further since no further information was needed. The five input events to branch 3.0, illustrated in Figure 6, were all designated by the rhombus, indicating that none of these events was analyzed further. The decision as to depth of analysis is made

Figure 4

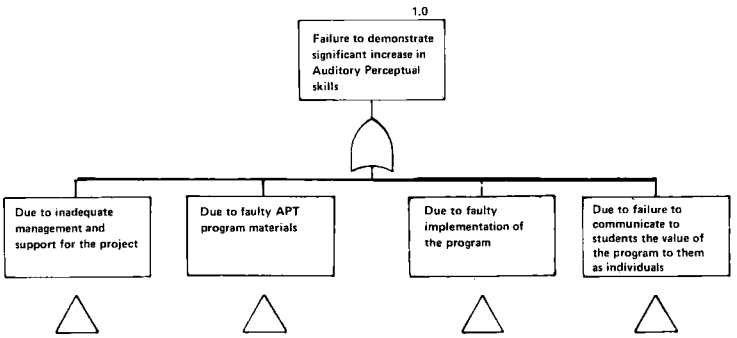


Figure 5

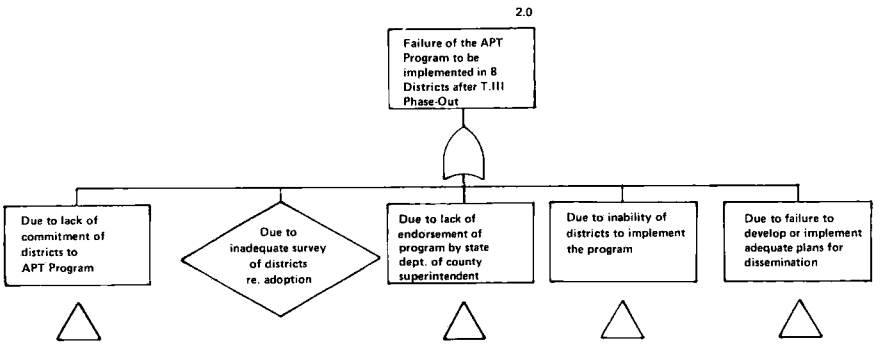
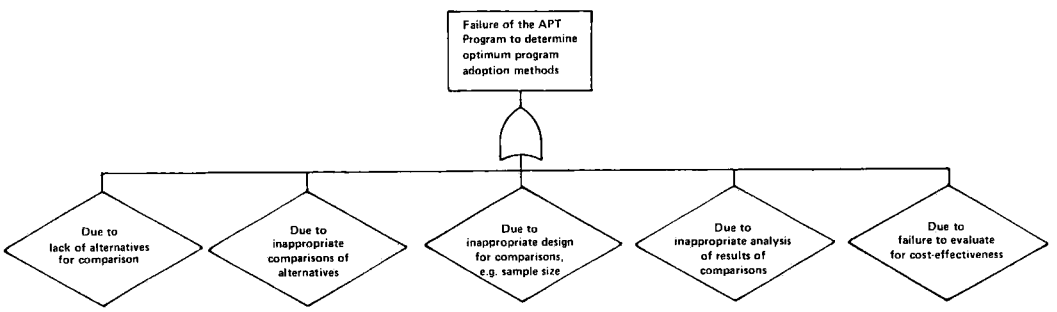


Figure 6



jointly by the analyst and the project management, and is based largely on time and judgment of the need for further information regarding possible causes of the failures.

The analysis ultimately specified potential failures dealing with materials production and quality, the content of the lessons and the criterion-referenced tests, teacher support, management support, student understanding of the program, facilities, logistics, inservice training of teachers, evaluation design, costs, resources, unmet timelines, and internal and external contextual and environmental factors. There were only four AND gates in the tree – evidence that almost all of the failure events were independent, rather than coexistent events. Therefore in most branches any event at the bottom of the tree was the same as the top UE. This is typical of non-hardware systems. Hardware systems, on the other hand, when well-designed, may have as many AND as OR gates, indicating safety features and back-up or redundant elements in the system. Thus, in the first stages of analysis, the fault tree revealed that the project would need constant monitoring on many fronts, and that back-up systems or alternatives should be installed wherever possible.

The staff and teachers were brought together again to quantify the tree. In two group sessions estimates were made of the relative importance of events at each level, and the frequency of occurrence of the events, independently, at the bottom of each branch. The data were processed at the computer centre of Brigham Young University. Five strategic paths were drawn – a prime path and four others in order of probable occurrence. The prime path led through these events:

> Failure of the APT program to demonstrate a significant increase in auditory perceptual skills of elementary school children due to faulty implementation of the APT program, due to failures of project management, due to failures in program design, due to failures of choosing treatment or control groups, due to selection errors, due to control group selection bias.

In order of probability the other failure paths were (intermediate events are not indicated): (a) failures in production of materials due to insufficient time, (b) failures in materials due to vocabulary level and programming aspects, (c) failures in project planning due to faulty assumptions and expectations about the students, and (d) inadequate management or support due to lack of maintenance or monitoring systems.

After carefully reviewing the analysis with the staff and teachers we found that some potential failure events probably were preventable, and some were not. Materials had already been produced,though not in quantity, but the manuals and resource guide still to be prepared might overcome some potential deficiencies. Quality controls were instituted for materials reproduction. A procedure for treatment and control group selection was set up which was designed to prevent bias. (We had found in previous years that school administrators resisted assigning classes randomly to treatment and control groups because they wanted the low-achieving students to benefit from the treatment.) The functions and tasks which might fail because of time constraints were analysed, and additional resources and some alternatives were provided where necessary. Additional monitoring took the form of classroom visits, feedback forms from teachers, meetings, and frequent communication among all segments of the project.

The analysis took less than a month, and over one-half of that was consumed with drawing the operations map. The qualitative analysis – mainly drawing the first and

second drafts of the tree – took about a week of the director's and analyst's time. One-half day was spent in orienting staff and teachers to the process, and their participation in the qualitative and quantitative analyses took another three days of their time, usually in half-day sessions. The total cost, including consultant time and the computer simulation, was $3350.

Use of the Fault Tree in Project Management

The fault tree and operations map were used together to monitor the progress of the project and to reschedule or revise its tasks as needed to meet commitments and target dates. In particular, the prime and secondary paths were watched closely as we tried to anticipate overloads or breakdowns in the system. About one-third of the way through the school year we again assembled the staff and teachers to review the tree and assign additional conditions to all the end events – that is, those at the bottom of each branch, whether or not they were on the prime or secondary strategic paths. Consensus was obtained on whether the event had already been neutralized (N), whether it might still be expected (E), or whether the outcome was still uncertain (U). For example, several N events noted were: failure of inservice training of the project's teachers to include instruction in the value of the program to students, failures connected with the need to have an adequate number of copies of materials, and failures due to faulty administration of the interim review tests. Several E events noted were: failure of teachers to relate the APT program to other class subjects, the poor quality of some class's tape recorders, and the failure of the project itself due to inadequate identification of potential failure events in fault tree branches. Some U events related to the reliability of the interim tests, impact of intervening variables in classrooms, teachers or students, and failure to provide sufficiently for individual differences of students.

Identification of these conditions during the interim program monitoring stimulated much discussion among the teachers. Problems identified as E and U events were noted and measures were taken wherever possible to prevent failures attributable to those sources. Each teacher had a copy of the fault tree and was encouraged to refer to it as needed. Specific suggestions were made to overcome some of the structural rigidity of the program, due to its audio-taped and auto-tutorial nature. Where failures of implementation according to the project design were anticipated, some tasks and processes were changed or were monitored more closely. The review was repeated two-thirds of the way through the year, and additional corrections were made.

Results

The results of FTA can be viewed in several ways: its predictive validity, its effectiveness as a planning and management tool, its effectiveness in preventing the major UE, and its contribution to the overall success of the project. The ensuing discussion will clarify why the last two points have been separated.

Predictive validity. Obviously, the only way that this can be determined is if one or more of the failure events actually occurs. The best way of testing this would be not to intervene in the system once the analysis has been done. Since we wanted to *increase* the probability of success and *prevent* failures, we have not way of knowing what might have occurred without staff or teacher intervention. However, in spite of the analysis and all efforts, some failures did in fact occur. One was in the prime strategic path – *the failure*

to select equivalent treatment and control groups. It transpired that in some schools, a selection bias had already operated in that second grade students with low reading scores had been scheduled into one class and the better students into another. Then the principal assigned the lower-achieving class to the project. This was a decision over which we had no control. Even though we had worked carefully through district-selected advisory committees and each school's administration, such decisions could not be prevented or changed. As a result of this failure to assign classes randomly to the groups, the mean reading scores of the control groups prior to the training were nearly one grade equivalent higher than the mean scores of the experimental groups. Although covariate analyses were used which took initial language and reading ability into consideration, the post-tests showed no significant differences in reading between the treatment and control groups. However, there were significant differences between the groups in auditory processing as measured by the criterion-based tests, and in general listening comprehension as measured by a standardized listening test. Since the tasks in the comprehension test were not like those in the program itself, it was felt that the increased ability in specific auditory processing skills had generalized to the more global and language-based tasks of the listening comprehension test. In the mid-project tests the treatment group was also significantly better in following complex aural directions, although not in short-term memory for unrelated words.

Another type of failure occurred - one that the analysis indicated had been neutralized. One path showed failures due to post-testing conditions, *due to* overtesting in the spring, *due to* the fact that the project post-tests had to be conducted in the same time period that the state-mandated testing program was being carried out. It was felt that this conflict in testing, and the resulting overload, would cause failures *only if* there was high anxiety in students -- a contingent event failure labeled *U*. Teachers, were alerted to the possibility, and they tried to arrange schedules to minimize test anxiety. As it turned out, this contingency failure did occur in one class and it had negative impact on the final project results. In analyzing the post-test scores on the CAPT we found that the mean score for one class was lower on the post-test than it had been on the pre-test! This seemed inconceivable, since the material reflected skill rather than knowledge (it was not a matter of forgetting the information). Later we learned that several children in that class had experienced very upsetting situations at home the previous day, and on the day of the test the class was in a restless, hyperactive state. Since the CAPT requires moment-by-moment attention to task, with the student having no control over the pacing of the stimuli or the interval for response, a momentary shift of attention can cause failure to the task. While most students improved significantly on attention span as well as on the processing tasks, the conditions operating in this one class brought most scores down, and affected the total treatment group's score. The tree did, in fact, predict the most probable modes of failure, except that the interim analyses (which had estimated that certain critical events were being neutralized) were in error. Furthermore, no back-up system had been designed to take care of such contingencies.

FTA in planning and management. The analysis was highly successful in this respect: by making hundreds of events visible in easily read graphic form, and by integrating the operations map with selective monitoring of high probability failure events, it freed the staff to get on with the job and in most cases prevented the work overloads that had been typical of the previous two years. The project also demonstrated the feasibility of using FTA as part of the normal research management system. Thus, planning and improvement of design were seen as integral parts of the project throughout the year.

Prevention of the major UE. Whether due to the FTA or not, the three major failures did not occur. That is, the students in the training program did show a significant increase in auditory perceptual skills, at least eight districts adopted the program in its entirety after the project ended, and program adoption methods were built into the kit of materials. To accomplish the latter, an orientation film strip/tape presentation was developed, and detailed manuals were written to accompany the teaching and testing tapes. The manuals were designed in format and content to be easily used by teachers who had no theoretical or research background in the subject. As to adoption, the program is still being used in school districts throughout the United States and in several other countries.

FTA's contribution to project success. In one sense, however, the project failed; the wrong UE was analyzed. Viewed internally, on its own terms, the project accomplished its mission. Materials were produced on time in accordance with high quality specifications, the lessons were given, field tests were completed, etc. What had been overlooked was that the major external criterion for success was award of a fourth-year dissemination grant by the state department - and moreover, that the state department's judgement was based not on listening improvement but reading improvement. In the beginning, the project had been based on assumptions about the feasibility of improving reading through auditory perceptual training; when the project focus shifted and major emphasis was put on improving auditory processing skills in their own right, the shift and the reasons for it were not adequately reported to the funding agency. Nor, as it turned out, did the agency accept the shift as being desirable or necessary. Therefore, the entire mid-project evaluation on which the award hinged was based on reading score comparisons between groups, not on listening scores. The mid-project evalution results were ambiguous, so the award was not granted.

Conclusion

Experience with FTA in this and other studies has shown that it can generate much information that is not likely to come from other planning approaches, particularly those that are exclusively success-oriented. The analysis uncovers barriers, constraints, and actual or potential overloads and breakdowns in the system. These often go unnoticed until it is too late to counter their effects. Hundreds of interrelationships in the project were described, visually displayed, and tracked through the life of the project. Any event postulated for a dynamic system may or may not occur within a given time. Failure events are foreseen which may, or may not, be the reciprocal of events on an operations success map. They are more likely to be events which would cause a given function or task to fail to occur, or cause them to occur improperly. Other events then show up on the tree as possible antecedents and consequences of the failure events, thus greatly expanding the density of the analysis.

The interaction of frequency and importance estimates is crucial. Some events in themselves appear to be of reltively low importance, but if they occur frequently enough the consequences may be critical. Although monitoring usually occurs in a project along the prime and secondary strategic paths, one should also look for the high probability single events in a branch or path that become critical at some phase in the project. Much more work needs to be done on the requantification of trees at different stages in the life of a project. And in the initial analysis alternative quantifications should be undertaken for the expected impact of events at subsequent stages. The study also showed that critical failures likely to be overlooked in complex projects (particularly in those funded by

external sources such as government) occur at points of contact between subsystems or between the project system and the external environment. External requirements need to be more carefully addressed than they often are. Failure events caused by the impact of requirements or constraints from higher echelons in the system or from an external authority are called *command events*. Such events were insufficiently addressed in our analysis. In order to take these into account, the major UE might have been:

> Failure of the state department of education to award the project an incentive grant for dissemination.

Such a UE would have generated failures that related both to external requirements and to internal objectives and management.

This was the first study in which FTA was used throughout an entire project year for planning, redesign, and management. We learned:

- To pay more serious attention to the implications of the first two or three strategic paths, since they had great predictive value.
- To design projects and educational programs with back-up systems, alternatives, contingency plans etc. When the tree revealed a preponderance of AND gates, that should have been a signal to us to consider some structural redesign of the project.
- To monitor more closely the interfaces between such things as materials and their classroom use, and neutralize, circumvent, or prepare for the undesirable effects of external contacts, obligations and constraints.

The method can be used with all levels of personnel: teachers, secretarial staff, and assistants all enjoyed the process and liked being involved in the analyses. In fact, it was observed that the teachers changed their opinions about aspects of the project and became more objective as they worked to help develop and quantify the tree. Their enjoyment and objectivity may be because the analysis focuses on events, rather than people. Therefore no blame is attached to individuals; all events are seen as possible. And the simulation aspect of the process encourages strong identification with the project – a sense of ownership of it.

Obviously FTA has strengths and pitfalls; we have illustrated both. It is a practical and feasible planning and management tool; with relatively small cost in time and effort it can be made to yield large benefits. FTA studies have shown that failure cannot simply be prevented by planning for success; just as failure analysis in itself does not ensure success. In both cases, the definitions of success and failure are of prime importance. If the major UE does not take into consideration external forces impinging upon the system important paths to failure will be overlooked and much time and energy will be devoted to over-ensuring success in less-than-critical aspects of the work. Furthermore, some failures cannot be prevented. So the two weighting factors which Stephens added to the quantification subsequent to this study, degree of confidence in the estimates and difficulty of rectification, have increased the reliability of the estimates and the likelihood that the "true" high-risk strategic paths will emerge.

At the time of the study which has been described all the fault tree graphing was done by hand. Since then, a computer program has been developed which draws the tree with a plotter, prints out manuals with all events listed in relevant sets with instructions and columns for quantification, computes prime and secondary strategic paths, and redraws the tree tracing out as many paths as desired. Since each event has a strategic path value,

all possible paths can be traced so that all events are ultimately included – although this is not usually done. Turn-around time from initial inputs to final path analysis is in the order of one or two weeks.

FTA is still an emerging technology. As each large-scale analysis is done, refinements are made to reduce the time and cost involved and increase its usefulness to educational planners and managers.

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Dan R. Quarles*

STUDENT EVALUATION OF INSTRUCTIONAL PERFORMANCE: A CONTINUING DILEMMA

Introduction

Much has been written about the role of the professor and the three areas of university life that demand his attention. Research, teaching and service are integral to the life of the university, but it is instruction which is of primary importance to the student in the classroom. It seems logical, therefore, that evaluation of classroom instruction provide one measure of institutional quality. The availability of students to provide input into such an evaluation supports this notion but unfortunately there is much disagreement as to what quality classroom instruction is. Even where it is agreed that quality can be measured, there is disagreement as to who should participate in the evaluation, how it should take place, and what dimensions should be measured.

In the November-December *Journal of Higher Education*, Daniel S. Sheehan wrote on this issue:

> Even if the comparability of student ratings is achieved by the construction of appropriate norms, a variety of other potential sources of invalidity exist. The first of these concerns the extent to which student ratings reflect effective instruction. The second has to do with the item selection procedures used in the construction of student rating scales and the possible exclusion of valid items. The format of student rating scales which presupposes that all of the items in the scales are equally important facilitators of student learning is a third potential source of invalidity. A last source of invalidity is the susceptibility of student ratings to variations in directions and to both subtle and outright instructor influence tactics.[1]

This paper reports a research study designed to take into consideration some of the above mentioned sources of invalidity and to evaluate classroom instruction at the college and university level.

Background

When one surveys the research on student evaluation, it seems obvious that students are able to provide valid and reliable responses to questions about faculty instruction. In recent years several research studies have investigated various implicit and explicit indicators of instructional excellence. One of the most influential was conducted in 1960 by David G. Ryans for the American Council on Education. It dealt with public elementary and secondary schools across the United States, gathering information by means of observation of critical incidents. This is a technique which is described as follows: "The Critical Incident Technique (CIT), rather than collecting opinions, hunches and estimates, obtains a record of specific behaviours from those in the best position to make the necessary observations and evaluations. The collection and tabulation of these observa-

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tions make it possible to formulate the critical requirements of an activity"[2]. Ryans added that: "A critical incident is defined as any observable behaviour or act which might make a difference between success or failure in some specific teaching situation"[3].

Schoenfeldt, drawing on the work of Deshpande, Webb and Marks,[4] has developed a questionnaire which used the CIT. The focus of this instrument was the frequency of occurrence of certain well-defined behaviour. Incidents were gathered, compiled, and factor analyzed to produce 26 specimens, divided into five dimensions of classroom behaviour:

1. Subject organization and instructional competence
2. Motivation-stimulation
3. Instructor-student relations
4. Reasonable workloads and tests
5. Clearness of grading procedures.[5]

A review of the literature shows that these are dimensions identified by previous research. More detailed treatment of this topic may be seen in the works of Costin, Greenough and Menges,[6] Richard Miller,[7] Riley,[8] Erickson and Kulik[9] and McKeachie.[10] Since 1969, interest has been focused on the measurement of the difference between respondent's actual and ideal perceptions of various phenomena. Grasha,[11] Levinthal, Lansky and Andrews,[12] and Gagne and Allaire[13] have done extensive work on classroom evaluation using variations of this type of format. Industrial management researchers have also used this type of procedure. Likert[14] used an "is-should be" format for collecting opinion systematically. The difference was used as an index of employee satisfaction.

Another emerging concept has been the measurement of the importance of identified activities, behaviour, and questionnaire statements. Kenneth O. Doyle[15] noted that the University of Minnesota used a format which measured the importance of each statement oriented to classroom behaviour. Asher pointed to the variance, in perceived importance of measures of instructional performance, between students, faculty and administrators across various departments in the university setting:

> The basic conclusions of the study were that: these comparisons show that each group's weighting of criteria [measures of instructional performance] differs to some degree. Some groups differ significantly on weighting of 13 of the 35 rated criteria items; others differ on as few as 1. The essential feature of these data is that there are a number of significant differences among groups as well as within groups.[16]

Synthesizing these ideas and techniques led to the creation of the questionnaire used in this study (see the appendix).

The Research Study

Assumptions

In the light of previous research, it was possible to make the following assumptions:

- Students are able to provide valid and reliable assessments of overall quality of faculty instruction, on an equal appearing interval scale ranging from "very worst" to "very best".
- Students are able to provide valid and reliable assessments of the actual and ideal frequency of occurrence of a group of well-defined behaviours which are viewed as

critical to the assessment of quality of classroom instruction on an equal appearing interval scale ranging from "never" to "always".

- The University of Georgia faculty course evaluation form contains 26 behaviourally-oriented statements which are viewed as critical to successful classroom instruction.
- Students are able to provide valid and reliable assessments of the importance of the 26 statements which are viewed as critical to successful classroom instruction measured on an ordinal scale ranging from "not important" to "extremely important".
- Professors can be identified by students as exhibiting excellence in classroom instruction.

The research questions

The assumptions formed the base for investigating the following questions:

- Does the recording of actual and ideal perceptions of the frequency of occurrence of the 26 well-defined behaviours and activities account for a sufficient amount of sample variance in the overall evaluation score to render this technique useful as a means of instructional evaluation?
- Does the use of student assigned boundary points (actual v. ideal) and the resultant discrepancy scores provide a valid and reliable means to differentiate between levels of performance of teaching faculty members?

The subjects

Undergraduate classroom instructors from Maryville College, Tennessee.and the University of Tennessee, Knoxville, were selected as the population of the study. Maryville is a small liberal arts institution with an enrollment of 650 students. UTK is a large multi-disciplinary university with an undergraduate enrollment of 20,000. Since participation in the study was on a voluntary basis, it seemed impractical to attempt to implement a random sampling procedure. Instead, professors and administrators were surveyed to determine the departments on the Knoxville campus which would be interested in participating in the research. From the survey, five departments were identified and the head of each was contacted. Concurrently, the academic dean of Maryville College was contacted. Some 120 instructors were identified. Since participation in the study was voluntary any identification and comparison of departments or colleges would be unfair. Moreover there is considerable doubt tht the seven groups are representative of the departments or college from which they were drawn. Therefore the investigation of the seven groups focuses on the demographic data and item responses of the research questionnaires. No attempt has been made to relate the findings to departments or colleges. Table 1 presents a summary profile of each group of participants.

Table 1 SUMMARY GROUP PROFILE OF PARTICIPATING PROFESSORS AND STUDENTS

Group Number	Number of Professors	Number Returned	Number Scored	Percent Returned	Student/Professor Ratio	Quarter Participated
1	30	1155	1021	88.40	34.0	Winter
2	14	422	397	94.07	28.6	Winter
3	17	352	321	91.19	18.9	Winter
4	16	325	293	90.15	18.3	Spring
5	15	293	277	94.55	18.5	Spring
6	17	458	433	94.54	25.5	Spring
7	11	402	367	91.29	33.4	Spring

The questionnaire

The survey instrument measured the student's perception of three aspects (the importance category, the actual and the ideal categories of frequency of occurrence) for each of 26 behaviours or activities commonly held to contribute to excellence in classroom instruction. The two frequency of occurrence categories, "actual/is" and "ideal/should be", were measured on a seven point scale ranging from "never" to "always". The absolute difference between the actual and ideal scores is the discrepancy score which can be interpreted as a measure of student satisfaction with a particular behaviour or activity. In addition, the instrument surveyed the student's perception of the importance of each behaviour on a five point scale from "not important" to "extremely important" as it applied to the domain of the course being evaluated.

Questionnaires were distributed to departmental offices in envelopes with the professor's identification number, section number, and course number attached. Each envelope also contained an instruction sheet and a letter of instruction to the participating professor. The questionnaires were completed in the last week of each quarter. The professor gave a designated student the envelope and then left the room. The student distributed the questionnaires, read the instructions, collected the completed questionnaires, and returned them to the departmental office. The questionnaires were then collected, scored, and the data recorded on computer tape.

The reliability of the research questionnaire

The results of the computation of the Pearson product moment correlation coefficient for each of the seven groups for both the real and discrepancy category scores are shown in Table 2. Table 3 displays the reliability coefficients after correction by the Spearman-Brown prophecy formula. Each of the seven groups achieved high uncorrected and corrected reliability coefficients for both the real and discrepancy categories. In all instances the coefficients for the real category scores were higher than the discrepancy category scores. While the difference was generally small, these statistics suggest that the real scores provided slightly more reliable assessment of student responses to the specified behaviours and activities, than the discrepancy scores.

The validity of the research questionnaire

The internal predictive validity of the research questionnaire was determined using multiple stepwise linear regression analysis. The regression model chosen examined the relationship between the dependent variable, overall classroom performance evaluation score, and two categories of independent variables, the 26 behaviour scores for the real and discrepancy categories. The regression analyses produced two sets of seven summary groups of regression statistics.

Table 4 shows the results of the regression analyses where the discrepancy scores were used as the independent variable. For the seven groups the F statistic was significant at the .01 level of significance. The coefficients of multiple correlation ranged from a high value of 78.1 percent to a low of 70.8 percent. The R^2 values ranged from 61.0 percent to 50.0 percent. In other words for group one, 61 percent of the variance in the overall evaluation scores was accounted for by the absolute difference between the real and ideal scores for the 26 behaviours. Similarly, the 26 discrepancy scores account for only 50 percent of the variance in the overall evaluation scores for group seven. The error variance, $1 - R^2$, or the amount of variance in the overall evaluation scores attributable to various sources of error, was 39 percent and 50 percent for groups one and seven respectively.

The between group differences for the coefficients of multiple correlation and associated R^2 s evidence three general clusters where groups one, three, and four had R^2s between 0.588 and 0.610. The respective R^2s for groups two and six were 0.546 and 0.537 and groups five and seven were 0.507 and 0.500.

Table 5 gives the results of the regression analyses for the real scores of the seven groups. For each group, where the real scores were treated as predictor variables, the F statistic, the coefficient of multiple correlation and the R^2 value, were found to be higher than when the discrepancy scores were used as predictor variables. Group three exhibited a 5 percent increase in the R value and an 8 percent increase in the amount of variance accounted for. Comparing the overall R^2 high and low values, between the real and discrepancy categories, group seven retained the lowest value with an R^2 of 54 percent for the real category as compared with an R^2 of 50 percent for the discrepancy category. Group one had the highest R^2 value for the discrepancy category, and showed a 3.7 percent increase in the amount of variance accounted for when the real scores were used as predictor variables. Groups three, four, and five showed increases in their respective R^2 values ranging from 7.5 to 8 percent. The standard error of the estimate for the real category was lower than its discrepancy counterpart for each of the seven groups represented. The lower standard errors coupled with the consistently higher values exhibited by the multiple R and R^2 statistics indicate that the real scores accounted for more of the variance in the overall evaluation scores than the discrepancy scores. It was also concluded that although there were some differences in relative values for all statistics between groups, the superiority of real score predictive ability was evident for all seven groups. This was viewed as consistent with the results of the reliability coefficient determinations.

The individual professor as a point of reference

By shifting the frame of reference from the group to the individual professor, a phenomenon of great practical importance was encountered. As a general rule, when viewing

Table 2 UNCORRECTED RELIABILITY COEFFICIENTS FOR THE SEVEN GROUPS OF PROFESSORS FOR THE REAL AND DISCREPANCY CATEGORIES

Group Number	1	2	3	4	5	6	7
Real	.911	.895	.897	.909	.886	.871	.881
Discrepancy	.909	.886	.889	.900	.875	.864	.873

Table 3 CORRECTED RELIABILITY COEFFICIENTS FOR THE SEVEN GROUPS OF PROFESSORS FOR THE REAL AND DISCREPANCY CATEGORIES

Group Number	1	2	3	4	5	6	7
Real	.953	.945	.946	.952	.939	.931	939
Discrepancy	.952	.939	.941	.947	.933	.927	.932

Table 4 SUMMARY STATISTICS FOR REGRESSION ANALYSIS OF DISCREPANCY SCORES AND OVERALL CLASSROOM INSTRUCTIONAL PERFORMANCE

Group Number	1	2	3	4	5	6	7
Signfficance (F)	52.67*	10.96*	12.82*	16.03*	7.83*	16.20*	11.08*
Multiple R	0.781	0.739	0.767	0.768	0.712	0.733	0.708
R square (R^2)	0.610	0.546	0.588	0.591	0.507	0.537	.500
Standard error	1.193	1.124	1.265	1.296	1.141	1.085	1.24
Number of students	868	328	251	261	216	375	302

*$p < .01$

Table 5 SUMMARY STATISTICS FOR REGRESSION ANALYSIS OF REAL SCORES AND OVERALL CLASSROOM INSTRUCTIONAL PERFORMANCE

Group Number	1	2	3	4	5	6	7
Significance (F)	61.94*	14.87*	18.52*	18.83*	10.90*	18.77*	12.96*
Multiple R	0.804	0.742	0.817	0.816	0.764	0.757	0.735
R square (R^2)	0.647	0.551	0.668	0.666	0.584	0.573	0.540
Standard error	1.135	1.083	1.094	1.232	1.047	1.042	1.191
Number of students	871	329	256	262	220	375	302

*$p < .01$

the progression from the midpoint to the highest mean score, it was found that the higher the mean overall evaluation score for a particular professor the lower was the standard deviation associated with that mean score. For the majority of the classes represented, the mean-standard deviation relationship held true. In Appendix Tables I through VII are the overall evaluation scores for each professor. The mean scores are presented in descending numerical order from highest to lowest for each group. The highest mean score achieved was 8.5 with 12 students responding and a standard deviation of 0.674. The mean, standard deviation relationship did not appear to be significantly affected by the class size as was evidenced by the consistently low standard error of the mean. The relationship of the mean to the standard deviation of classes with overall mean evaluation scores below the midpoint was not very distinct because of lack of mean scores falling within this range. The lowest mean score was 1.779 with a standard deviation of 1.013 and thirteen students responding. However, this example represents one out of a total of only 12 classes with mean scores below the midpoint of five, compared with 108 overall evaluation mean scores of five or greater. The consequence of a professor achieving an average overall evaluation mean score and a relatively high associated standard deviation was interpreted as evidence of a lack of consensus among students. In other words, each of the students in the class provided somewhat different ratings of the frequency of occurrence of the 26 behaviours and assigned differing overall evaluation scores. The regression analyses pointed to the fact that there was relative agreement among students regarding the relationship between the dependent and independent variables. The lack of consensus among students within classes precluded comparison between the professors.

The importance category responses

Originally it was expected that the importance categorical responses could be used to shed some light on the relative differences between courses, professors, activities and behaviour. Unfortunately it was found that, at times, the information provided by students was invalid and inaccurate. The data revealed that the students experienced difficulty in providing assessments of the importance of an activity or behaviour.

Conclusions

The real and ideal categories

The difference between the reliability and predictive ability of the real and discrepancy scores led to the conclusion that some type of measurement error might well have been introduced when the discrepancy score was calculated. Existence of such a measurement error could be due to a number of things. One source of error might be that students' real responses were based on the questionnaire extremes as maximums and minimums because they are accustomed to dealing in fixed or absolute ideal points. This would pose no problems except in the case where the ideal responses did not correspond to the maximum and minimum values. It is conceivable that some students would be somewhat lenient in responding to the ideal, thus choosing scale values one or two points removed from the maximum or minimum. This combined with the use of absolute extremes for the real category responses could produce error.

A number of authors (Lord,[17] McNemar,[18] Cronback & Furby,[19]) have suggested that from a mathematical standpoint the computation of a discrepancy score will

compound the error of the results. Their reasoning is that each response, the real and ideal, contains a certain amount of judgmental error. When one is subtracted from the other the error of each is not partitioned out of the operation and an amount of judgmental error larger than that of either individual score is present in the resultant score. Our results tend to support this thesis.

It is also possible that students were not clear about the concept ideal professor, because of lack of experience or lack of exposure to excellent teaching. Many respondents were freshmen and sophomores. It is possible that they have not yet established for themselves what things an ideal professor should do and how often.

It is also possible that questions related to the most appropriate instructional behaviour were not asked. The 26 activities examined in this study were consistent with those reported in the literature. However, although the "critical incident technique" purports to gather behavioural incidents which are objectively derived, it is possible that the information gathered has been influenced by the views and bias of the evaluators. One of the most common functions of assessment is to obtain the student's perception of the performance of a professor. Stated another way, one function of student assessment is to compare the instructor's performance with the student's likes and dislikes. It is possible that his likes and dislikes are not congruent with the student's achievement. A professor could satisfy the student's likes and dislikes while the student learned little or nothing. Conversely, the professor could satisfy few of the student's likes and dislikes, while the student attained a high level of achievement. In some instances, student evaluations are assumed to be valid and reliable assessments of the professor's performance. The professor's assessed performance is assumed to be a measure of his teaching ability, which is, in turn, assumed to be a measure of the student's learning or achievement. Such assumptions fail to address the question of whether or not student likes and dislikes can be used as valid and reliable measures of the teaching and learning process.

The dilemma presented above, supported by many writers on student evaluation, illustrates the complexity of trying to evaluate faculty instructional performance. Perhaps the wrong questions are being asked. Perhaps the use of paper and pencil questionnaires to measure such complex phenomena as the interactions of faculty and a heterogeneous group of students is naive.

The means and standard deviations of the overall evaluation scores

One major purpose of evaluation research is to provide a means of differentiating between professors for purposes of reward or rebuke. This study's findings on the questionnaire's ability to discriminate between professors are not encouraging. It was found that the closer the mean overall evaluation to the scale midpoint, the larger the disagreement among the raters. In part this might be a function of the use of the mean as a descriptive statistic, for a few widely deviant scores could affect the mean. However, generally, when this is the case the standard deviations are not raised to the level found in this study. Conant[20] stated that it is possible to identify an elite if they distinguish themselves by their actions. This has been demonstrated by high means and low standard deviations of overall evaluation scores. However, the concern should be with those professors who do not distinguish themselves and are viewed differently by different students in the same classroom. By design the questionnaire was oriented to gathering objective ratings of the frequency of occurrence of specific actions. The ratings were then compared to the

overall evaluation of classroom instructional performance. The correlations between the two measures were substantially high, which leads to the conclusion that, to a degree, the frequency of occurrence ratings contribute to the overall evaluation rating of the professor. It was demonstrated by regression, that if there was variance in the overall evaluation scores, a similar amount of variance was present in the frequency of occurrence ratings of a particular professor.

The data support the notion that different students provide different ratings for the same professor. Two factors may partially account for this finding. First the scaling of the research questionnaire has been expanded from the more commonly used four to five point scale to seven and nine for the frequency of occurrence categories and the overall evaluation rating respectively. Nunnally has stated that:

> As the number of scale steps is increased from 2 up through 20, the increase in reliability is very rapid at first. It tends to level off at about 7 and after about 11 steps there is little gain in reliability from increasing the number of steps. To some extent the monotonic relationship between scale reliability and number of steps may be at variance with common sense. It might, for example, but reasoned that, if there are numerous scale steps, the subject would have difficulty making up his mind and might mark a different point on a retest. It is true that, as the number of scale points increases the error variance increases, but at the same time, the true score variance increases, at an even more rapid rate.
>
> The only exception to the rules that reliability increases with the number of scale steps would occur in instances where a large number of steps confused subjects or irritated them to the point where they became careless.[21]

Although the type of error introduced by the increased number of scale points is a possibility, neither the reliability coefficients nor the regression analysis results suggest that this type of error was present to a significant degree.

Another possible explanation for the variance among raters is the different perceptions and expectations of the students, coupled with differing interpretations of the scale point descriptors. Grasha found that students use various frames of reference when rating instructors. He stated:

> The data should not be interpreted to suggest that the reference points discussed are the only ones that students use. Nor should the interpretation suggest that students literally use, for example, an internal representation of their best or worst teacher. It is quite likely that the [student's] internal representations are more generalized impressions of relatively good and poor teachings . . . .
>
> If teacher ratings are normally associated with different frames of reference then several dimensions are represented in a distribution of ratings of the same behavior.[22]

Grasha's conclusions and our results suggest that while student ratings of the frequency of occurrence and overall evaluation scores are consistent with their internal frame of reference, frames of reference differ from student to student. Moreover the student's internal frame of reference seems to contain a rather standard conceptualization of "excellent", "best", "most", "least", and "superior". Below the optimum value students' conceptualizations appear to vary considerably. The intuitive answer is that universal

benchmarks or standards should be established which implicitly and explicitly, subjectively and objectively, will define the levels of performance from "poor" to "excellent". But as others have observed, 'The individual teacher can nearly always take exception . . . 'My case is somewhat different' . . . and it is."[23]

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This questionnaire gives you the opportunity to express your views of this course and the way it has been taught. The purpose of this probe is to assist in the improvement of instruction. It will serve this purpose best if you answer the items CAREFULLY and CANDIDLY.
Please respond by blackening the appropriate circle with a soft lead pencil. Only one response should be applicable to each set of answers. IF YOU BELIEVE THE STATEMENT DOES NOT APPLY, LEAVE IT BLANK.
To help assure anonymity, the instructor will be absent from the room and a designated person will collect the completed questionnaires and return them to the appropriate office.

The reporting of data collected from the administration of this questionnaire will be done in such a way as to insure that the anonymity, rights, and welfare of subjects are adequately protected, as well as complying with any other requirements contained in the DHEW Policy on Protection of Human Subjects.

P. I. D. | C. I. D.

(DO NOT WRITE IN ABOVE SPACES)

(1) What is your class standing?
① Freshman
② Sophomore
③ Junior
④ Senior
⑤ Graduate

(2) SEX:
① Female
② Male

(3) Which of the following was your most important reason for selecting this course?
① It was required
② Advisor's recommendation
③ Teacher's excellent reputation
④ Subject was of interest
⑤ Thought I could make a good grade

(4) What is your major field?
① Education
② Business
③ Engineering
④ Agriculture
⑤ Math/Science
⑥ Liberal Arts
⑦ Other

(5) What was your interest in this subject prior to taking this course?
① Nil
② Small
③ Average
④ Substantial
⑤ Very great

(6) How many hours per week did you devote to this course outside of class?
① 0 - 2
② 3 - 5
③ 6 - 8
④ 9 - 11
⑤ 12 or more

(7) What is your present G.P.A.?
① Less than 2.0
② 2.0 - 2.49
③ 2.5 - 2.99
④ 3.0 - 3.49
⑤ 3.5 - 4.0

(8) What percentage of class meetings did you attend?
① 0 - 19
② 20 - 39
③ 40 - 59
④ 60 - 79
⑤ 80 - 100

(9) How would you rate the over-all classroom instructional performance of this professor in this course? (blacken one)

Very best ① ② Among the best ③ ④ About average ⑤ ⑥ Among the worst ⑦ ⑧ Very worst ⑨

This form is an adaptation of the University of Georgia Faculty Course Evaluation Form, by Dr. Lyle F. Schoenfeldt, Copyright 1973, by the University of Georgia.

NCS Trans-Optic F3155-54321

Dan R. Quarles

Experimental Questionnaire – Side 2

This section ascertains your perceptions of the frequency of occurrence and importance of a group of selected behaviors and activities related to your professor's classroom and instructional performance.

The importance response category surveys your perceptions of how important each behavior or activity is in this particular course and classroom situation. There should be only one importance response per behavior or activity statement.

The frequency of occurrence responses are divided into two parts: the REAL/"IS" response category, which surveys your perceptions of how often each of the behaviors or activities is actually occurring in your classroom, and the IDEAL/"SHOULD BE" response category which surveys your perceptions of how often the behaviors or activities should be occurring in your classroom.

If you believe a particular statement does not apply to your classroom or instructional situation, leave all three categorical responses BLANK. It is imperative that each statement have either (1) all three categorical responses blackened, or (2) all three categorical responses blank.

EXAMPLE: You feel that the instructor's behavior, "was well prepared everyday", is VERY IMPORTANT; that your instructor REALLY ALMOST ALWAYS IS, "well prepared everyday"; and that your instructor IDEALLY ALWAYS SHOULD BE, "well prepared everyday." Your response to this statement would be:

① ② ③ ● ⑤ was well prepared each day. ① ② ③ ④ ⑤ ● ⑦ ① ② ③ ④ ⑤ ⑥ ●

IMPORTANCE: NOT IMPORTANT	SLIGHTLY IMP.	IMPORTANT	VERY IMPORTANT	EXTREMELY IMP.	(If you believe a particular statement does not apply to your classroom or instructional situation, leave all three categorical responses BLANK. It is imperative that each statement have either (1) all three categorical responses blackened, or (2) all three categorical responses blank.) THE INSTRUCTOR:	REAL "IS": NEVER	ALMOST NEVER	INFREQUENTLY	OCCASIONALLY	OFTEN	ALMOST ALWAYS	ALWAYS	IDEAL "SHOULD BE": NEVER	ALMOST NEVER	INFREQUENTLY	OCCASIONALLY	OFTEN	ALMOST ALWAYS	ALWAYS
①	②	③	④	⑤	seemed well informed about the materials presented.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	was willing to give individual assistance outside of class.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	encouraged students to think for themselves.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	gave tests that were reasonable in length.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	spent time on unimportant and irrelevant materials.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	pitched the presentation above the heads of the students.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	encouraged students to ask questions.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	tried to get you to see beyond the limits of the course.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	was well prepared each day.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	clearly described the grading procedures.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	stimulated the intellectual curiosity of the students.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	was enthusiastic about the subject.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	was clear about basic principles.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	clearly indicated what materials tests would cover.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	kept the course moving at a steady pace.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	tried to stimulate creative abilities.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	gave advice on how to study for the course.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	assigned a lot of burdensome busy work.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	gave presentations that were logically arranged.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	tried to increase the interest of class members in the subject.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	explained text materials that were confusing to students.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	demanded an unreasonably large amount of work.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	recognized student's difficulties in understanding new material.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
					* * * * * *														
①	②	③	④	⑤	The instructor's information seemed up to date.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	Test content was representative of assigned material.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦
①	②	③	④	⑤	In this class I felt free to express my opinions.	①	②	③	④	⑤	⑥	⑦	①	②	③	④	⑤	⑥	⑦

Appendix Table I SUMMARY STATISTICS FOR GROUP 1 OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
16	8.125	0.719	.179
13	8.077	0.759	.210
37	7.756	1.164	.191
14	7.286	1.382	.370
17	7.236	1.147	.278
46	7.087	1.297	.197
24	7.000	1.142	.233
48	6.938	1.655	.239
54	6.778	1.269	.173
22	6.546	1.438	.307
47	6.510	1.530	.223
31	6.484	1.568	.282
68	6.382	1.753	.213
19	6.368	1.382	.317
13	6.308	1.316	.365
50	6.224	1.516	.214
46	6.130	1.485	.219
58	5.897	1.861	.244
24	5.791	1.769	.361
17	5.641	1.730	.419
27	5.407	1.647	.317
20	5.300	1.593	.356
14	5.143	1.834	.490
40	5.050	1.551	.245
33	4.818	1.570	.273
78	4.705	1.751	.198
48	4.604	1.887	.272
43	4.093	1.460	.223
28	3.786	1.912	.361
26	2.923	1.547	.303

Appendix Table II SUMMARY STATISTICS FOR GROUP 2 OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
20	7.000	1.486	.332
34	6.971	1.267	.217
24	6.875	1.484	.303
35	6.658	1.552	.262
22	6.591	1.259	.269
22	6 364	1.293	.276
53	6.264	1.227	.169
14	6.214	1.805	.482
43	5.837	1.429	.218
13	5.539	1.626	.313
27	5.371	1.904	.367
24	5.208	1.850	.276
37	5.136	2.110	.347
29	5.034	1.476	.274

Appendix Table III SUMMARY STATISTICS FOR GROUP 3 OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
21	8.238	0.995	.217
32	8.167	0.718	.207
12	8.083	0.996	.288
14	7.957	0.929	.248
20	7.750	1.293	.289
12	7.688	0.965	.171
21	7.620	1.071	.234
22	7.591	1.098	.234
16	6.937	1.692	.422
22	6.273	1.723	.367
16	6.250	1.341	.335
22	6.091	1.411	.301
24	5.542	1.382	.282
23	5.438	1.701	.355
15	5.266	1.387	.499
12	3.667	1.803	.376
17	3.236	1.522	.369

Appendix Table IV SUMMARY STATISTICS FOR GROUP 4 OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
12	8.500	0.674	.195
25	7.360	1.319	.264
22	7.091	1.630	.348
13	6.308	1.437	.398
12	6.167	1.337	.386
13	6.000	1.633	.453
16	5.875	1.544	.386
12	5.501	1.883	.435
15	5.334	1.447	.374
34	5.236	2.104	.361
31	5.162	1.319	.237
13	5.077	1 605	.445
28	5.000	1.981	.374
17	5.000	1.936	.470
17	4.530	1.625	.394
13	1.779	1.013	.281

Appendix Table V SUMMARY STATISTICS FOR GROUP 5 OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
19	8.158	0.834	.191
24	8.012	0.943	.192
17	7.883	1.054	.256
26	7.693	0.970	.190
25	7.680	0.945	.189
12	7.667	1.371	.396
15	7.467	0.516	.118
23	7.435	1.121	.234
13	6.556	1.374	.381
14	6.500	1.454	.389
20	6.550	1.395	.312
13	6.308	1.377	.382
15	5.800	1.373	.355
22	5.591	1.403	.299
19	5.181	1.834	.424

Appendix Table VI SUMMARY STATISTICS FOR GROUP 6 OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
37	8.297	0.939	.154
36	8.195	1.117	.186
52	8.038	1.083	.150
26	7.885	1.143	.224
25	7.880	0.971	.195
26	7.731	1.151	.226
24	7.667	1.204	.246
20	7.500	1.762	.394
21	7.467	1.246	.322
24	7.459	1.020	.208
22	6.955	1.362	.297
18	6.945	1.474	.347
22	6.728	1.279	.273
19	6.579	1.539	.353
16	6.187	1.601	.400
25	5.720	1.242	.248
20	3.917	1.240	.194

Appendix VII SUMMARY STATISTICS FOR GROUP 7
OVERALL EVALUATION SCORES

Number of Students	Mean	Standard Deviation	Standard Error
65	8.215	0.927	.115
24	8.112	1.090	.240
34	8.029	1.058	.182
26	7.923	1.017	.199
13	7.539	1.050	.291
29	7.448	1.213	.225
64	7.313	1.435	.179
34	6.500	1.251	.255
16	6.438	1.459	.133
31	5.742	1.904	.197
31	4.097	1.513	.272

EDITORIAL NOTE

The 1976 Nashville conference included a series of case studies and research papers. The former were less formal sessions with presentations based on brochures, slides and transparencies for use with an overhead projector. This issue of Educational Planning omits one paper and two case studies. The paper given by Gayle D. Thornton, "Decision Theory: The Linkage to Educational Management" was printed in the October 1976 issue of the journal. The case studies given by Bernard Novick of New Jersey and Gary Q. Green of Maryland had to be omitted because we did not receive a paper describing them. In the former case, since we have the materials distributed, a brief abstract of the presentation is given below. In the latter case, even this is not possible. Gary Green's presentation was entitled, "Administrative Information Management Systems (AIMS): Distributed Data Processing Comes to Education". If readers wish to know more about the Maryland experience in this area, they should write to Dr. Green at the Research Coordinating Unit, Maryland State Department of Education, Baltimore.

CASE STUDY ABSTRACT

COMPREHENSIVE MULTI-LEVEL PLANNING: A HOME GROWN PROCESS

by Bernard Novick, Edison, New Jersey

The case study described the steps taken thus far in the comprehensive planning process of the Woodbridge Township School District and distributed copies of *A Plan for Excellence*, 1975-1985. The latter is one of a set of brochures and pamphlets which present the "plan" and describe the consultation process. The plan incorporates the work of the Superintendent of Schools' task forces of 1972-73 and 1973-74, but the main planning effort dates from 1974-75. The case study materials describe the composition of the Planning Committee, and the forms for use in analysing goals, listing priorities, flow charting the steps of implementation, etc. The plan is based on sixteen defined goals for the Woodbridge school system. Each goal is stated and then followed by a brief analysis as to what the goal involves, the needs identified by reference to it, the success indicators to be used in judging the extent to which the goal is being achieved, and the time phases of the plan (1975-76, 1976-77, 1977-78, 1978-82 and 1982-85) together with a listing of precisely who is to do what.

The Ontario Secondary School Dropout Study. 1974/75

by Cicely Watson and Sharon McElroy, Ontario Ministry of Education, pp. 506.

The report of a cooperative study conducted by The Ontario Institute for Studies in Education with the assistance of twenty-six Boards of Education whose schools represent 42.4% of the 1974-75 Ontario secondary school enrollment. During that academic year 20,027 students dropped out of their programs. The study was a survey by questionnaire and interview, and its findings greatly upset the stereotype of the "classic" dropout.

Available only on microfiche from: The Ontario Government Book Store, Toronto, Ontario.

FOCUS on DROPOUTS

by Cicely Watson. Toronto: OISE, 1977, pp. 350.

An abridged version of the full report. **Available March 1977**

Paperback $5.00

The International Society of Educational Planners

The Society was founded on December 10, 1970, in Washington, D.C. Over fifty local, state, national and international planners attended the first organizational meeting.

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The activities of the Society are those of most professional associations: it publishes a newsletter and a journal, holds an annual conference, sponsors training workshops, conducts professional liaison with related organizations and encourages research.

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residents of other countries – $15.00
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Institutional Membership – $ 75.00
Sustaining Members – $50.00

Send applications to the Secretary of the Society: Dr. Bernard Kaplan, Educational Policy Research Center at Syracuse, Merrill Lane, Syracuse, New York 13210.

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