

EDUCATIONAL PLANNING



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Dr. Cicely Watson
Department of Educational Planning
OISE
252 Bloor St. West
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THE FAURE REPORT, A TURNING POINT IN EDUCATIONAL PLANNING

In the title for this paper I refer to the Report of the International Commission for the Development of Education¹ primarily because its publication seems to coincide with, and to have helped influence, what René Maheu, the Director-General of UNESCO, has called “a turning point in the development of education.” Since the turning point there is a new perspective for viewing education as an organized, partially organized, and even an unorganized human activity. By no means were all of the new insights revealed by the International Commission Report. But the Commission’s work seems to have been synchronized with advances in the evolution of educational policy and overall development policy in many parts of the world – in developing countries and in technologically advanced ones as well. More than synchronized, its follow-up is putting new energy into the complex machinery by which individuals, families, groups, communities, nations and communities of nations realize their potentials through education.

This is not the place to summarize the International Commission Report. Some unusual attributes should be mentioned, however. Commissioned by UNESCO, it is a statement of the broad areas of agreement of its seven independent members, each a distinguished educational leader who undertook only to speak for himself, but in doing so to try to take into account the concerns of his region of the world – Africa (Henri Lopez of the People’s Republic of the Congo), Latin America (Felipe Herrera of Chile), North America (Champion Ward of the U.S.A.), Asia (Majid Rahnema of Iran), the Arab World (Abdul-Razzak Kaddoura of Syria), Eastern European countries (Arthur Petrovsky of the USSR), and Western Europe (Chairman Edgar Faure of France). Except for minor reservations indicated in the text, these members reached a consensus. And they reached this consensus after a very systematic critical assessment which drew on (1) Unesco’s experience in serving as the United Nation’s instrument for international cooperation in education, (2) the opinions expressed in 75 specially prepared reports by advanced and often controversial observers,² and (3) hearings and discussions which the seven commissioners held in 23 countries in the course of preparing their report.

It might be expected that the International Commission’s assessments, conclusions and recommendations, being a consensus, would be bland. They are not. The Commission deals at length with the “dead ends” and inequalities of much existing educational practice – such as its preoccupation with hierarchies and authoritarianism; its excessive obeisance to rigid examinations; its tendency to mirror and, in some cases, to magnify the elitism found in the societies which it serves; its international inequalities, e.g., developing countries, with 75% of the children of the world, in 1968 spent only 8.6% of the world’s educational budget (down from 9% in 1960); and its intra-national inequalities, e.g., the absence of literacy courses in developing countries which offer “free” higher education, or rural-urban inequalities.

*Director, Department of Planning and Financing of Education, UNESCO, Paris. These are the author’s views. They do not necessarily represent the position of UNESCO. This was one of the papers of the ISEP/AAAS Mexico City Conference, June 1973.

But the International Commission Report by no means stops at diagnosing the pathology of education. Instead it calls for reform, and sketches broad outlines of the reform, rejecting "half-measures." By offering many teasing glimpses into discoveries and arrangements which hold promise for the future of education, it gives hope and stimulation for national and local efforts in the quest for what it terms the "learning society." The Commission did not undertake to propose strategies for the educational systems of the world. It recognized that cultures vary widely from country to country and that each State decides for itself the choice of education for its people. But the International Commission does suggest guidelines that can help in the evolution of such strategies.

Representatives of UNESCO's 130 member governments, meeting in their biennial General Conference in the fall of 1972, received the International Commission Report and devoted serious attention to its findings. In a carefully worded and passionately debated resolution, the General Conference recommended follow-up of the Report by member governments, by UNESCO, and by other interested agencies. While expressing satisfaction that the International Commission had carried out the major tasks entrusted to it, it identified problems with which the Commission had been unable to deal adequately. These include the differentiation of strategies for differing social-economic and cultural systems; the definition of the role of teachers in educational reform and regeneration, and the assessment of education's potential for promoting international understanding and peace. The Report of the International Commission already is available in French, English, Spanish and Italian. Twelve other language editions are in preparation. In several countries seminars and symposia for reviewing national educational policy in the light of the International Commission's findings are being held, including Nigeria, Chile, Iran, Canada, the Netherlands, Peru, Lebanon, France, Syria, India, Yugoslavia, Malagasy Republic and Switzerland.

On the international scene before the International Commission Report there was the Williamsburg Conference of 1968 and its sobering message of *The World Educational Crisis*.³ In 1970 there was wide-spread reflection on the future of education in nearly every country of the world, stimulated by UNESCO's General Conference having declared that year as the International Education Year.

During the last several years at national and sub-national levels an unusual number of fundamental reviews of educational policy have been taking place, many of them leading to proposals for, and adoption of, fundamental reforms. Examples include Costa Rica, Pakistan, Indonesia, Korea, Tanzania, Peru, Rwanda, Canada, and Ethiopia.

The last two countries named illustrate an interesting relationship between national efforts and the international turning point referred to above. Much of the attention in Canada has been given to policy for post-secondary education, which includes adult education. There, of course, the major activity is at the provincial level, since education does not come under the jurisdiction of the national government. Several provinces have convened commissions to study and propose patterns of development for education in the 1980s and, in general terms, the 1990s. The Ontario Commission, which published its findings in *The Learning Society*, made 126 recommendations, all generally designed to implement and to finance what on examination turns out to be strikingly similar to the bold conception of life-long education advocated by the International Commission. The work of the Ontario Commission proceeded in parallel with, but independent of, that of the International Commission; both commissions show remarkable agreement in diagnosis and in prescription. Now that the Report of the International Commission is available, Canadians in Ontario

and other parts of Canada are conducting a provincial-national-international review by means of a series of seminars and symposia.

Similarly, in 1971 Ethiopia embarked on a thorough-going review of its educational development in cooperation with external sources of development assistance. In July 1972 the government convened a meeting, to which its external development partners were invited, to discuss the findings of the fifteen Ethiopian task forces which had been examining aspects of educational policy and practice, and to consider the three alternative strategies for the development of Ethiopian education which had been drawn from the work of the task forces. These efforts also were contemporary with the work of the International Commission, and the strategy adopted, following the review meeting, bears striking resemblance to the general findings of the International Commission. Thus, while the Ontario Commission helps spell out in practical measures the International Commission's concept of life-long education, the Ethiopian Review translates into specific innovative patterns its concepts for the reform of primary education (which in Ethiopia is to be called "basic formation" in order to distinguish it from conventional primary schooling) through combinations of formal and nonformal education linked by work-study practicums.

Neither in Canada nor in Ethiopia was the Faure Report seminal (although two commissioners had visited Ethiopia in the course of the International Commission's consultations). The point we wish to make is that in education there is movement in new directions across a very broad front, and much of this movement seems vectored in similar directions. Nonetheless the availability of the Report is playing a key role in encouraging national and local educational policymakers to take the many risks involved in departing from obsolescent practices. In the Report they discover not only that many of their problems are general, but also that solutions to these problems are part of a larger whole — the universality of the educational endeavour.

Education as Development

It is necessary to place the foregoing efforts toward educational reform in the larger context of development, of which education is an integral part. In economic and social development, as in education, new orientations are evolving. The strategy for the UN's Second Development Decade in part reflects the changing values. The essence of this change is a general acceptance of a redefinition of national development that includes not only growth in Gross National Product but also improvement in the distribution of income and employment, the alleviation of poverty, the provision of minimal social services, and the enhancement of cultural values and identity.⁴

One of the lessons of the First Development Decade is that by itself education seldom provides the dynamic by which people can get on the ladder of self-sustaining development, that education and training can perhaps only complement and reinforce other development efforts. This lesson, still largely unheeded, requires a new partnership between educational planners and other agents of change. In this partnership mutual adjustments in arrangements within and outside of the educational authority are necessary. Along with the greater prominence of social and cultural values healthy debate is beginning about the ethical basis of development. In this connection, Goulet says "Development is not a cluster of benefits given to people in need, but rather a process by which a populace acquires greater mastery over its own destiny."⁵ This conception is quite harmonious with the growing realization that one of the principal justifications for education is its contribution to the escape from dependency.

Before acceptance of the concept of life-long education, education was co-terminous for the most part with maturation of the young into adulthood. Not only was it co-terminous, too often it was confused with the maturation process – so much so that shortcomings in education generally could be ascribed to maturation syndromes, rather than inadequacies in the design of the educational process. Life-long education can liberate us from this confusion. Of course maturation is a natural movement from dependency to autonomy. But the appropriate education of children and youth can speed this process rather than inhibit it. Dependency, alas, extends beyond puberty: it is not confined to the dependence of the immature child or youth upon his parents or those *in loco parentis*. As Freire points out, oppressed adults are dependent upon their oppressors. Life-long education for every age group can provide the means by which individuals and groups may transcend their dependency and, by their own actions, help reshape the environments and societies in which they live. Education should thus be expected to make a positive contribution to the escape from dependency; educators as well as learners ought to be held accountable for performance against this objective.

Not every kind of education, nor every kind of development assistance, will serve the movement from dependency to autonomy. It is easy to imagine types of education which program students towards continued dependence, just as some patterns of relationship between deprived and better favoured groups (i.e., those in the establishment, oligarchy or other vested interests) tend to perpetuate vulnerability and dependency.

The movement out of dependency into today's complex inter-dependent world should not imply the goal of autarchy or individualistic isolation. Even when he had unlimited territory into which to expand, man was a social being, needing social interaction with others for the full expression of his humanity. Various societies will, by their mores and practices, define differing values governing interdependency. Some patterns imply more autonomy for the individual than others. No matter. The universal task of education is to provide an impetus for a favourable *direction* away from dependency towards autonomy in an interdependent and finite world: an *absolute* target of autonomy is not required. At a single point in time and in political space a specification may indeed be given. But a culture-specific or ideology-specific definition need not concern us here.

Education as Life-Long Learning

A principal recommendation in the International Commission's Report was adoption of the concept of life-long education, extended not only in time but also beyond formal schooling into all activities which have a potential to contribute to learning. Implementation of such a recommendation means linking education more closely to life, to work and to solving community problems. This linkage is simply the rediscovery of powerful earlier precepts: Plutarch of ancient Greece said, "The city is the best teacher;" Pestalozzi said "Every part of the background, natural or man-made – the home, the school, the community – participates in the educative task."

To meet education's challenges after the turning point, to overcome its dead-ends and inequalities, and link it more intimately with other development efforts, widespread innovation – indeed a veritable mutation – in education is required. This conclusion runs throughout the International Commission's findings. Needed are innovations which explore, on a large scale, the vectors of change which hold promise of major improvements in equality of opportunity, relevance, and effectiveness to cost. Tinkering with existing highly wasteful

systems will not be sufficient. Educational planning at the turning point thus becomes largely the planning and management of large-scale innovation. While this need not lead to deschooling as advocated by some, it will mean structural rearrangements. This implies new tasks for education planning.

Planning as Vectors

Much of educational planning in the 1960s could be characterized as target planning — that is, the programming of educational activities and flows to meet quantitative levels at specified times in the future, within projected resource constraints. One can speculate that given the exigencies developed above target planning, while still necessary in guiding the allocation of scarce resources in education, may need to be subordinated to what I shall call vector planning. By this I mean the designing, programming, and diffusing of educational innovations, giving particular attention to the *direction* of movement likely to achieve the desired result, and making provision for the use of feedback for self-correction.

Perhaps a useful analogy is with the art of aerial navigation. In a flight plan one knows the general orientation — the vector — for the destination, but one depends upon subsequent positional fixes, the changing conditions of wind and weather aloft, and *en route* air traffic in order to correct one's progress along the way. So too in education we need vectors for getting started in the right direction and *en route* feedback for making course corrections. But this analogy is too simple in that the educational navigator must simultaneously give attention to many vectors to make sure, for example, that progress toward diversifying educational offerings doesn't bring with it an unfavourable effect upon student mobility, or upon unit cost. And the analogy is also too simple in that the ultimate destinations of educational progress are less known than the general direction in which we want to move. However, the concept of vector planning is useful because it puts primary emphasis on the direction of change, without presuming as yet to specify the absolute target levels to be achieved at destination. This is also realistic in view of the uncertainties of predicting specific educational outcomes for particular learners, through the employment of particular educational resources. Education is not that much of a science. But it is a quest. A job of planning, then, is to select from among the repertoire of possible arrangements and experimental evidence, those programs which seem to offer reasonable prospect of helping to transform education in desirable directions.

As a means of illustrating vector planning we list below some frequently observed orientations of educational reform which are consistent with the recommendations of the Faure Report. The vectors to be selected in a particular case need to be uniquely tailored to the values of objectives being sought in the society and to a diagnosis of how existing and possible learning arrangements contribute to, or impede, the achievement of these values and objectives. The following listing, of necessity, is expressed in highly condensed language.

<u>Vector</u>	<u>Planning Implications</u>
a. Toward lifelong education	— redefine education's system boundaries in time and space, ultimately to include the learning society.
b. Toward diversification of learning opportunities	— revise admission arrangements to encourage multiple entry and re-entry into educational activities.

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- c. Toward mobility of learners from educational experience to others
 - design ladders, bridges, linkages from non-formal education to formal, across disciplines, among courses, from one level to another, inter-region and inter-country.
- d. Toward education as an integral part of other development efforts
 - identify education and training dimensions of development programs and projects in other sectors.
 - plan mutual adjustments so that education and other efforts reinforce each other.
 - stress through education the preparation for performance in the world outside the classroom, not just preparation for more schooling.
- e. Toward equality of educational opportunity
 - prepare school maps with view to equalizing spatially the access to relevant education.
 - organize “second chance” arrangements to serve drop-outs and push-outs.
 - remove obstacles to full participation in education by girls and women.
 - identify causes of educational inequality.
- f. Toward relating the world of work to education
 - organize work-study programs, school-connected apprenticeships, simulations which introduce world of work problems and materials into the curricula.
 - co-opt employing establishments, farming cooperatives, etc. to offer education and training activities.
- g. Toward enhancement of the quality of life, artistic expression and cultural development
 - include indigenous creative arts in school and community activities – music, drama, artistic expression.
 - encourage students to find and record traditional indigenous folk-lore and art.
- h. Toward a scientific point of view
 - include simple do-it-yourself science experiments in primary and secondary school curricula
 - teach powers of observation.
 - foster drawing of inferences from observations.
 - use local environment to understand ecological balance.
- i. Toward solving educational problems by harnessing new technologies and the findings of behavioural sciences
 - establish cooperation between education and communication media of TV, radio, newspapers.

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- i.
 - examine possibilities of self-service education centres in libraries and community centres.
 - apply the concept of “education as liberation” (see International Commission Report).
- j. Toward mobilizing resources not now employed in education
 - inventory skills and facilities in the community having learning potential.
 - enlist volunteers as aides, *animateurs*.
 - institute systems of student fees and loans so that beneficiary shares in the cost of his education.
- k. Toward serving the remarkable learning capacity which characterizes the early childhood years
 - undertake research and development to find feasible combinations of parent education and community efforts.
 - harness informal education potentials such as TV and radio.
 - recognize the intimate connection between early childhood education and the further liberation of women.
- l. Toward democracy in educational content and learning processes
 - suppress hierarchical distinctions among teachers, between teacher and student.
 - foster participation in educational governance by representatives of education’s major stakeholders.
 - make school attendance voluntary.
- m. Toward teaching by inquiry and problem-solving methods
 - train teachers in inquiry processes such as the use of convergent and divergent questioning.
 - encourage student to student interaction as distinguished from only student to teacher interaction.⁶
- n. Toward higher education’s responsibility for leadership in national and community development
 - involve universities in solving development problems.
 - explore national service arrangements by which university students can reimburse the state for part of their educational benefits.
 - link universities with the reform of other levels of education and of nonformal education.
- o. Toward education for International understanding
 - apply materials developed in UNESCO’s network of associated schools.
 - convene multi-nation committees to examine curriculum materials for fairness and tolerance.

- o.
 - simulate international problem-solving in classroom.
 - encourage international exchanges of students and teachers.
- p. Toward International cooperation in solving educational problems
 - draw on multilateral agencies for advice and documentation regarding experience in educational innovations.
 - join networks which share information and risks in particular types of educational innovations.
 - participate in regional and international seminars and conferences on education.

A number of principles can help guide the application of vector planning. One is to take a good deal of care in selecting points of entry – those points in the formal and nonformal education system which offer interesting potential for experimentation, where there is a climate of readiness to take risks along one or more desired vectors of change, and where there may be leverage for propagating and diffusing more widely the benefits to be realized from the innovation. The appropriate point of entry is specific to the given situation. In one case it may be the wide-spread perception of a need for in-service updating and re-orientation of the teacher force. In another it may be reform of an obsolescent examination system. It may be a pioneering effort in adult education adapted to certain felt needs, or experimentation with shorter learning cycles by which learners can acquire mastery of a set of needed understandings or proficiencies. The point of entry might well be external to the formal education system – for example an employer’s staff development program – but have the potential to be usefully linked in a workstudy arrangement to some level of formal schooling.

In looking for points of entry, special attention should be given to indigenous micro innovations, the too often neglected local departures from conventional educational practice in which a pioneering teacher, principal, district supervisor, or group of students develop an approach which promises progress along one or more of the desired vectors. Indigenous learning innovations often develop outside the formal education system – in employment, a club, or an association. While in nearly all indigenous innovations there is an important ingredient of personal leadership, there are generally other essential elements which can be combined to favour more systematic experimentation and which facilitate the propagation of successful results. The trick is in first having the sensitivity to identify the spontaneous innovations. After identification additional resources must be mobilized in such a way as to move toward the desired vectors. They include not only finance and expertise, but also organizational resources needed for the experiment itself and the subsequent propagation. It is psychologically important for future adopters elsewhere to become involved early in the experiment so as to build a sense of commitment and start thinking of the modifications required for transfer.

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CANADIAN EXPERIENCE IN THE APPLICATION OF QUANTITATIVE MODELS FOR EDUCATIONAL DECISION-MAKING

The title above is that which appeared in the conference program in Mexico City, but it is not precisely accurate. It implies that the paper will deal with the technical problems of implementing, or adapting and modifying quantitative models for educational planning. That was not the intention. My interest is in the experience which Canadian administrators have had in the use of quantitative models. To learn something of that experience, beyond personal knowledge gained through my job (which relates mostly to Ontario), a brief questionnaire was sent to 126 educational agencies in Canada in spring 1973. In a covering letter personally addressed to the deputy minister of education of a province, the director of education of a board, the president of a university or whatever, the purpose of the survey was explained. This paper does not present the survey findings in detail, copies of the report are available, free, from the Department of Educational Planning, OISE. Instead I shall make some rather categorical statements about the experience reported, and give my opinion on what has caused the present condition. "Proof" of my statements, at least in the form of an analysis of tabulated responses corroborating them, can be read in the survey report.

One hundred and twenty-six questionnaires were sent out — 61 to large school boards, 44 to universities and 21 to education or higher education systems agencies such as Ministries of Education, Higher Education Councils or Associations of Universities. Thirty-nine universities (86.6%), 45 school boards (67.2%) and 17 system authorities (81%) replied. The response from all Canadian provinces except Quebec was satisfactory. Six of the seven Quebec universities in the sample replied, but only four of their twelve largest school boards and none of their systems authorities (i.e., neither the Ministry itself, *nor* the Fédération des CEGEP, nor the Association des Collèges du Quebec). With the *caveat*, therefore, that I might well be under-reporting conditions in Quebec, I would claim that the response is sufficient to make general statements about the largest school boards and universities in each province of Canada, and in some provinces about a group of medium and small universities as well. The sample is not a *representative* sample — i.e., there are many more medium and small jurisdictions in Canada than were proportionately represented in the sample. However, the sample represents my guess of the most likely group to have had experience in the use of models. My hypothesis was that such a group had the need for models because it represented large complex educational jurisdictions; that this group had both the human resources and the financial incentive to design and implement models, and the financial resources to make their use an administrative convenience. In my judgment, if this group was not making use of mathematical models, no other educational group in Canada was likely to be.

My first finding is that most agencies of the sample are not making use of models. Only 11 universities, 10 large school boards, the Ministries of Education in four provinces, the

*Professor, Department of Educational Planning, the Ontario Institute for Studies in Education, and the Department of Educational Theory, School of Graduate Studies, University of Toronto; Dr. Watson is a board member of the ISEP. This was one of the papers of the ISEP/AAAS Mexico City conference, June 1973.

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Ministry of Colleges and Universities in Ontario, and two other higher education systems agencies – one in Ontario and one in British Columbia – reported models in use.

What kinds of models are in use? What is their purpose? For what questions of planning and administration have they been designed?

The models reported are of three main types:

Resource prediction devices which enable institutions to simulate staff and space requirements, and hence costs and budgets. When used to re-align budgets they work from registered enrollment, staff inventories, space inventories and institutional policy regulations. When used to estimate the future effects of changes in policy regulations, staffing patterns or demand-for-service patterns as represented by changes in enrollment they work from projections of enrollment or from proposed legislation or regulations. Such a model permits the calculation of numbers of staff, of class rooms and other space etc. for a given series of programs and a given level of service. The most commonly found models of this type are the so-called WICHE models (i.e., those designed at the National Center for Higher Education Management Systems, Western Interstate Commission for Higher Education).

The second category of model is similar to the first but it optimizes some factor or policy as defined by the institution or the system.

The most common models of this type *used by systems agencies* are the grants simulators, particularly the ones which demonstrate the best mix of local and provincial cost sharing between school boards of varying size and resources and the provincial government.

The most common models of this type *used by schools or school boards* are the scheduling models used in large secondary schools to prepare individual student timetables, master timetables by program and department, and master timetables for space. They optimize students' first subject choices at given levels of difficulty, equalizing class size across subject insofar as possible, equalizing classroom loading factors, and scheduling prime favorite subjects for prime class time during the day and less popular ones for the end of the day. They also optimize the use of scarce or specialized space such as language laboratories. When used as a simulator they assess the future load of the school under projected enrollments and proposed policy changes; for example in such curriculum matters as optional vs. required subjects, minimum and maximum class size by subject.

The prediction models form the third category. To some extent the other two may be also said to be prediction models, but they are driven by a set of predicted numbers, usually of students by course, which are derived from models that project future conditions according to a set of parameters which involve both in-system variables and conditions (demographic, social and economic) over which the system or institution has limited or no control. The more sophisticated enrollment prediction models generally are sponsored by a system agency and, at the higher education level at least, they are concerned with total numbers of students by faculty and broad type of program. They do not allocate the totals to institutions. The models of the institutions themselves, however, are concerned with their share of the predicted pools of students. School boards are less interested in gross figures, and the enrollment models which serve them (whether those of the Ministry or their own) must be very detailed and specific. They require estimated future numbers by local authority, grade level, and school and (for the secondary school) by subject and level of difficulty.

From the responses of my survey I set up a categorization scheme of 23 types of models,

according to their purpose as defined by the administrators who completed questionnaires. The categories are not mutually exclusive and my coding system may be considered arbitrary. The tables in the report show the distribution of experience in using models for certain recurring tasks, and report on a number of items for each model. In order to devise this categorization scheme I had to face the question "What is a model?" It is clear from the replies of several agencies (school boards in particular) that they have models (such as the scheduling model) in use which they consider to be data processing systems rather than decision-making models. Many wrote across the questionnaire "N/A except for student scheduling, record keeping and reporting". Other agencies reported a scheduling model which probably is not too dissimilar. However, in their notes on the questionnaire they gave examples of how they used it as a simulator to optimize students' choices or to test the effects of changes in program regulations. Some systems reported one comprehensive model. Others reported a group of models which were probably the elements of a set which was very comparable to the comprehensive model. Not all systems reported using all elements of a model. I adopted the following compromise: If the agency reported the device as a model, it must consider it a model and therefore I accepted it as a model. If the description showed that the model satisfied ten of the "purposes" of my category scheme I listed it under the ten purposes. Reprinted here is a table from the appendix of the report giving all the information provided for each model, in abbreviated form.

What conclusions may be drawn from this cursory survey? The findings reinforced the opinions with which I started:

- (1) Only a small number of educational agencies in Canada actually have had experience of the regular use of models.
- (2) The experience is geographically concentrated in the government departments and large urban school boards of Ontario and Alberta.
- (3) The models used by school boards tend to be specific to jurisdictions and to recurring annual tasks – such as the definition of bus routes and scheduling of vehicles to minimize costs, classroom scheduling to optimize the subject choices of students and the use of space at the more popular times of the school day, (i.e., classrooms are "fully loaded for peak times" and "under used" at the end of the day).
- (4) University models tend to be less task specific. They are generally used to advise on "what if" questions. The most popular ones actually being used are modifications of the WICHE models.
- (5) "Own staff" (research or computer services) do most of the design work, even where the original model was a commercial product.
- (6) The names of a few consultant firms are reported but much less frequently than I would have predicted. IBM seems to have marketed a most successful scheduling model about 1968/69. The CAMPUS VIII model of SRG of Toronto is used for the entire College of Applied Arts and Technology system of Ontario. Professors of the OISE Department of Educational Planning, of the University of Western Ontario Business School, of Simon Fraser University, of the University of Alberta (Edmonton), of the University of Calgary and the Massachusetts Institute of Technology were involved in the design of some of the models reported. But the "big names" of the United States who were active in the pioneer development of decision-making models (the Rand Corporation, Brookings's Institute, the University of California at Berkeley, Florida State University and the University of Chicago) were notable in their absence.

- (7) The cost data reported in the survey are of little use. In many cases the cost of salaries was not reported. It proved to be difficult to separate design and implementation costs and many respondents did not even try. In the case of commercial products it is obvious that the price of the model covers a variety of services so that a valid cost comparison between models cannot be made. Also the cost of developing an information system appropriate for a particular model is related to its implementation costs, and will vary greatly depending on the statistical practices which formerly applied. Generally such costs were not reported. In some of these models the cost of organizing the data files exceeded the cost of the model itself. Nevertheless according to these reports many modest but useful mathematical and data processing models are currently employed in Canada whose investment was well under \$5,000 (each).
- (8) The reports on design time and implementation time should only be taken as indicative because (a) detailed records are only known for work done by an agency's own staff; and (b) the time reports do not always say how many persons were involved (i.e., express the time in man-months or man-years). However, the reports are of some value; they demonstrate that many models were in use within six months of beginning the design. This takes much of the "mystery" out of such models, reducing them to the status of common administrative tools. Six months would be the usual time needed to implement even minor changes in traditional administrative procedure. Many models were found to show an immediate economy. School boards, in particular, frequently reported the estimated saving achieved by the use of a model (e.g., 5-10% reduction in transportation costs was routine for a bus scheduling model). Since many of the administrative routines which the models replaced were "hand crafted" (e.g., student reporting, student timetables, teacher timetables and master scheduling for a secondary school), the saving should also be expressed in terms of the time of highly paid administrators rather than dollars. Use of such a model generally does not lead to a reduction in payroll, but it frees administrators for other work involving personal relationships with the teachers and students.

This survey did not support the hypothesis that only large jurisdictions have the resources to design, implement and use quantitative models for making educational decisions. Of the 12 largest Canadian universities (Université de Montreal, Laval, McGill, Toronto, Western, McMaster, York, Manitoba, Saskatchewan, Alberta, Calgary and British Columbia) only the two in Alberta and two in Ontario, reported models in use. One of the smallest universities in Ontario reported the development of a budget cost estimation model which was expected to be in use within a year.

It seems that many universities and large urban school boards in Canada, whose resources are such that they could design a series of models for management decisions, have not found their use sufficiently attractive to induce their adoption. As with many other administrative innovations, first must come the conviction that the change is worthwhile. This conviction seems to be very localized in Canada. The foreigner who wishes to discuss the use of quantitative models with officials of school boards, government departments and universities can, by visiting only a few Canadian cities, tap all our experience. For some the experience is varied and extensive. For these jurisdictions mathematical models are no longer a "gimmick".

Why have models failed to find universal acceptance in Canadian educational agencies — particularly in our universities? Why do we find only a few universities reporting that they

are actually using models (and these are not the large universities with extensive research facilities)? Why is it that we find the most imaginative work reported by large urban school boards? The director of education of the average large Canadian school authority is not usually described as a highly imaginative, innovative, risk-taking type. Nor is this the stereotype of a provincial deputy minister of education. Administrative conservatism and bureaucratic inertia are at least as prevalent in the government departments of Canadian provinces as they are in its universities. Why then have the universities rejected planning and decision-making models as administrative tools? My explanation is as follows:

School boards in Canada have a longer history of public scrutiny than the autonomous universities. And many aspects of school administration lend themselves easily to the use of quantitative models. School board and ministry of education cost accounting systems are better developed than those to be found in universities and colleges. Their staff and space inventories and their student record systems are better. It is, therefore, easier for them to implement models and rather difficult to resist public pressures towards "efficiency" and "accountability".

The models which school board personnel design, implement and use address themselves to specific recurring tasks of administration. They show an immediate benefit when these tasks are carried out in a planning format, albeit a short-range format of 2 or 3 years forward. The models are modest in intent. Their data output is manageable. If the model needs modification the data processing and computer services staff of the board tinker with it. In fact it was reported that many of the school board models are modified more frequently than once a year. If the system changes, the model is scrapped and a new one is designed (for example, the City of Toronto Board of Education scrapped its budget simulator after 18 months use because the provincial grant system changed and made the model obsolete). Because school board models are specific, practical, low cost and usable, their constant use demonstrates to administrators their many advantages. In a budget meeting or a negotiation meeting with a teachers' federation or the ministry, it is invaluable to be able to estimate the effect of agreeing to certain conditions *before* commitment is made. A simulated run can produce estimates of many effects within a few minutes. A few such experiences can be very convincing.

What future use of models can we predict from Canadian experience thus far? The art of designing models and using them in the decision-making procedures by which we plan and administer educational institutions is still quite primitive. As yet we hardly use these devices to make *educational* decisions. Our universities do not even use them extensively to make logistics or budget decisions. But the influence of models is prevalent and, in my opinion, their use will grow. However, in order to use a model for recurring policy and planning decisions the administrator must adopt quantitative modes of thought. This does not come easily to educators, particularly to professors who are the academic administrators of our universities. The data needs of the models which have been designed already have directed our attention to information systems and the inadequacies and limitations of our educational statistics. In many jurisdictions these are already being improved. The very attempt to define the system covered by a model forces administrators to look at their institutions with fresh insight into the relationships of the sub-systems, so that there is new appreciation of how the organization operates. It forces them to consider, in a more specific fashion, goals and objectives and to assess alternative solutions to problems — even when the problems cannot be satisfactorily quantified.

It is clear that educational administrators who *use* models have no faith in the "single

objective function” type of description of their enterprise. They recognize that it is facile and misleading. However, they seem also to have decided that a model can be of use in demonstrating the critical factor central to a problem. It can enable the administrator to explore a few trade offs and alternative courses of action before policy commitment has to be made. The key to successful use of models in the administration and planning of educational institutions seems to be the ability to keep them as simple and task-specific as possible.

QUESTIONNAIRE

Mathematical Models for Decision Making in Education

1. Name of institution, system or jurisdiction
2. Name or description of the model
3. Type of computer installation on which it is run
4. What is its main purpose? (e.g., to predict enrollment, to simulate payroll, to prepare individualized timetables, to make decisions on programs, etc.)
5. Who designed the model? (e.g., own research staff, consultant firm. Please give name(s).)
6. How long did the design stage take? (e.g., 6 months)
7. How long did the implementation stage take?
8. How long has it been in use?
9. How frequently have modifications been made to the original design?
10. What did its design cost? (rounded estimate of direct costs)
11. What is its annual operating costs? (rounded estimate of direct costs such as salaries of personnel, supplies and overhead)
12. If model was implemented and its use is now discontinued, why? (Give main reason)
13. If you can supply us with any further information which hasn't been covered above, or wish to make any comments, please do so below.

Thank you for your co-operation.

SUMMARY TABLE
 NUMBER OF MODELS REPORTED BY REPORTING AUTHORITY, PURPOSE (S) OF MODEL,
 AND RESPONSES TO QUESTIONS 3, 5, 6, 7, 8 AND 9

Type and Name of Reporting Authority	Purpose (s) of Model (from Table 3)	Question 3	Question 5	Question 6	Question 7	Question 8	Question 9
University:							
Quebec (1) ¹		CDC 640	NCHEMS (WICHE)	-2	**4	-	once
Lakehead (1)	17, 2	IBM 360/50	Own Staff	*3	-	-	-
Brock (1)	2	Burrongs 5500	Own Staff	6 mths.+	**	-	cont.
McMaster (3)	9, 2, 16, 8	IBM 370/155	Own Staff	1 yr.	**	2 yrs.	cont.
	1, 4	CDC 6400 & IBM 370/155	Own Staff	1 yr.	**	2 yrs.	cont.
	9, 19	CDC 6400 & IBM 370/155	Own Staff	1 yr.	**	1/2 yr.	infreq.
Western Ontario (4)	11	IBM 370/145	NCHEMS (WICHE)	-	1 yr.	-	none
	11	IBM 370/145	NCHEMS (WICHE)	2 mths.	**	13 mths.	infreq.
	4, 5, 17	IBM 370/145	Own Staff	2 mths.	**	-	-
	15	IBM 370/145	Own Staff	2 mths.	**	-	-
Manitoba (4)	17	IBM 360/40	Own Staff	2 yrs.	3 mths.	15 mths.	-
	11	IBM 360/65	Own Staff	-	3 mths.	1 mth.	-
	1, 8	IBM 360/65	M.I.T.	-	-	1 yr.	-
	12	IBM 360/65	Own Staff	-	**	-	-
Saskatchewan (1)	11	IBM 360/50 and /40	NCHEMS (WICHE)	-	3 mths.	twice	none
Calgary (4)	11	IBM 360/50	NCHEMS (WICHE)	-	6 mths.	5 mths.	-
	12, 14	IBM 360/50	Own Staff	*	-	-	-
	14	IBM 360/50	Own Staff	1 yr.	**	5 yrs.	infreq.
	17	CDC 6400	Own Staff	2 yrs.	**	1 1/2 yrs.	twice
Alberta (6)	5	IBM 360/67	Own Staff	3 mths.	2 mths.	2 yrs.	thrice
	5	IBM 360/67	Own Staff	1 mth.	1/2 mth.	1 1/2 yrs.	once
	10	IBM 360/67	NCHEMS (WICHE)	1 mth.	1 1/2 mths.	9 mths.	none
	11, 5	-	-	-	-	-	-
	5	-	-	-	-	-	-
Lethbridge C.C. (2)	5, 2	-	NCHEMS (WICHE)	2 mths.	6 mths.	1 yr.	-
	11	-	NCHEMS (WICHE)	2 mths.	6 mths.	1 yr.	-
	11	-	Own Staff	4 mths.	4 mths.	-	none
Simon Fraser (2)	5	IBM 370/155	NCHEMS (WICHE)	1 yr.	-	-	-
School Board:							
C.S.R. de Tilly (4)	16	IBM 370	SIMEQ (M of Ed)	1 yr.	4 mths.	2 yrs.	twice/yr.
	1	IBM 370	SIMEQ	1 1/2 yrs.	6 mths.	1 1/2 yrs.	once/yr.
	2	IBM 370	IBM	-	4 mths.	2 yrs.	once/yr.
	17	IBM 370	SIMEQ	1 yr.	3 mths.	1 yr.	twice/yr.

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London (3)	1, 3, 14 4	IBM 370/155 PDP 10	Min. of Ed. Univ. Consult.	—	1 yr. **	2 yrs.	—
Borough of York (2)	5	IBM 370/155	Own Staff	1-2 yrs.	2 mths.	***5	—
	17	Honeywell 120 Honeywell 120	Honeywell SRG	6 mths. 3 mths.	1 mth. 3 mths.	4 yrs. 1 yr.	once/yr. freq.
Bor. of North York (1)	1, 8, 14	S/360 MOD 30 128K	IBM	—	—	6 mths.	none
	1, 8, 13	Honeywell 1200	Own Staff	2 mths.	4 mths.	3 yrs.	freq.
Bor. of Scarborough (4)	2	Honeywell 1200	Own Staff	2 wks.	1 mth.	1 yr.	freq.
	5	Honeywell 1200	Own Staff	—	2 mths.	5 yrs.	freq.
City of Toronto (6)	13	Honeywell 1200	Own Staff	—	3 mths.	2 yrs.	none
	1, 8, 14	IBM 360/30	Memphis S.B. IBM	—	1 yr. 2 mths.	6 yrs. 1½ yrs.	cont. once
Hamilton (1)	17	IBM 360/30	Own Staff	6 mths.	—	—	—
	5	IBM 360/30	Own Staff	—	2 wks.	6 mths.	once/3 mths.
Edmonton (4)	13	IBM 360/30	Own Staff	—	**	—	—
	13	IBM 360/30	Hamilt. P.D. Hamilt. P.D.	2 mths.	2 mths. Coinc.	3 yrs. 3 yrs.	none once/yr
Ottawa (1)	1, 8, 14	IBM 360/30	Own Staff	14 mths.	—	—	—
	13	IBM 360/85	Own Staff	—	with design	—	—
Carleton (1)	14, 17	None as yet	Own Staff	1 mth.+	**	2 yrs.	twice
	17	Honeywell 1200	Own Staff	½ yr.	**	—	—
Calgary (1)	8, 17	IBM 370/135	Own Staff	2 weeks	2 yrs.	2 yrs.	once/yr.
	2, 8, 14	IBM 370/135	Own Staff	1 mth.	2 yrs.	2 yrs.	none
Edmonton (4)	1	IBM 370/135	IBM	—	—	5 yrs.	—
	16, 17	IBM 370/135	Own Staff	2 weeks	1 week	3 yrs.	minor
Education System:							
Ontario Ministry of Education (9)	1, 2, 8, 14	IBM 370/155	Own Staff	4 yrs.	4 yrs.	3 yrs.	once/yr.
	18	IBM 370/155	Own Staff	4 mths.	**	4 yrs.	twice/yr.
Saskatchewan Ministry of Education (2)	7	IBM 370/155	Own Staff	3 mths.	**	6 yrs.	once/yr.
	23	IBM 370/155	IBM	3-4 mths.	3½ yrs.	1 year	none
Alberta Ministry of Education (6)	18	IBM 370/155	Ministries	½ mth.	2 mths.	6 mths.	none
	20	IBM 370/155	Ministries	4 mths.	1 week	—	—
Manitoba Ministry of Education (2)	21	IBM 370/155	Own Staff	6 mths.	2 weeks	1 year	none
	19	IBM 370/155	E.P., OISE	1 yr.	1 yr.	1 year	freq.
Saskatchewan Ministry of Education (2)	4, 5	IBM 370/155	E.P., OISE	1 yr.	Coinc.	4 yrs.	once/yr
	2	—	—	—	with design	—	—
Alberta Ministry of Education (6)	18, 5	IBM 360/40	Own Staff	—	—	—	—
	18	IBM 360/40	Ministries	1 mth.	2 mths.	6 mths.	freq.
Manitoba Ministry of Education (2)	2, 3	—	—	3 mths.	2 mths.	2 mths.	twice
	3	—	—	—	—	—	—
Saskatchewan Ministry of Education (2)	5	—	—	—	—	—	—
	23	—	—	—	—	—	—
Alberta Ministry of Education (6)	18	—	—	—	—	—	—
	17	—	—	—	—	—	—
Manitoba Ministry of Education (2)	1, 8, 14	—	—	—	—	—	—
	1, 8, 14	—	—	—	—	—	—

SUMMARY TABLE
(Cont.) NUMBER OF MODELS REPORTED BY REPORTING AUTHORITY, PURPOSE (S) OF MODEL,
AND RESPONSES TO QUESTIONS 3, 5, 6, 7, 8 AND 9

Type and Name of Reporting Authority	Purpose (s) of Model (from Table 3)	Question 3	Question 5	Question 6	Question 7	Question 8	Question 9
Higher Education System:							
Ontario Ministry of Colleges & Universities (1)	2, 4, 6, 8, 10, 12, 14, 15, 17, 18	IBM 360/85	SRG	2 yrs.	**	4 yrs.	cont.
Council of Ontario Universities (4)	18 4, 9 17 22	IBM IBM IBM IBM	Own Staff Own Staff Own Staff Own Staff	2 mths. 4 mths. 2 mths. —	— — — —	4 yrs. once 3 yrs. —	freq. once freq. —
B.C. Post-Sec. Educ. Enrollment Standing Committee (1)	5	IBM 360/67	University cons.	1 year	4 mths.	1½ yrs.	twice

¹Number of models reported.

²Unknown, no response, not applicable.

³Still in design stage.

⁴Still in implementation stage or continually implementing.

⁵Discontinued.

Source: Appendix Table of *Report of the Survey of Canadian Users of Mathematical Models for Educational Decision-Making*, Cicely Watson, The Ontario Institute for Studies in Education, 1973, pp. 52-55.

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TABLE NUMBER OF MODELS REPORTED BY PURPOSE OF MODEL AND REPORTING AUTHORITY

Purpose of Model	Univ.	School Boards	Educ. Agencies	Higher Educ. Agencies
1. Student timetabling or scheduling	2	8	2 ²	—
2. Simulation of student course and program choice (and resultant student timetables and schedules)	4	4	2	1 ³
3. Reporting student progress (and resultant placement, guidance or program choice)	—	1	2	—
4. Student flow models (within institution or system variables) for enrollment prediction	2	1	1	2 ³
5. Student flow models (transition models) for enrollment prediction	7	3	3	1
6. Student performance models (linked to tests and placement)	—	—	—	1 ³
7. Student awards models (to stimulate costs and awards distribution)	—	—	1	—
8. Teacher timetabling or scheduling (linked with master scheduling or faculty work load simulation)	2	7	2 ²	1 ³
9. Faculty flow models (recruitment, retirement, faculty supply/demand)	1	—	—	1
10. Faculty needs estimate models (apart from WICHE or CAMPUS models)	1	—	—	1 ³
11. WICHE models or modifications of them	10 ¹	—	—	—
12. Space or classroom needs models (apart from WICHE or CAMPUS models)	2	—	—	1 ³
13. Space needs (linked to use of schools or attendance areas)	—	4	—	—
14. Space needs (linked to master scheduling)	2	7	2 ²	1 ³
15. Library planning	1	—	—	1 ³
16. Personnel payroll models (apart from WICHE models)	1	2	—	1
17. Program budgetting, resource allocation or unit cost models (apart from WICHE)	4	7	1	2 ³
18. Grants simulation models	—	—	5	2 ³
19. Teacher costs model	1	—	1	—
20. Minimum subsidy model (for Teachers Superannuation Fund)	—	—	1	—
21. Escalation subsidy model (for Teachers Superannuation Fund)	—	—	1	—
22. Early retirement model	—	—	—	1
23. Bus scheduling or transportation models	—	—	3 ²	—

¹Memorial and Simon Fraser are also "considering" them.

²The Ontario model is also used by school boards.

³CAMPUS is represented here.

Note: From their description several models fall into more than one "purpose" category, and it is evident that in some cases a set of models has been reported as "one" where an equivalent grouping of linked models has been described as if each sub model were independent. Moreover not all respondents answered each question about every model. So the sums of the categories in the tables of this report are not always identical.

Source: Table 3 of *Report*, pp. 42-43.

NATIONAL PLANNING SYSTEMS IN LATIN AMERICA: THEIR ENVIRONMENTS AND THEIR IMPACT

While 1960-1970 may not have been the “decade of development,” it most certainly was the decade of development planning. There are few developing countries which had not, by the end of the decade, established some kind of national planning system. In this paper cross-national data from the Latin American nations are brought to bear on two questions: (1) In what sorts of political and economic environments are highly elaborated national planning systems likely to be found? (2) What are the observable effects, over time, of having a highly elaborated national planning system? Although having an elaborate planning system is not a guarantee of effective planning (however that term may be defined and measured), it is assumed that having a very minimal (or no) planning system will, in most cases, guarantee that very little and/or very ineffective planning will get done.

The Environments of Planning Systems

In a previous study, through the use of a non-metric analogue of factor analysis on Latin American data we demonstrated the existence of three separate dimensions of national development. We labelled their urbanization, economic information processing capacity, and political information processing capacity.¹ Here the concern is the relationship between these development dimensions and a measure of the elaboration of national planning systems. In order to discuss the predicted nature of these relationships we first must consider how each dimension is defined and measured.

Urbanization

Our work supports the results of several studies which show that the data series traditionally used to measure “development” (per capita income, proportion of population in cities, commercial energy consumption, radio, telephone and newspaper distribution, etc.) are highly interrelated; and, taken together, they represent a single factor or dimension of development.² Some refer to this single factor as “wealth” (which we consider too narrow a term) or “economic development” (too broad). Following the lead of Ruth Young we use the term “urbanization”.³ It is commonplace to note that the phenomena which the traditional indicators describe are typically urban phenomena in developing societies. Indeed, there is a vast literature regarding the difficulty of spreading such phenomena from the urban areas, where they originate, to the hinterland.

Information Processing Capacity

Derived from theories of information systems analysis, this term refers to the general ability of a social system to respond to, or channel, diverse types of information. A capacity related to ability to adapt to changes in its environment, it is roughly equivalent to flexibility and opposite to rigidity. In the economic sphere it is measured by such things as a scale of industrial diversity, a scale of the diversity of foreign economic contacts, number of patents filed, and number of radio transmitters. In the political system it is measured

*Associate Professor and Chairman of the Department of Educational Planning, OISE; Associate Professor of the Department of Educational Theory, School of Graduate Studies, University of Toronto.

by a scale of “communicative development,” defined by Ruth Young as “the extent to which all sectors of a nation are in conversation with one another, that is, the degree to which they react to each other and to the central government,” by a typology of the penetration of armed forces into political life, by a classification of the extent to which polities are competitive, and a classification of type of regime, ranging from *caudillo* to post-revolutionary.

Two Hypotheses

Measures of “urbanization” can be thought of as indexing the economic support for a national planning system. One would expect two general types of relationships. Some countries will have elaborate planning systems because they can afford them, having already acquired the minimal degree of wealth. Other countries will be so poor that, according to the current ethos and the requirements of their creditor nations and international agencies, they cannot afford not to develop planning systems. In the former case one could expect fairly elaborate systems; in the latter, minimal systems. It is our hypothesis that *a measure of planning system elaboration will relate positively, but at a low level, with measures of urbanization.*

One lesson readily drawn from the burgeoning literature on national planning is that planning systems are most likely to flourish in information-rich political and economic systems. Indeed, an adequate flow of information from all sectors of a social system is a prerequisite for effective planning. Waterston, in his massive compilation of World Bank experience, has stated the obvious, “In summary, planning depends on the existence of qualitative and quantitative facts about resources and economic and social activity.⁴ It is a general tenet of systems analysis as used here that the more elaborated and differentiated a system the more capable it is of responding to a diversity of kinds of information.⁵ Consequently, it is our hypothesis that *there will be a very strong association between a measure of planning system elaboration and measures of information processing capacity in the economic and political systems.* In short, we suggest that the important environment for development of a planning system is not the available wealth in the urban areas of a developing society, but the flexibility and ability to process and channel diverse types of information of the economic and political systems.

A Scale of Planning System Elaboration

To measure the extent of elaboration of planning systems of a number of countries, a thirteen item Guttman scale was constructed. The data in Tables 1 and 2 represent the situation as of approximately 1960. Data availability led to concentration upon the nineteen Latin American nations which were autonomous at that time. Cuba was omitted because of the difficulty of acquiring statistics. Technical details of Guttman scaling and its general applicability to measuring the characteristics of national systems need not concern us here.⁶

The items chosen for Tables 1 and 2 do not, of course, exhaust the possible traits of national planning systems. Fortunately, scalogram analysis requires neither an exhaustive nor a random sample of items. These were chosen because data regarding them were available in two standard sources. However, it is our contention that the thirteen items represent most of the important aspects of national planning systems, as well as important features of one of the most strategic sectoral systems — education.

The most popular item was the central planning office; all nineteen nations possessed

TABLE 1 SCALOGRAM OF LATIN AMERICAN PLANNING SYSTEMS (c. 1960)

	Central Planning Office	Periodic production of national account figures	Official educational plan	Any sectoral planning office	Special training for educational planners	General 2-3 year development plan	Integrated educational plan	General development plan (medium-long term)	Land reform	Regional planning office	Program budgeting by autonomous agencies or sub-national govts.	Program budgeting by public enterprises	Structural reform of administration
Haiti	X	O	O	O	O	O	O	O	O	O	O	O	O
Dominican Rep.	X	O	O	O	O	O	O	O	O	O	O	O	O
Nicaragua	X	O	O	O	O	O	O	O	O	O	O	O	O
Uruguay	X	O	O	O	O	O	O	O	O	O	O	O	O
Paraguay	X	O	X	O	O	O	O	O	O	O	O	O	O
Guatemala	X	X	O	O	O	O	O	O	O	O	O	O	O
El Salvador	X	X	X	O	O	O	O	O	O	O	O	O	O
Peru	X	X	X	X	O	O	O	O	O	O	O	O	O
Costa Rica	X	X	X	X	O	O	O	O	X	O	O	O	O
Honduras	X	X	X	O	X	O	O	O	X	O	X	O	O
Panama	X	X	X	X	X	X	O	O	O	O	O	O	O
Argentina	X	X	X	X	X	O	X	O	O	X	O	O	O
Brazil	X	X	X	X	X	X	X	O	O	X	O	O	O
Ecuador	X	X	X	O	X	X	X	X	O	O	O	O	O
Venezuela	X	X	X	*	O	X	X	X	X	O	O	O	O
Chile	X	X	X	X	X	X	X	X	X	X	O	O	O
Mexico	X	X	X	X	X	X	O	X	X	X	O	O	O
Bolivia	X	X	X	X	O	X	X	X	X	O	X	X	O
Columbia	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes: X indicates an item is present, O that it is absent, and * that there is insufficient data. For those with a technical interest in such matters, the Coefficient of Scalability is .76. Using the combination of Green and Goodman procedures suggested by Chilton (Roland J. Chilton, "A Review and Comparison of Simple Statistical Tests for Scalogram Analysis," *American Sociological Review*, Volume 34, April, 1969) the difference between the obtained C.R. and the expected C.R. is significant at the .00000001 level.

Sources: Educational planning items – Rafael Fernandez, *Situacion del planeamiento integral de la educacion en America Latina* (Washington: Union Panamericana, 1963).

All other items – "Progress in Planning in Latin America," *Economic Bulletin for Latin America*, vol. 8 (October, 1963), pp. 129-46.

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one. Fourteen nations backed up the activities of this office (at least in intention) by producing national account figures. An equal number had an educational plan, which represents at least the effort to plan for the development of a particularly important public sector. Sectoral planning offices of any sort were found in only nine of the nations. Eight provided some form of special training for their educational planners, and eight (but not the same ones), had a general two- or three-year development plan. Seven had integrated their education plan with their general development plan. Six had a medium or long-term general development plan. Seven had adopted some form of legislation affecting basic land reform, the first item which might be taken to represent some legislative impact of planning. Five had established at least one regional planning office. Program budgeting is often held to be a requisite for the control and supervision of various sectors and agencies which are being "planned for." However, only three Latin American nations used such budgeting for autonomous agencies or for sub-national governments, and in only two did public enterprises prepare program budgets. Finally, as another indicator of legislative impact of planning, only one nation had adopted legislation involving a basic structural reform of the national administration.

TABLE 2 SCALE OF LATIN AMERICAN PLANNING SYSTEMS

<u>Step No.</u>	<u>Item</u>	<u>Proportion having Item</u>	<u>Errors</u>
1.	Central Planning Office	1.00	—
2.	Periodic Production of National Account Figures	.74	0
3.	Official Educational Plan	.74	1
4.	Any Sectoral Planning Office	.53	3
5.	Special Training for Educational Planners	.42	3
6.	General 2-3 year Development Plan	.42	1
7.	Education Plan Integrated with General Development Plan	.37	1
8.	General Development Plan (Medium or Long Term)	.31	0
9.	Adoption of Legislation Affecting Basic Land Reform	.37	2
10.	Regional Planning Office	.26	3
11.	Program Budgeting by Autonomous Agencies or Regional or Municipal Governments	.16	1
12.	Program Budgeting by Public Enterprises	.10	0
13.	Adoption of Legislation Affecting Basic Structural Reform of Administration	.05	0

The scale as demonstrated in these tables represents the conditions of about 1960; things have changed since then. However, what is important for present purpose is the ranking which the scale provides of the Latin American nations according to the elaboration of their planning systems. It is this ranking which permits testing the hypotheses noted above.

Testing the Hypotheses

Table 3 presents the rank associations calculated to assess the relationships between the elaboration of planning systems and urbanization and information processing capacity. Since the planning scale and several other of the measures are ordinal, all the data have been converted to rank orderings and a rank association statistic, Kendall's τ_c has been used.⁷

Looking first at the urbanization measures, one notes a wide range and a low mean association (.29). The only urbanization measures which are strongly associated with planning system elaboration are GNP per capita 1950, per capita consumption of commercial energy 1960, and average rate of urbanization 1945-55. Not much of a story can be told on the basis of these three. Fully half of the twenty-two associations calculated are below .30. These results generally confirm the hypothesis that planning system elaboration relates positively but at a low level to urbanization measures. Nations which have a relatively greater degree of urban-based economic development are definitely not those most likely to have the most elaborate national planning systems.

It is clear, however, that our hypothesis is correct in that the information processing capacity of the economic and political systems is highly related to planning system elaboration. Moreover, as forecast, the relationship is particularly strong with the political system. That is the significant aspect of the environment for planning is not wealth, but information.

A Note on Politics and Planning

Since there is considerable discussion of what constitutes an appropriate political environment for planning, it will be useful to pay some attention to section C of Table 3. The highest correlations are with the Lieuwen typology (.74) and the Shapiro classification (.64). Lieuwen's study classifies Latin American polities into three categories, according to the penetration of political life by the armed forces: (1) the government is dominated by the armed forces; (2) a transitional state; (3) the armed forces are non-political.⁸ In Latin America relatively developed planning systems are very likely to be found in polities in which the armed forces are non-political.

Shapiro's work classifies Latin American governments into five types: (1) *caudillo*; (2) conservative with some degree of political democracy; (3) newly established liberal regimes; (4) revolutionary; (5) post-revolutionary.⁹ In the Latin American context revolutions have been fairly frequent and generally have resulted in a weakening of traditional authority. They thus provide one indicator of the breakdown of political rigidity. In this region, highly elaborated planning systems are likely to be found in polities which are revolutionary or post-revolutionary.

The associations with the scale of communicability (.35) and Coleman's index of political competitiveness (.32) are moderate to low. The communicability scale, developed by Ruth Young, is designed to "reflect legitimate, regular and recognized channels of communication between the national government and many sectors of the nation: labor, political parties, the press, business, geographic areas of the country, the people through direct representation, and finally a diversity of minorities and private interests through the existence of a supreme court free of political control."¹⁰ The Coleman index categorizes the nations as politically competitive, semi-competitive, or authoritarian, based on the "expert" judgment of a number of political scientists.¹¹ It would appear that having a polity in which a variety of public sectors are free to compete is of marginal importance to the

TABLE 3 RANK ASSOCIATIONS OF PLANNING SCALE WITH MEASURES OF URBANIZATION AND INFORMATION PROCESSING CAPACITY LATIN AMERICA, USING KENDALL'S TAU_c

	Tau
A. Urbanization Measures	
GNP Per capita 1950	.47
Percentage of population in cities of 20,000+ 1950	.34
Percentage of population over 15 years of age literate 1950	.39
Percentage of population white 1940	.28
Number of radio receivers per 1000 population 1950	.22
GNP per capita 1957	.16
Percentage of population in cities of 100,000 +, 1960	.23
Percentage of population in cities of 2500 + 1960	.35
Percentage of population over 15 years of age literate 1960	.23
Number of radio receivers per 1000 population 1960	.24
Number of telephones per 1000 population 1960	.37
Per capita consumption of commercial energy 1960	.43
Average rate of urbanization 1945-55	.52
Electricity generation in kwh per capita 1960	.30
Newspaper circulation per 1000 population 1960	.18
Newsprint consumption 1960	.34
Number of motor vehicles per 1000 population 1960	.39
Calories consumed per day per capita 1960	.15
Proteins consumed per day per capita 1960	.09
Number of hospital beds per 1000 population 1960	.18
Percentage of urban population served by piped water 1960	.34
Number of persons per physician 1960	.14
B. Economic Information Processing Capacity Measures	
Scale of economic flexibility 1950	.34
Scale of industrial diversity 1950	.53
Percentage of GDP due to manufacturing 1950	.40
Number of radio transmitters 1950	.59
Scale of economic flexibility 1960	.37
Scale of industrial diversity 1960	.43
Percentage of GDP due to manufacturing 1960	.41
Number of radio transmitters 1960	.32
Number of patents filed with the U.S. Patent Office	.40
C. Political Information Processing Capacity Measures	
Scale of national communicability	.35
Lieuwen typology of armed forces in politics	.74
Shapiro classification of Latin American governments	.64
Cutright measure of political development	.14
Coleman index of political competitiveness	.32
Mean association with all urbanization measures	= .29 (Range .09 - .52)
Mean association with all measures of economic information processing capacity	= .42 (Range .32 - .59)
Mean association with all measures of political information processing capacity	= .44 (Range .14 - .74)

development of a national planning system in Latin America. Finally it is interesting to note the very low association with the Cutright measure of political development. This measure scores nations on the basis of the number of years they have had competitively elected legislatures, with more than one party, and competitively elected chief executives.¹² Apparently, having a long history of competitive politics is of no relevance to the elaboration of Latin American planning systems.

In summary, the extent to which a polity is formally competitive and open to influence from many sources is of little consequence for the elaboration of a planning system. The extent to which it is free from military influence and subject to a revolutionary or post revolutionary regime is of great consequence. Note – this does not suggest, as some have maintained, that open competitive politics *impede* planning activity. Although some of these associations are low, none is negative. The evidence simply suggests that this aspect of political life, in at least one region of the world, is not relevant one way or the other to planning.

These data appear to confirm some commonly held suspicions: that planning flourishes in relatively flexible, information-rich economic and political systems; that the amount of available economic resources play a relatively minor role in the adoption of planning; that a rich nation in monetary terms is of minor importance; that being rich in political and economic information, with a political system sufficiently flexible to use that information, is of great importance.

The Effect of Planning System Elaboration

To study adequately the effects on national development of planning system elaboration would require a substantial body of data showing the performance of Latin American nations on such development indicators as those used above, for a period subsequent to 1960. Moreover, since the effects of planning take a considerable length of time to manifest themselves, the data should cover at least a decade. Unfortunately, given the lags in collecting, processing and reporting such data a comprehensive body of data do not yet exist – nor will they be available for several years.

However, there are two relevant data series which have recently become available, dating from approximately 1970, GDP per capita and percentage of GDP due to manufacturing. GDP per capita taps one dimension of national development, urbanization. However, due to well-known measurement problems, it may not capture that dimension adequately. Indeed, we have argued (see reference 1) that, due to its peculiar pattern of association with other important indicators of development, analyses relying solely on GNP per capita (a variable which is highly associated both conceptually and statistically with GDP per capita) in some cases may be misleading. However, since a major goal of most national development efforts is to increase GDP per capita, and since this variable is central to most literature on development,¹³ consideration of the relationship of elaboration of the national planning system and GDP per capita ten years later should be of interest.

As indicated in Table 3, the variable “percentage of GDP due to manufacturing” in smallest space analysis clusters as a measure of economic information-processing capacity. It appears to operate as an indirect but fairly powerful measure of the diversity (the differentiation) of the manufacturing system. Thus, by relating the planning systems scale for 1960 to these two measures, one tapping the “urbanization” dimension and another the “information-processing capacity” dimension, in 1970 one can get some idea of the over-time effects

of having established an elaborate planning system.

Given the cross-sectional patterns of association exhibited earlier in this paper, the first result of this over-time analysis is not surprising. The 1960 planning system scale is more strongly associated with the 1970 information processing capacity indicator (Tau = .23 with percentage of GDP due to manufacturing in 1970) than with the urbanization indicator (Tau = .13 with GDP per capita in 1970).¹⁴ Thus, planning system elaboration in 1960 predicts information-processing capacity ten years later better than it predicts urbanization.

However, inspection of the scattergrams for these two associations indicates that, while the association with percentage of GDP due to manufacturing is reasonably linear, the low association with GDP per capita shows not a random scatter but a strong curvilinear pattern. There is an evident tendency toward a random association among those nations with low GDP per capita in 1970, and a marked tendency toward a positive association among those nations with high GDP per capita in 1970. Given that the ranking of Latin American nations on GDP and GNP per capita has remained relatively constant over time, this pattern suggests that national planning systems may perform quite differently in relatively more and less wealthy societies. To explore this possibility the distribution of Latin American nations on GNP per capita in 1960 was divided in half, and the rank association between planning system elaboration in 1960 and GDP per capita in 1970 was calculated separately for each half.¹⁵ The results are as expected: the rank association is .14 among the less wealthy nations and .32 among the more wealthy nations. The same pattern holds for the association between planning system elaboration in 1960 and percentage of GDP due to manufacturing in 1970. Among the poorer nations the rank association is .21, while among the wealthier nations it is .48. These data suggest that, in terms of subsequent development, the establishment of an elaborate planning system is more likely to be useful if a country is relatively wealthy at the outset.

However, another way of looking at these data is to examine the multiple rank associations of (1) several measures of urbanization and information processing capacity in 1950, (2) planning system elaboration in 1960, and the two development indicators in 1970. The question of interest is this: given the association between various development indicators in 1950 and the two development indicators available for 1970 — 2 decades later — what is the *added* effect of establishing a more or less elaborated planning system midway in the 20 year period? Tables 4 and 5 present the relevant coefficients for GDP per capita 1970 and percentage of GDP due to manufacturing 1970. In both tables column 1 contains the simple associations of several development indicators for which 1950 data are available¹⁶ with the 1970 measure. Column 2 contains the multiple association coefficients obtained when the effect of planning system elaboration in 1960 is added, and column 3 indicates the amount added to the simple associations by planning system elaboration.

The data of Tables 4 and 5 are somewhat complex, since multiple indicators of the two development dimensions are used. To demonstrate the general patterns of association, their data are summarized in Table 6. Here the average simple and multiple associations across the several indicators of each dimension in 1950 are presented, for high and low GNP per capita nations, in relation to four overall types of association:

- A. Urbanization 1950 predicting urbanization 1970
- B. Information processing capacity 1950 predicting urbanization 1970
- C. Information processing capacity 1950 predicting information processing capacity 1970
- D. Urbanization 1950 predicting information processing capacity 1970

TABLE 4 EFFECT OF PLANNING SYSTEM ELABORATION OVER TIME ON GDP PER CAPITA 1970

1950 Variables	<u>Column 1</u> Simple Assoc. with GDP per capita 1970	<u>Column 2</u> Multiple Assoc. adding Planning System Scale	<u>Column 3</u> Amount added by planning System Scale
I AMONG NATIONS RANKING HIGH ON GNP PER CAPITA 1957			
Urbanization			
GNP per capita	.83	.86	.03
Percentage of population in cities of 20,000 +	.78	.92	.14
Percentage of population literate	.21	.47	.26
Number of radio receivers per 1,000' population	.66	.67	.01
Information Processing Capacity			
Scale of economic flexibility	.76	.80	.04
Scale of industrial diversity	.46	.66	.20
Number of radio transmitters	<u>.55</u>	<u>.78</u>	<u>.23</u>
Mean Values	.61	.74	.13
II AMONG NATIONS RANKING LOW ON GNP PER CAPITA 1957			
Urbanization			
GNP per capita	.55	.63	.08
Percentage of population in cities of 20,000 +	.18	.54	.36
Percentage of population literate	.17	.36	.19
Number of radio receivers per 1,000 population	.22	.25	.03
Information Processing Capacity			
Scale of economic flexibility	.39	.43	.04
Scale of industrial diversity	.62	.74	.12
Number of radio transmitters	<u>.64</u>	<u>.85</u>	<u>.21</u>
Mean Values	.40	.54	.15

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TABLE 5 EFFECT OF PLANNING SYSTEM ELABORATION OVER TIME
ON PERCENTAGE OF GDP DUE TO MANUFACTURING, 1970

1950 Variables	Column 1 Simple Assoc. with GDP per capita 1970	Column 2 Multiple Assoc. adding Planning System Scale	Column 3 Amount added by Planning System Scale
I AMONG NATIONS RANKING HIGH ON GNP PER CAPITA 1960			
Urbanization			
GNP per capita	.19	.48	.29
Percentage of population in cities of 20,000 +	.63	.78	.15
Percentage of population literate	.48	.55	.07
Number of radio receivers per 1,000 population	.38	.38	.00
Information Processing Capacity			
Scale of economic flexibility	.45	.53	.08
Scale of industrial diversity	.50	.64	.14
Number of radio transmitters	<u>.39</u>	<u>.71</u>	<u>.32</u>
Mean Values	.43	.57	.15
II AMONG NATIONS RANKING LOW ON GNP PER CAPITA 1960			
Urbanization			
GNP per capita	.43	.52	.09
Percentage of population in cities of 20,000 +	.37	.60	.23
Percentage of population literate	.26	.40	.14
Number of radio receivers per 1,000 population	.49	.49	.00
Information Processing Capacity			
Scale of economic flexibility	.52	.63	.11
Scale of industrial diversity	.61	.71	.10
Number of radio transmitters	<u>.63</u>	<u>.81</u>	<u>.18</u>
Mean Values	.47	.59	.12

TABLE 6 SUMMARY OF SIMPLE AND MULTIPLE ASSOCIATIONS OVER TIME BETWEEN URBANIZATION AND INFORMATION-PROCESSING CAPACITY, WITH AND WITHOUT PLANNING SYSTEM ELABORATION (AVERAGES BASED UPON DATA IN TABLES 4 & 5)

	<u>Column 1</u> Average Simple Association	<u>Column 2</u> Average Multiple Association	<u>Column 3</u> Average Amount added to Simple Association
A. Urbanization 1950 with Urbanization 1970			
High GNP per capita	.62	.73	.11
Low GNP per capita	.28	.44	.16
B. Information Processing Capacity 1950 with Urbanization 1970			
High GNP per capita	.59	.75	.16
Low GNP per capita	.55	.67	.12
C. Information Processing Capacity 1950 with Information Processing Capacity 1970			
High GNP per capita	.45	.63	.18
Low GNP per capita	.59	.72	.13
D. Urbanization 1950 with Information Processing Capacity 1970			
High GNP per capita	.42	.55	.13
Low GNP per capita	.39	.50	.11

The introduction of planning system elaboration does seem to improve the ability to predict performance on the 1970 development indicators. On the average, over all the relationships considered, the multiple associations are just under 30% higher than the simple associations. Two questions then arise: (1) What combination of variables best predicts performance on the 1970 development indicators? (2) Is the contribution of planning system elaboration different in societies having high and low GNP per capita?

The combination of variables which best predicts urbanization in 1970 (GNP per capita) is information processing capacity 1950, plus planning system elaboration (Section B, Table 6). This combination provides a slightly higher multiple association with 1970 GDP per capita than does urbanization 1950 plus planning system elaboration among high GNP per capita nations (multiple Tau = .75 vs. .73). It provides a much stronger multiple association among low GNP per capita nations (multiple Tau = .67 vs. .44). The same condition obtains where predicting information-processing capacity in 1970 (percentage of GDP due to manufacturing). Here too the advantage of information-processing capacity 1950 plus planning system elaboration (as compared to urbanization 1950 plus planning system elaboration) is greater among societies of low GNP per capita (multiple Tau = .72 vs. .50) than those of high GNP per capita (multiple Tau = .63 vs. .55). Thus it appears that the strategy which best predicts the performance on both of the development dimensions considered here, in the 20 years from 1950 to 1970, is to develop the information processing capacity early and then develop the elaborated national planning system. Considering that what we have here called urbanization captures most of the traditional notion of economic development, with or without planning system elaboration, the 1950 urbanization measures *do not* predict either dimension of development in 1970 as well as does the information-processing capacity in 1950.¹⁷ It would appear that, in the long run, information-processing capacity is a more critical dimension of development than the conditions captured by traditional development indicators.

The second question arising from Table 6 is whether the contribution of planning system elaboration is different in high and low GNP per capita nations. Column 3 lists the amounts added to the original simple associations by the inclusion of the planning system scale. Compare the figures for high and low GNP per capita nations for each of the four relationships. In three of the four comparisons (Sections B, C, and D of the Table) the amount added is greater in high GNP per capita societies; in one (Section A) it is greater in the low GNP per capita societies. This confirms the evidence presented earlier that the impact of planning system elaboration is greater in societies which are relatively wealthier at the outset. Although the differences are not large, there is some evidence that investing resources in the establishment of the elaborate planning system is a better bet, in terms of subsequent performance on these two development dimensions, for nations which are relatively well-off to begin with. Lest it be suggested that this difference is due to the less wealthy nations having less elaborate planning systems, it should be noted that the two nations with the highest ranks on the planning scale are among the low scorers on GNP per capita. Moreover, the average planning scale rank in the two groups is identical.

Conclusion

One obvious possible explanation of these findings is that the relatively poorer nations have less institutional capacity to effectively utilize an elaborate planning system — in such nations a planning system is an “empty set.” Although no independent direct evidence of planning “effort” is available, there is indirect evidence which is appropriate. In the Latin

American context one of the important "effects" of planning ought to be some effort at land reform. (Item 9 of the planning system scale refers to land reform.) Ruth Young¹⁸ has recently developed a scale of land reform activity in Latin American nations which captures the situation prior to the Bogota Conference of the OAS, which stimulated "unusual" land reform activity in several countries. The items on the scale, in order of popularity, by scale step, are: (1) There is an agency with land distribution as one of its functions, usually accompanied by small scale land distribution; (2) The nation has a law or agency with land distribution as its aim; (3) There is a formal program with a special agency exclusively devoted to land; (4) There is a full informal program of land distribution or settlement; (5) There is a national law of land settlement of 1958; (6) The nation has a stated aim or law with improvement, rather than reform, as its purpose; (7) The nation has a stated aim or law for land reform, implying expropriation or reorganization of the structure of land. This "effect" scale has a fairly strong association with the planning system scale over all 19 nations ($\text{Tau} = .50$). However, the association is much lower among the low GNP per capita nations (.28) than among the higher GNP per capita nations (.70). Thus there is some evidence that planning has greater "effect" in relatively wealthier nations, but the evidence is hardly conclusive.

All of this does not necessarily imply that a very poor nation is wasting its scarce resources if it embarks upon planning – that planning only bears fruit when the process of development is already fairly well advanced. Though it seems reasonable to expect that the "payoff" to planning will be somewhat higher in the relatively more developed nations, it is not nonexistent among the poorer ones. Also, these data refer to one region of the world – one with its own peculiar political and administrative traditions – and only one period of time – albeit a relatively long and crucial period. Generalizations to other regions and future time must be very tentative. Moreover, this analysis focusses on only two development variables in 1970. In themselves they are important variables, and they represent the two broad dimensions of development which have been identified as significant in earlier work, but still they are only two. As broader data sets of recent date become available, this analysis should be filled out in order to test these findings.

The general strategic lesson suggested by this exercise is that attempts to establish very elaborate planning systems in very poor nations should proceed with caution. That we should have learned this some time ago is fairly obvious. However, the author's recent experience in developing nations suggests that the warning bears repeating.

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2. See, for example, Theodore Caplow and Kurt Finsterbusch, *A Matrix of Modernization*, paper prepared for presentation at the 1964 meetings of the American Sociological Society (New York: Columbia University, Bureau of Applied Social Research, 1964); Leo F. Schnore, "The Statistical Measurement of Urbanization and Economic Development," *Land Economics*, 37 (August 1961); Jack Sawyer, "Dimensions of Nations: Size, Wealth, and Politics," *American Journal of Sociology*, 63 (September 1967).
3. Ruth C. Young. "A Structural Approach to Development," *The Journal of Developing Areas*, 2 (April 1968), p.354.
4. Albert Waterston. *Development Planning: Lessons of Experience*. Baltimore: The Johns Hopkins Press, 1965, p. 198.
5. David Easton. *A Framework for Political Analysis*. Englewood Cliffs, N.J.: Prentice Hall, 1965, p. 123; Walter Buckley, *Sociology and Modern Systems Theory*. Englewood Cliffs, N.J.: Prentice Hall, 1967, p. 50.

6. For such discussion see Joseph P. Farrell. "The Structural Differentiation of Developing Educational Systems," *Comparative Educational Review*, XIII, 3 (1969); Don Adams and Joseph P. Farrell, "Societal Differentiation and Educational Differentiation," *Comparative Education Review*, V, 3 (1969).
7. In considering the results of this analysis, not too much emphasis should be placed on any single coefficient. Given the well-known problems of reliability and validity which plague the user of most "found" quantitative cross-national data series, the best strategy (and the one followed here) is *not* to peg the analysis to single coefficients, but rather to use alternative indicators and search for general patterns of association. The tau statistic used here provides a direct measure of the extent to which two rankings are in agreement. It is not analogous to the more commonly used Pearson product-moment correlation coefficient (r). Among other things, values of Tau typically are far smaller for the same data than values of r . If there are no ties on either ranking, the absolute value of Tau, not its square, can be interpreted as indicating proportional reduction in error of estimation made possible by the relationship. According to Hays, a Tau of .62, for example, should be interpreted as follows: "If a pair of objects is drawn at random from among those ranked, the probability that those two objects will show the same relative order in both rankings is .62 *more* than the probability that they would show a different order. In other words, from the evidence at hand it is a considerably better bet that the "... randomly selected pair [will be ordered] in the same way than in a different way." William L. Hays. *Statistics for Psychologists*. New York: Holt, Rinehart and Winston, 1963, p. 649.
8. Edwin Lieuwen. *Arms and Politics in Latin America*. New York: Praeger, 1961.
9. Samuel Shapiro. *Invisible Latin America*. Boston: Beacon Press, 1963, Chapter 2.
10. The following items are found on this scale, by scale step, according to degree of popularity: (1) There were functioning political parties as of 1963; unions are not controlled by the government; (2) There is a free domestic press; there was a wholly elective functioning legislature in 1963; (3) There is no dictator form of government, nor has there been a conservative counter-revolution with a suppression of the legislature; there were elections in 1963-64; (4) There are supreme court justices elected or appointed for life; (5) The nation has a federal form of government; (6) There is an unlimited right to strike; there are frequent strikes. Ruth C. Young. "The Plantation Economy and Industrial Development in Latin America," *Economic Development and Cultural Change*. (Forthcoming).
11. James S. Coleman, "Conclusion," in *The Politics of the Developing Areas*. Eds., G.A. Almond and J.S. Coleman, Princeton: Princeton University Press, 1960.
12. Phillips Cutright. "National Political Development: Measurement and Analysis," *American Sociological Review*, 28 (April 1963).
13. For a recent example see Everett E. Hagen and Oli Hawrylyshyn, "Analysis of World Income and Growth, 1955-65," *Economic Development and Cultural Change*, 18, (October 1969), Part II.
14. The temptation to use the data from two points in time to construct rate-of-change indices has been resisted. Several methods for calculating such rates exist, each of which gives a different ranking of nations. It thus becomes impossible to interpret correlations using such indices, for one cannot determine whether the observed coefficients reflect the actual relationship between the variables or are a reflection of the particular method of calculation used. For an example of the difficulties in interpretation presented by rate-of-change indices see Nancy Baster, *Aspects of Social and Economic Growth: A Pilot Statistical Study*. Geneva: United Nations Research Institute for Social Development, 1965, pp. 17-19
15. The nations with low GNP per capita are: Haiti, Bolivia, Paraguay, Honduras, Ecuador, Columbia, Guatemala, Brazil and Peru. Those with high GNP per capita are: El Salvador, Dominican Republic, Nicaragua, Costa Rica, Mexico, Chile, Panama, Uruguay, Venezuela and Argentina.
16. One 1950 variable, percentage of GDP due to manufacturing, was eliminated from this stage of the analysis. The pattern of missing data produced considerably different Ns in the high and low GNP groups.
17. This conclusion runs counter to the indications of the author's earlier study (reference 1) covering the years 1950-1960, in which it was found that urbanization predicted information-processing capacity better than the reverse. Over the longer time period we find information-processing capacity gaining predictive pre-eminence.
18. Ruth C. Young, *Some Dimensions of Development: A Cross-National Study*. Cornell University: Unpublished manuscript, p. 87.

NEEDS ASSESSMENT IN EDUCATIONAL PLANNING

The educational planning function, whether it be conducted at a broad policy level encompassing a nation or a state or at a much more specific operational level, such as a school district, is one component of a system. This system is a natural network of interactions and interrelations. Thus, although planning is an activity designed to bring order, rationality and comprehensibility to the system, its implementation will change that system. This is so because a planning function sophisticated enough to deal with the complexities of the system will, of necessity, enter the system to obtain the required data, and, by this entry, will signal a potential alteration to the perceived *status quo*. The entry will also focus attention upon certain components of the natural system, thereby setting the stage for some sort of alteration of these components.

Planning therefore must be viewed as a dynamic function, undergoing continuous reality testing and subject to frequent revision.

A contrasting approach, one which might be called non-planning, frequently operates: The system is allowed to evolve by itself, with policy makers primarily reacting to crises or dealing with a limited sub-set of the network of interactions which comprise the system. This approach is popular because it does not require of administrators the Intellectual risks inherent in stating a position, a judgment, or an expectation. However, one of the functions of planning is to reduce the reactive nature of decision making and increase the data available for systematic analysis.

Although assessment is an information gathering sub-set of the planning function, in the educational setting all too frequently it has been viewed in relative isolation, and therefore has made limited contribution to changing the educational scene. Consequently many assessment specialists have expanded their definition to include other elements of the planning function, particularly those concerned with the process politics of assessment. Examples are broadly based goal setting activities and information utilizing activities such as were described by data interpretation teams in the *Pennsylvania Plan*.¹ The discussion which follows uses an expanded definition of assessment, thereby drawing attention to other elements of the planning system, especially those which are closely interactive with assessment and which may immediately precede or follow the data collection function.

To illustrate the necessity of these elements, a brief detour into history is helpful. Three events in the recent past have influenced the nature and direction of assessment activity. The first was the effort of state legislators to determine somehow what constituted a high quality school in contrast to a low quality school. In response to this quandary, the Pennsylvania legislature passed an act requiring the Commonwealth's Board of Education to devise a plan for evaluating the effectiveness of the educational programs offered by the schools in the state (Sec. 290.1 of Act 299, August 8, 1963). Note that it is programs, not students, which are to be evaluated. To meet the legislative requirement, thoughtful evaluators drew up assessment plans which were responsive to the complexities of the

*Director, Center for State Assessment, Educational Testing Service, Princeton, New Jersey. This was one of the papers of the ISEP/TAPER San Antonio conference, June 1973.

situation.² Early efforts to implement such plans highlighted the problems and promise of assessment programs.

The next event which added substantial momentum to the assessment movement was the organizing of the Exploratory Committee on Assessment of Progress in Education. National attention was drawn to the problems of assessment and to the documentation of educational progress — especially because of widespread concern about the use of the data, which culminated in the American Association of School Administrators expressing formal opposition to national assessment. The course of these events is not detailed here because it is well documented elsewhere.^{3 & 4} In this context the Exploratory Committee deemed it wise to make certain decisions about the nature of assessment devices and the use of results, which have markedly influenced the development of assessment.

The next major event which accelerated the assessment movement was the passage of Public Law 89-10, Elementary and Secondary Education Act of 1965. It, together with subsequent Amendments, required that states conduct assessments of educational needs as a prerequisite to applying for grants under Title III of the Act. Many assessment plans designed to meet this requirement later were expanded to include more comprehensive procedures to assess the status and quality of the state's educational programs. (See for example that of the West Virginia Department of Education⁵).

Two types of assessment developed. One, which I label facilitative assessment, concerns itself with resources such as adequate staff, adequate buildings, the availability of certain special programs, and the like. It is assumed that these produce the results toward which the second type of assessment is directed — student attainment or output. Both types are appropriate elements in a planning function, but neither can adequately stand alone.

Against this background, the problems of implementing assessment programs can be considered and reasonable solutions proposed.

If we assume for the purpose of this discussion that we are concerned with a state wide planning function, and if we further assume that educational needs are a measure of the discrepancy between what ought to be and what is, three tasks must be completed before it can reasonably be said that a functioning system exists.

The first is a working description of what ought to be, goals expressed in terms upon which there is sufficient agreement to secure adequate public support. Objectives which can be observed with sufficient precision that their presence or absence can be verified must be derived from the goals. Immutability is definitely not required; in fact is not expected, since the operation of the planning function may reasonably lead to changes in the expectations implied by the statements of what ought to be. The methods for achieving these statements of goals and objectives are varied, but almost always proceed from some preliminary set of statements which are then reviewed and debated by groups of varying constituency until some acceptable agreement is worked out. There are two sources of potential trouble in this process. One is that substantial groups affected by the assessment process will perceive themselves as having been left out and will be inclined to resist the information collection effort. The planner must make a careful judgement about the representativeness of the review groups and take pains to see that the results of their deliberations are publicized among their constituencies. The other risk is that so much time will be expended in the consultation process that the results will lose their political viability before the process is completed.

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If the planner is confident of his sensitivity to the community at large he may proceed with the second and third tasks of assessment activity in parallel with the goal definitions. One of these is the transformation of the statements of goal into more specific observable objectives. The risk herein is that the objectives may not match the final goals. It is desirable, however, to provide the tentative objectives as input to the goal review groups during their discussions, and thereby achieve the efficiency of refining the performance objectives while more sharply defining the goals.

The third task, which ought also to be undertaken simultaneously with the first two, is to determine the role of the assessment data in the planning system. While logically this decision should have been made before any needs assessment activity begins, in the fluid political-educational world which exists the role of assessment data is usually nebulously and simplistically perceived. Some questions, the answers to which determine the nature and scope of an effective program are:

1. Will assessment data be used to allocate resources?
2. Will it replace existing data collection procedures?
3. Can it be used to evaluate teaching effectiveness?
4. At what level will it be usable – state? district? school? classroom?
5. Will it be used to evaluate the effectiveness of programs?

The remainder of this paper will describe an assessment plan designed to deal with the issues raised by these questions. The plan could provide an index which would become a term in a state aid formula, thereby becoming a component of the resource allocation process. It could supplement, as well as replace, parts of existing data collection procedures. While the data produced under the operation of this plan could be a part of the evaluation of teaching effectiveness, it should not be used alone for this purpose. In terms of use the data would begin at the student level, and, in progressively reduced sample percentages, be used at classroom, school, district, and state levels. It would be specifically useful for program evaluation.

There are two central components for such a system. The first is a comprehensive set of observable objectives for the areas to be assessed. It is not necessary that they be hierarchical in nature, although in many instances that will be the approximate case. Nor do they need to be exhaustive, so long as a reasonable sample of the important sub-sets of the domain are included. Objectives defined as enabling and integrative should be included. To illustrate these from the field of decoding the written word (translated - reading), a child should at some point be able to pronounce correctly a series of words with the diphthong *oi* (enabling). After reading the warning label on a bottle of liquid, he decides that it isn't soda and refuses to drink it (integrative).

The second component is a series of objectives-based mini-tasks which can be efficiently recorded for both immediate and subsequent use.

The device for recording the results of the mini-task is a two part, self-scoring answer form with a machine processable first sheet. When separated, the teacher has an immediate feedback on the student's performance, while the machine processable first sheet is forwarded to the next level of data use. Not only can the success or lack of it be recorded in this manner, but the nature of the error can be followed by the teacher using information on the incorrectly selected alternatives. A technical requirement is a means of analyzing the relationships among performance on the mini-tasks and condition variables which may influence learning or, at least, are proxies for the more fundamental influences on learning.

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The fundamental unit of data collection in this system is the individual. From the student two kinds of data are collected. One is success-no success accomplishment of the mini-tasks. An additional kind is a response-to-situation report, either self or observed, which is used to document skill independent goals. The unit of analysis, however, changes with the purpose for which the data is used. Other units of data collection (e.g. housing values) are utilized to provide additional information for specific analyses as needed.

To illustrate the workings of the model, we have charted the flow and utilization of a sub-set of data through the system, see Figure 1. For example, a set of objectives relating to reading are selected for instruction. They include certain enabling objectives such as:

001 The student is able to recognize and identify the long vowel *a* in monosyllabic words.


and certain integrative objectives such as:

007 The student is able to pronounce correctly monosyllabic words containing a long *a*.

It is expected that children will differ in their readiness to attain the objectives and that some will require more time than others. The mini-tasks presented to record the students' attainment are used at varying times for different individuals. First the teacher makes a judgment about the instructional activity to be used. Following a suitable interval, depending on the complexities of the task, the students attempt the mini-task relating to the objective. For those who succeed, a new instructional activity will occur. An alternative set of mini-tasks will be available for students who move through a re-cycle process. For all students, periodic reiteration of conceptually equivalent tasks will be used to verify the reliability of the initial assessment. A reinforcement learning cycle will be available for those showing serious loss. The teacher will have had assessment material of immediate diagnostic value, and data will be preserved for subsequent use in other analyses.

At the end of some period of time — for example a school year — the school will have the number and description of objectives successfully attained, expressed as proportions of students in various groups and according to the expenditure of time involved. The table below shows the type of data presentation which might be suitable.*

PROPORTIONS OF CLASS ACHIEVING OBJECTIVES AFTER VARYING PERIODS OF TIME

Time Weeks	Objectives							N
	001	002	003	004	005	006	007	
12	.25	.05	#	#	#	#	.05	
11	.20	.05					.08	
10	.15	.07					.10	
9	.15	.06					.12	
8	.10	.10					.03	
7	.08	.18						
6	.05	.20						
5		.22						
4		.03						
3								
2								
	.98	.96					.37	

*I am indebted to my colleague, Rex Jackson, of Educational Testing Service for this suggestion.

Figure 1 A Comprehensive Assessment Model Student Module

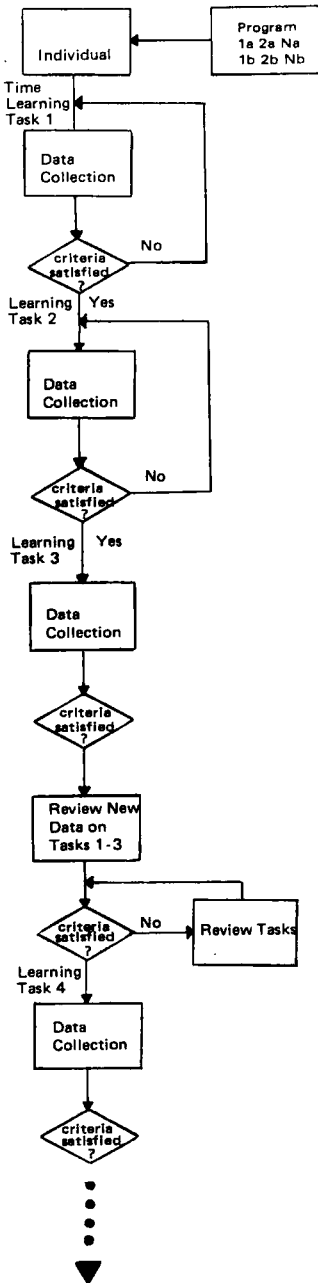


Figure 2 Comprehensive Assessment Model School Module

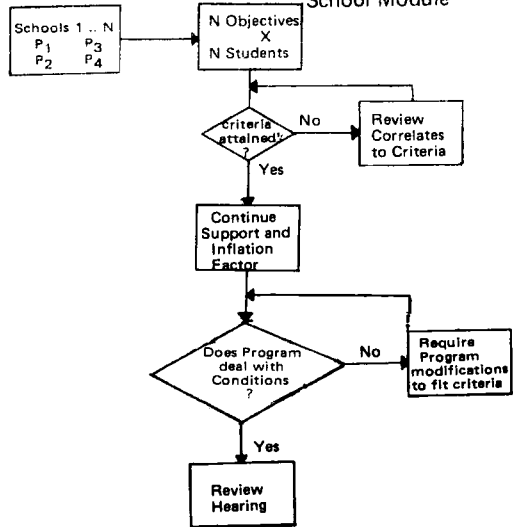
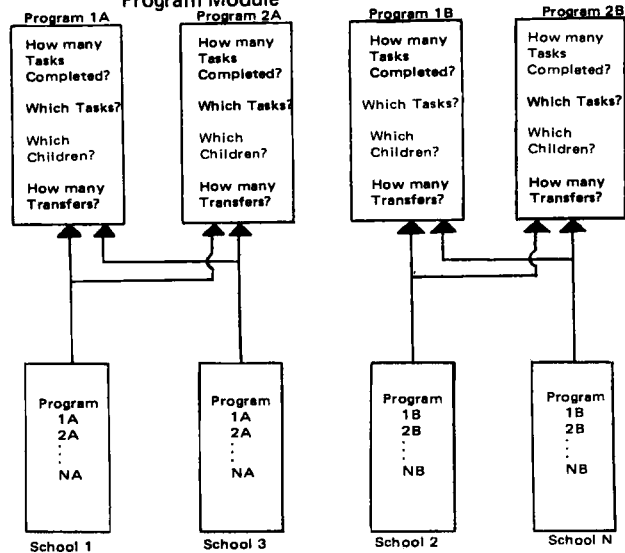


Figure 3 Comprehensive Assessment Model Program Module



As presented here the columns are nominal while the rows are at least ordinal. By using some such hierarchical scheme as Bloom's Taxonomy of Educational Objectives,⁶ objectives could be classified so that the columns would also be ordinal. The sum of the column entries gives the proportion of the group attaining the objective, while the number of columns with an entry indicates the number of objectives which at least some of the class or group attained. If preliminary agreement had been reached about which objectives were appropriate for the class to attain during this period, a comparison of the attained objectives with the intended objectives will provide a discrepancy matrix. A matrix of this type is the information source for program evaluation and possible modification.

At the school level, input data such as previous achievement, proxies for out-of-school experience, language patterns, or other plausible and quantifiable variables can be used as correlates of both the learning time required and the complexity of objectives attained. Hypotheses about strategies for learning improvement can thus be generated and subsequently tested. If more than one program is in operation in the school — that is, alternative learning strategies designed to reach the same objectives — the time required, the proportions successful, and the number and complexity of objectives reached can be compared. It is more likely, however, that this kind of comparison can more profitably be made at a higher level of aggregation such as the district or region. At this level a variety of locations for the same kind of program, and a variety of programs aimed at the same set of objectives should be available (see Figures 2 and 3). Now it becomes possible to compare programs across locations, and school units across programs. Note that schools and programs are the objects of evaluation, not teachers and students. In low success areas, program comparisons permit evaluation which may suggest options for changing the programs or refining their implementation. Strategies for doing this are found in "A Design for Accountability in Education," by McDonald and Forehand.⁷

It is probably unnecessary to consider all of the data used at the classroom level for the district and regional analyses. Rather, representative objectives from broader goal areas should be considered as a sample of the attainments expected. The degree of success in attaining them, as measured by the proportions of students reaching them and the time required for success, becomes the index either of program or of school effectiveness.

As indicated earlier, another kind of data should be collected in an assessment program. Not all of the objectives of a school are cognitive task accomplishments. Some are such humanitarian objectives as the shift from rejection to tolerance of alternative points of view; from rejection to acceptance of other people; the retention of such human traits as curiosity and flexibility; the maintenance of an approaching rather than avoiding attitude toward learning situations. A sampling, across schools, districts, or states should be collected at regular intervals as a monitoring device for institutional condition in relation to such objectives. Problem areas will probably be identified requiring programmatic treatment. These are very important but nebulously defined assessment areas which require much additional study. Although they do not lend themselves to the intensive treatment used for the cognitive tasks, they are included because to collect data about them, however crude, will tend to focus attention upon them of both researcher and practitioner; a necessary first step to the needed study in depth.

The objective sampling model proposed for districts or regional units can readily be expanded for statewide analyses. Indices of performance can be expressed as proportions of objectives attained and time invested, and proportions of successful students. Using

this type of data program evaluation, cost effectiveness studies, and resource allocation can be more systematic than at present. Program evaluation requires an additional monitoring step not yet described. The learning activities of which the various programs purportedly consist must be documented and the data related to them separately categorized. Otherwise, no meaningful differences among programs are likely to be discovered, because the results of differences in practice will be submerged by inclusion in the overall body of data. If differences in results can be shown, and input differences have been accounted for, the time component as well as the program specifications, with attendant costs, will allow cost effectiveness studies to be undertaken. The resource allocation problem can be approached from study of the correlates of time expended and objectives attained, and from consideration of successful programs and their cost. However, the larger question of societal benefit is not answered, nor the judgement of the relative value of the various goals.

The question of politics in a planning model requires more extensive discussion than can be accommodated within the limits of this paper. The reader is referred to excellent treatments by Kirst⁸ and Berke,⁹ and to my comments in other Center publications.^{10 & 11}

In closing, it is worth noting that an assessment model by itself is neither destructive nor supportive of the people, programs, or institutions to which it applies. It is rather analogous to an airplane, which may be used on an errand of mercy to transport a burn victim to the Shriners Hospital for treatment, or to transport napalm to produce more burn victims. To continue the analogy, the model we have proposed here is equipped with fuselage *access* doors to accommodate stretchers and medical supplies rather than bomb bay doors, but its ultimate use depends upon the users.

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APPLICATION OF THE NATIONAL ASSESSMENT MODEL TO STATE AND LOCAL ASSESSMENT NEEDS

National assessment is a nationwide data gathering project designed to collect information about the knowledge, skills and attitudes of young Americans in ten subject areas. The project began in 1964 with the formation of the Exploratory Committee on Assessing the Progress of Education with John Gardner, Ralph Tyler, John Tukey and other distinguished educators and lay persons. The committee was named because of lack of information at the national level of the educational attainments of students and young adults. At that time a great deal was known about the level of educational expenditure in the United States; but little was known about the level of actual achievements of young Americans. A variety of state-administered and school-administered tests were being used; but they only provided achievement scores relating one student to another or one district to another. And these tests were administered under a variety of circumstances, making national comparability impossible. While they were useful for categorizing students or schools, they were not useful for systematically describing what Americans know and can do.

The major purposes for national assessment developed at this early stage were: (1) to obtain census-like data on the educational attainment of a major portion of our national population, and (2) to assess periodically the same subject areas in order to measure the growth or decline in educational achievement taking place over time. Under ECAPE, four years of work (financed by the Carnegie Corporation of New York, the Fund for the Advancement of Education, the Ford Foundation and USOE) went into defining the goals and developing the measuring instrument to respond to these purposes.

Ten subject areas were defined for the assessment: art, career and occupational development, citizenship, literature, mathematics, music, reading, science, social studies and writing. The first assessment, conducted in three areas – science, citizenship and writing – began in the spring of 1969 and extended into the winter of 1970. The present cycle for national assessment calls for two subject areas to be assessed each year; each will be reassessed at five year intervals.

Cycle 1

March 1969 - February 1970	Science, Writing, Citizenship
October 1970 - August 1971	Reading, Literature
October 1971 - August 1972	Music, Social Studies
October 1972 - August 1973	Math, Science
October 1973 - August 1974	Writing, Career and Occupational Development
October 1974 - August 1975	Citizenship, Art

*Director of Operations, National Assessment of Educational Progress, Education Commission of the States, Denver, Colorado. This was one of the papers of the ISEP/TAPER San Antonio conference, June 1973.

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Cycle 2

October 1975 - August 1976	Reading, Literature
October 1976 - August 1977	Music, Social Studies
October 1977 - August 1978	Math, Science
October 1978 - August 1979	Career and Occupational Development, Writing
October 1979 - August 1980	Citizenship, Art

By 1974-75 all ten areas will have been assessed once and several areas twice.

Data for each is collected and reported by several reporting categories: four age levels (9, 13, 17 and young adults 26-35), seven types of communities (low metro, high metro, extreme rural, main big city, urban fringe, medium city and small places), four geographic regions (northeast, southeast, central and west), four educational levels of parent (no high school, some high school, graduated from high school and post high school); color (black and white) and sex (male and female).

Four key steps are involved in assessing a subject area. They span approximately five years from the beginning of development to the final reporting of results and summarization of the area. Initially, objectives are developed for the area to be assessed, with the assistance of consultants from the academic area. Then they are reviewed for acceptability by three groups of people – scholars in the discipline of the subject area, educators teaching it and lay citizens. The second step consists of the development, field testing and revision of exercises or test items designed to measure the degree to which the objectives have been achieved. In the third, the exercises are administered to a national probability sample of young people by a nationwide field testing staff, trained and supervised by national assessment personnel. Finally, the data is scored and analyzed and the results reported to the public and to educational decision-makers.

It must be emphasized that national assessment is an objective-referenced approach to evaluation. The objectives are considered a standard it would be desirable to achieve. The exercises, if they are good measures, determine to what extent the goals expressed in the objectives are being achieved. This approach is intended to describe specifically what a person knows or can do in relation to the objectives established.

This objective-referenced approach contrasts with the traditional norm-referenced assessment approach in that there are no prior standards established for the exercises, and thus there is no comparison of one individual to another based upon some external standard. The two testing methods have different purposes. The results of standardized tests can be used to counsel students, to group them for instructional purposes, or to select them for special programs. The objective-referenced data obtained by national assessment cannot do this. However, when standardized tests are used to evaluate instructional programs in a school or district, they can tell only whether the program is above or below the average of the group upon which the test was standardized. They do not tell what people know or what they can do, except in a very limited sense.

Other differences can be noted between the national assessment model and norm-referenced tests. National assessment attempts to make subject area coverage as comprehensive as possible; efforts are made to measure each objective in the areas being assessed. The total assessment materials for each subject at each age level require between six to eight hours of assessment time. By sampling at both the pupil and item level, the total amount of materials is divided into approximately 35 minute units. No student in school takes

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more than one unit of work; no adult (or 17-year-old being interviewed out of school) takes more than four units of work. Because national assessment is interested in group rather than individual results, it is possible to portion out the materials in this manner and keep the demands placed upon any respondent or school within reasonable limits. Typically, standardized tests involve between 30 and 70 minutes of testing per subject area, and each person takes the same test.

National assessment's mode of administration involves both group and individually administered tests. Paper and pencil tests are administered to groups of up to 12 students and individually administered tests to single respondents. The group tests are administered with a paced tape to remove any bias stemming from reading difficulties rather than inability to comprehend the subject matter. This contrasts with the standardized test program where a youngster must rely on his reading ability in order to understand the meaning of the question. While the group tests are similar to the paper and pencil items given in standardized tests, the individually administered assessment involves more complicated exercises which attempt to measure the youngster's thought process or his ability to perform such manual tasks as conducting a science experiment or playing an instrument. This is quite different from the paper and pencil items administered in large groups which comprise most standardized tests.

Because of the complexity of the developmental process and the administration process, the data collected is more complicated to score than that of the usual standardized test. While national assessment has some multiple-choice materials that can be scored by machine, many are open-ended requiring the respondent to write his answer. Such items need some kind of judgmental scoring from a controlled scoring process. For the more complicated materials, detailed scoring criteria (or keys) have been developed on the basis of field testing which precedes the assessment. Then scorers with specific qualifications in the subject area are trained to evaluate the results in a standardized fashion. This contrasts with the standardized test administration where most materials are objectively scored by machine at a very rapid and inexpensive rate.

The assessment involves materials from a variety of difficulty levels within the subject area at each age level, because national assessment is interested in identifying what the most capable person, the average and the least capable person can do at each age level. Most standardized tests discriminate among youngsters, rank ordering the individual respondents. The materials of the typical standardized test best measure within the average range, allowing certain youngsters to go off the top of the test and others to fail to respond to any of the items.

During the time that national assessment was developing its model, a variety of national, state and local concerns contributed to the development of the "accountability movement." States and local districts realized a need to describe their programs, goals and achievements in ways which would allow educational decision-makers to evaluate them. Oftentimes the requirements for data at the state level were such that traditional standardized tests could not answer all relevant concerns and questions.

In 1970, national assessment, through the Education Commission of the States Steering Committee, adopted a resolution to offer assistance to states developing assessments by using released national assessment items for state programs. By late 1971 the interest in assessment and the demands coming from the field led national assessment to create a new department, the Department of Utilization/Applications, and to include a fifth step in the developmental process — that is, to consult with state and national educational groups in

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the interpretation of national assessment data and the adaptation of the national assessment model to state assessment efforts. The department was established in December 1971 initially to provide states with assistance in developing their own assessment programs, and to respond to many requests from state and professional organizations for the use of national assessment materials. It serves both professional educators and public groups involved in education and, when requested, has responsibility to do the following:

- To meet with state representatives to explain the national assessment model and its objectives and operation.
- To explain how national assessment's model might be adapted to state and local use.
- To provide states with basic cost estimates of performing various tasks in population sampling, exercise administration, etc.
- To assist states in utilizing NAEP assessment materials.
- To identify consultant services to states wishing to implement the technology.
- To provide workshops and seminars for state department representatives and others to show how states can tie in to national assessment as a part of their own program.

One major thrust of the department has been to work with states wishing to adapt the national assessment model for state or local use. However, the staff also provides consultation to local school districts on a limited basis. To date consultation and assistance have been provided to 25 state education departments in adapting the national assessment model, and at least 14 states are currently using some of our materials, exercises and techniques. In a recent Gallup Poll 70% of the persons questioned favored local school testing of students to compare their performance with national results.

NAEP-type data are useful to a state in two ways. First, a state assessment which has nationwide or regional comparability gives educational decision-makers new insight into areas of strengths and weaknesses in their school programs. Secondly, NAEP-type assessment results, because they describe student achievement in terms of specific items of knowledge, give the public a clearer understanding of what students are learning. This is especially important in the current era of accountability when both the public and the state legislators want evidence of the relationship between the time and effort invested and the results produced by school systems.

I would like briefly to describe what four states are doing in utilizing national assessment results and methodology in their state assessment activities: In 1972, the Maine State Department of Education conducted an assessment of citizenship knowledge and of writing skills among 17-year-olds in public and private schools. The results were reported for the state and for four planning regions. This is a part of a ten year assessment program planned to give Maine data on current student performance and comparable data on the change in performance over time. No comparison of the local districts was made, but the state will assist districts interested in conducting their own assessment. The materials used in the Maine assessment were released national assessment materials from the Year 01 assessment, and the methodology used was similar to that of national assessment in hiring staff to carry out the sampling and administration procedures — so that results are comparable to national assessment's findings. In citizenship Maine young people tended to surpass the national performance on concern for the well-being of others and for their rights as individuals. However the national assessment results were so low in some of these areas that this may not be much consolation to the school personnel of Maine.

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Connecticut has conducted a statewide assessment of reading using a selection of national assessment exercises; the results were released in September of 1972. Although the overall performance of 9-, 13- and 17-year-olds was consistently higher than the national percentages of people giving correct responses, the large city group was below the national large city performance in the four skills assessed: understanding, analysis, judgement and use of printed materials. Connecticut is now acting to improve the reading program in its five largest cities.

Colorado carried out a science assessment in the spring of 1972 using NAEP objectives and exercises and following the NAEP sampling method in administering the materials. The state results were compared to national results on 13 of the items reported, and ranged from seven percent above national data to five percent below national percentages. The results are being used by the state to guide Title III funding and by districts for measurement of their individual programs. In spring 1973 Colorado continued its assessment with mathematics, reading and language arts.

National assessment objectives and exercises for science, reading and literature are being used by Iowa to assess grade levels rather than ages, using grades 4, 7 and 12 to obtain student samples. While the data is not directly comparable to that of national assessment, results from this assessment have been compared to the results from the central region of the national assessment, and indicate that Iowa's performance generally is equal or above performance in the central region. However, comparison with National Assessment results is not the main thrust of Iowa's effort. Results will be analyzed on the basis of whether or not the objectives measured by the exercises designed to assess them are in fact being met. In this way the Iowa Department of Education hopes to define areas where students are having difficulty and modify the curriculum to better meet their needs. The state is also participating in cooperative efforts with the local districts to disseminate the assessment objectives for use in local district curriculum development.

Often states are able to go beyond the present scope of national assessment by making district comparisons, by including a variety of social, family, school and economic factors, and by having direct follow-up or remedial programs based upon the assessment results. Michigan, for example, collects and publishes district results within the state. North Carolina, Maine and Minnesota have collected a host of "background factors" related to the social and economic background of the child.

States have made a variety of uses of the exercises and data from national assessment. Their officials can adapt or adopt as much or as little of the national assessment model as they wish. It is not prescriptive in that various aspects can be tailored to the particular requirements of a state or local educational agency. This is particularly useful given the states' concern for assessment programs based upon specific needs, and a public concern for local data which can be considered comparable to national data.

COST UTILITY ANALYSIS FOR PROGRAM EVALUATION AND RESOURCE ALLOCATION

A vast number of the educational institutions across the United States are experiencing financial difficulties. There exists a severe limitation on the supply of public funds for education, while the demand for public expenditure for education seems to be virtually unlimited. Consequently, careful consideration must be given to the process by which the allocation of funds is decided. It has been suggested that cost-benefit and cost-effectiveness techniques would be useful in optimally allocating limited resources to maximize the return from educational investment.

Levin and Shank describe cost-benefit analysis as "a measurement technique in which the total costs of a given program are compared with the probable total benefits."¹ In practice this technique relies almost exclusively on quantifiable, tangible events, which limits benefits to be measured primarily in terms of cognitive achievement. In addition, inputs and outputs are reduced to quantification in monetary terms. Cost-effectiveness analysis is a variation of cost-benefit analysis but there is less emphasis on estimating the dollar return on an educational resource investment and more on correlating the alternative monetary allocations to achievement of specified goals. Therefore, cost-effectiveness normally retains output in raw form without converting it to a dollar value. When this approach is applied to education often the results are broad generalizations which are difficult to translate into recommendation for specific programs at individual schools. However appealing the above approaches may be theoretically, Kaufman has observed that "before cost-effectiveness and cost-benefit analysis can be used effectively, considerable refinement must be done with respect to the relationship between economic concepts and theory and the institutional (e.g., human, political and social patterns of behavior) framework surrounding education."² And Levitan demonstrated the pertinence of this warning by observing that while the Job Corps Program could be fully justified on equitable and moral grounds, such a program was terribly vulnerable to profit and loss analysis.³ One would expect this type of vulnerability to occur frequently when considering expenditures for educational programs; both cost-benefit and cost-effectiveness analysis fail to consider explicitly the decision-maker's judgment of program worth or value. That is, cost-benefit and cost-effectiveness models do not take into consideration intangible, subjective feelings and hunches. They rely on objective inputs; so there will be a judgmental gap between the output of these models and the real world. According to Raiffa, "This judgmental gap is often so wide that the analysis does not pass the threshold of relevance, consequently the analysis may be (and all too often is) general."⁴

In an attempt to reduce the judgmental gap between model output and the real world in 1971 the author developed a *cost-utility* model for optimally allocating resources among competing educational programs.⁵ Cost-utility analysis is quite similar to cost-effectiveness analysis with the major difference that the former considers both quantitative and qualitative determinants of program worth. That is, the decision-maker takes judgments of value

*Assistant Professor, Division of Educational Administration, Lehigh University, Pennsylvania. This was one of the papers of the ISEP/TAPER San Antonio conference, June 1973.

into explicit consideration when evaluating program utility.⁶

Budgeting and Resource Allocation

The quality of management exhibited in school districts throughout the United States is very uneven, in terms of technical capabilities. One of the most common failure areas is budgeting and financial administration.

However educational administrators do not deserve full blame for these failures. It is true that some administrators have exhibited poor judgment in the allocation of scarce resources. For the most part they are not trained managers; and economists, social scientists and operations analysts who have attempted to assist them have failed to provide relevant models amenable to the solution of their problems. In 1967 in *Datamation* Charles Hitch commented:⁷

Economic analysis is concerned with the allocation of resources. Its basic tenet is to maximize the value the resources used. In business this reduces itself to maximizing profits, because both income and outgo are measured in the same units (dollars). In defense, and, generally, in the public sector *we lack a common valuation for objectives and resources.** The result is that we have to use one of two weaker maxims: Maximize objectives for given resources, or minimize resources for given objectives.

In the development of resource allocation models optimization decision-making theory has been used extensively by operations analysts. The concept is intuitively quite simple: Given a mix of resources, allocate the resources to maximize some index which reflects the utility of a set of goals or objectives. Luce and Raiffa stated this more formally as follows:⁸

Let X be a generic act in a given set F of feasible acts and let $f(x)$ be an index associated with (appraising) X ; then find X in F which yields the maximum (or minimum) index — i.e., $f(x)$ is greater than, or equal to, $f(x)$ for all X .

Utilizing the optimization concepts of decision theory, cost-utility analysis generally assumes one of two general formats:

1. For a specified level of utility the decision-maker seeks to choose from the set of F possible resource alternatives that mix which optimizes the given index of cost, $f(x)$, i.e., which minimizes program costs for a specified level of utility; or
2. For a specified level of costs the decision-maker seeks to choose from the set F of possible resource alternatives that mix which optimizes the index of utility, $f(x)$, i.e., which maximizes utility for some fixed level of costs.

Cost-effectiveness, cost-benefit and cost-utility techniques have been suggested as a basis for decision-making in education by a large number of authors during the past decade. In 1970 Temkin concluded that: "Firm theoretical bases for these studies are lacking. Theory in the domain of decision-making, should provide not only a basis for description and explanation, but explicit statements of assumptions underlying the proposed rationale or methodology."⁹ Cost-benefit and cost-utility methods fared no better in providing the educational decision-maker with explicit statements of the assumptions upon which the resource allocation model is based. When optimizing the allocation of resources to programs, the educational decision-maker is faced with a number of alternative decision sets

*Our emphasis.

with respect to a proximate measure of the relationship between educational inputs and outputs. He may choose to characterize the relationship as one of cost versus an indirect measurement of attainment of the program's objectives (such as pupil-teacher ratios, dollar expenditure per pupil), or he may decide to identify it as one of costs versus some comprehensive measure of attainment of the program's objectives (such as a measure of program worth or value).

Robert N. Anthony in "Planning and Control Systems: A Framework for Analysis"¹⁰ stated that every budgetary system comprises three processes, not always distinguishable operationally but identifiable as:

Planning which involves the determination of objectives, the evaluation of actions and the authorization of select programs.

Management which involves the programming of approved goals into specific programs, the design of organizational units to carry out approved programs and the staffing of these units and the procurement of necessary resources.

Control which refers to the process of binding operating officials to the policies and plans set forth by their superiors.

Utilizing Anthony's conceptual framework for a longitudinal study of budgetary reform in the United States government Schick¹¹ observed that the control process predominated in the years from 1920 until 1935. The primary concern was to develop systems for expenditure control, and there followed a demand for trained accountants. The management process was dominant from 1935 until the early 1960s, an era which saw the advent of performance contracting in governmental agencies — an interesting concept which is receiving considerable attention in American elementary and secondary education.¹² In the present era, the planning era, there has been emphasis on the integration of budgeting and planning, typified by the introduction of PPB in all agencies of the federal government. Schick sees the planning stage as manifesting the following characteristics: Economic analysis has had an increasing role in shaping fiscal and budgetary policy; new informational and decision-making techniques have enlarged the applicability of objective analysis to policy making; and a convergence has gradually occurred between the overall planning process and the budgetary process.

In Kopff's opinion the first activity, especially microanalysis, has led to cost-utility analysis. Initially this analysis was developed by welfare economists in their efforts to generate a science of public finance. As he states, "Such a science of public finance, predicated on the principle of marginal utility, would furnish objective criteria for determining the optimal allocation of public funds amongst competing uses by appraising the marginal costs and the marginal benefits that would accrue from alternatives, thereby determining the combination which maximized utility."¹³ The new informational and decision-making techniques are exemplified by the electronic computer and comparatively recent developments in statistical decision theory.

In his dissertation, Charles T. Nephew¹⁴ examined the fiscal allocation patterns of 119 school districts in ten states to determine and specify any functional relationship between resource inputs and educational outputs. He concluded that "... money and the manner in which it is allocated to expenditure sub-categories does have an effect on school output, even after the effect of socio-economic background has been accounted for." And also, "One can reasonably conclude that local school boards and their staffs must assign priorities to school objectives before allocating the available financial resources to specific categories

within the school budget ... across the board cuts or increases are not the answer.”

In other words, the setting of priorities for allocations to competing educational programs is not an objective process. Quite the contrary, it is primarily a judgmental process.

Levels of Resource Allocation

One might conceive the budgeting process for a local educational agency as a process of resource allocation reallocation which progresses from the macro-organizational level to the micro-organizational level as demonstrated in figure 1.

The budget constraint at the district (macro) level is determined primarily by political events at the local, state and federal levels. Such political events would be exemplified at the local level through bond issues, at the state level through subsidies, at the federal government through federal revenue-sharing.

Here we are not really concerned with the process by which the freely allocatable portion of the K dollar budget is allocated to individual buildings or schools, only how it provides a constrained budget for the individual school. This is done in most cases on a simple per pupil dollar allocation formula.

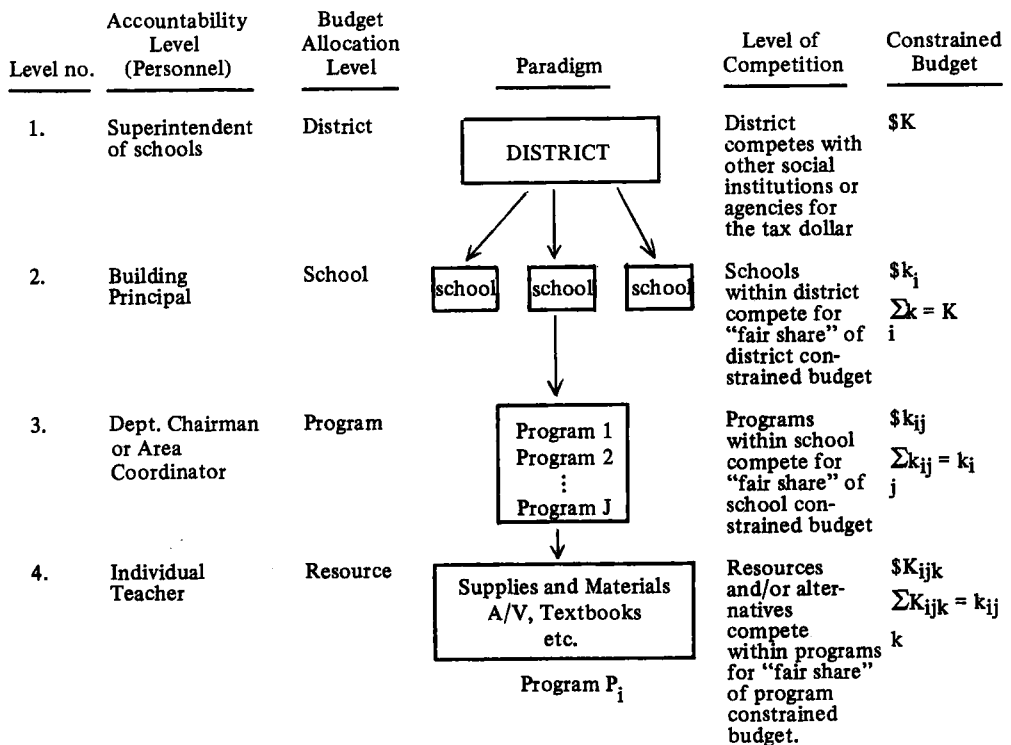


Figure 1 Budget Allocation Reallocation

At the third level we are given a constrained budget of k_{ij} dollars to be distributed in some manner to j programs within school i . The questions to be answered at this level are "What do we value in education?" and, "How should we allocate the constrained budget so as to maximize some measure of total program worth?" That is, how should we budget the k_{ij} dollars to the competing programs within school i to maximize the total worth (utility) of the j programs? The allocation of funds to specific programs by the process suggested for level three budgeting provides a budget constraint of k_{ijk} dollars for each of the j programs. At this level we are not so concerned with the value (utility) of a program *per se* as much as, given a constrained budget of k_{ijk} dollars for program j , the most "effective" mix of resources for that program's objectives.

School personnel are continually faced with choosing a solution from competing alternatives. Essentially this is a decision process. The nature of the decision process is the implication of a futuristic orientation, one of anticipating the consequences of acting on the decision-alternatives. Since the educational decision maker must make a choice, it seems apparent that in some way he must weigh anticipated consequences against various factors to reach an overriding value assessment which will determine his choice. The decision process, in arriving at an educational budget allocation, involves a high degree of uncertainty, so values and personal judgment play an important part.

Level 3 Budgeting Process (Model I)

References to Model I are illustrated by the basic value decision model represented in figure 2. In Model I the a_i are programs (such as mathematics, science, english, social studies) in which the utility of program i is the sum of weighted utilities across the k criteria. That is $U_i = \sum_k U_{ik} W_k$. The numerical value of U_i is then utilized in allocating a constrained budget to the i competing programs.

Figure 2: Basic Value Decision Model

Weight	W_1	W_2	W_3	"	W_k	"	
Criteria	C_1	C_2	C_3	"	C_k	"	
a_1	U_{11}	U_{12}	U_{13}	"	U_{1k}		
a_2	U_{21}	U_{22}	U_{23}	"	U_{2k}		
.							
.							
a_i	U_{i1}	U_{i2}	U_{i3}	"	U_{ik}	"	

a_i = alternative

C_k = criterion for assigning utility

W_k = importance of C_k , $\sum_k W_k = 1$

U_{ik} = utility associated with a_i and C_k

$U_i = \sum_k U_{ik} W_k =$ asymptotic utility of alternative i

The Cost-Utility Model I requires that programs competing for funds be specified along with a set of criteria by which the relative value or worth (a numerical measure of program worth of each program) can be judged by the decision-maker. Subsequently, a numerical measure (utility) is assigned to each cell in the program-criteria matrix. That is, the decision-maker must assign a value to program-criterion combinations, and the values assigned represent the potential value or worth of each program with respect to attaining the specified

program criterion.

The numerical values assigned to the program-criterion matrix are checked for consistency with the decision-maker's judgments by using the Churchman-Ackoff approximate measure of value or worth (see reference 5).

The process of allocating expenditures to educational programs to maximize total program worth can begin once the programs have been evaluated, and the constrained budget and individual program threshold costs have been determined. An interactive computer program has been written which can be used by the decision-maker to evaluate programs and allocate expenditures to programs which will maximize total program worth. The algorithm to maximize total program worth is based on optimization theory using the Lagrange Multiplier Technique and recursion methods.

In order to allocate limited resources among competing programs based on the utility of these programs, it is necessary first to establish a functional relationship between the utility of a program and the cost of each program at various levels of cost. The utility of a program is defined as a real valued number which expresses an evaluator's judgment of the degree to which a given program has the potential to contribute to the satisfaction of some stated criterion or objective. (It is assumed that the evaluator's judgment or preference takes into consideration both qualitative and quantitative factors.) The resources allocated to a given program depend upon the degree to which it satisfies a given set of criteria or objectives. In other words utility is a function of the level of expenditure and some set of criteria or objectives. A number of relationships between utility and level of expenditure become immediately obvious, which will enable us to determine a relatively good approximation of the cost-utility curve, and subsequently a functional relationship between program expenditure and program utility. These underlying assumptions are that:

1. a program allocated zero resources has zero utility for any set of criteria or objectives;
2. the utility of a program increases as its level of expenditure increases;
3. there is a minimum level of program expenditure which must be allocated to a given program if it is to operate at all. (Corresponding to this threshold level of program expenditure is a minimum level of acceptable utility. A utility value below this level implies a non-operable level of program expenditure.)
4. the utility of a program does not increase indefinitely as it is allocated greater and greater expenditure levels. (This seems reasonable; for example, it is doubtful if teachers' salaries were doubled that the value or worth of the program would also double. That is, beyond the threshold level of utility the marginal utility decreases as the expenditure level increases.)

Resource Allocation Model

The results of the previous sections provide a functional relationship between the utility, $U_i(x_i)$, and the level of expenditure, x_i , for any program i , $i = 1, 2, \dots, L$. That is, given program threshold cost, C_i , $i = 1, 2, \dots, L$, and the corresponding values $U_i(x_i)$, $i = 1, 2, \dots, L$ derived by methods outlined in the evaluation model, it is assumed that $U_i(x_i)$ and x_i are functionally related by the logarithmic function:

$$U_i(x_i) = U_{je}^{-B_i/x_i} \quad \text{Where } B_i = 2C_i$$

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The problem now is to find the values $x_i, i = 1, 2, \dots, L$ constrained by N dollars allocated amongst L programs

and the sum, $\sum_{i=1}^L U_i(x_i)$, is maximized, i.e.,

$$\text{MAX: } \sum_{i=1}^L U_i(x_i) \tag{1}$$

$$\text{S.T.: } \sum_{i=1}^L x_i = N \tag{2}$$

For example, consider the case where $L = 2$. By the method of Lagrange multipliers, a general method for finding an extreme value (maximum or minimum) of a function subject to one or more constraints,

$$F(x_1, x_2) = \sum_{i=1}^2 U_i e^{-B_i/x_i} + (\sum_{i=1}^2 x_i - N).$$

Sample output from the expenditure allocation algorithm with $N = 37,000$ would appear as follows:

<u>Program</u>	<u>Expenditure</u>	<u>Utility</u>
Math	\$10,200	18.7
Science	9,800	16.4
English	8,300	9.3
Social Studies	<u>8,700</u>	<u>10.6</u>
Total	\$37,000	55.0

Level 4 Budgeting Process (Model II)

After the budget constraints for programs within a school are determined, the decision maker is faced with the choice of the “best” mix of alternative resources consistent with some identified decision criteria.

In such a situation we must identify an objective function which will combine information concerning the utility of outcomes (see Figure 3) and the probability of outcomes (see Figure 4) into an estimate of expected utility, assuming that the decision rule is to maximize expected utility.

Figure 3: Matrix of Utility Function $U(C_i)_j$

		Alternatives		
		a_1	a_2	a_j
Criteria	C_1	$U(C_1)_1$		$U(C_1)_j$
	C_2	$U(C_2)_1$	$U(C_2)_2$	$U(C_2)_j$
	C_i	$U(C_i)_1$	$U(C_i)_2$	$U(C_i)_j$

$U(C_i)_j =$ utility of C_i given a_j

C_{ij}

Figure 4: Matrix of Outcome Estimates $f(C_i)_j$

		Alternatives		
		a_1	a_2	a_j
Criteria	C_1	$f(C_1)_1$	$f(C_1)_2$	$f(C_1)_j$
	C_2	$f(C_2)_1$	$f(C_2)_2$	$f(C_2)_j$
	C_i	$f(C_i)_1$	$f(C_i)_2$	$f(C_i)_j$

$f(C_i)_j = f(C_i a_j) =$ estimated probability density function of C_i given a_j

The objective function then becomes:

$$U_j = U [u(C_i)_j, f(C_i)_j]$$

where U_j = expected utility associated with alternative a_j .

$U[]$ = functional notation.

$U(C_i)_j$ = set of utility estimates.

$f(C_i)_j$ = probability density function of criteria estimates.

Let U_{ij} = the expected utility of C_i given a_j .

If C_i is measured on a continuous scale, then

$$U_{ij} = \int_{-\infty}^{\infty} U(C_i)_j \cdot f(C_i)_j \cdot dC_i.$$

Assuming that the criteria are independent in terms of value, the expected utility of alternative a_j becomes:

$$U_j = \sum_i \int_{-\infty}^{\infty} U(C_i)_j \cdot f(C_i)_j \cdot dC_i$$

The decision rule then is to choose that alternative which has the greatest expected utility.

Model I (Simulated Application)

For purposes of the simulated application, we will assume that five programs – mathematics, science, English, social studies and languages – are to be evaluated against the following four criteria: relevance, generality, assimilation and urgency. In addition, we shall assume values for the following threshold levels of program expenditure, C_i :

<u>Program</u>	<u>Threshold level (C_i)</u>
Mathematics	\$ 2,400
Science	3,200
English	1,800
Social Studies	2,100
Languages	<u>1,850</u>
Total	\$11,350

And we shall assume that the total budget constraint = $N = \$20,000$.

Since the $\sum_{i=1}^5 C_i$ is equal to \$11,350 and the budget constraint is \$20,000 the question to be answered is how should the $N - \sum C_i$ dollars be allocated to the various programs to maximize total program utility; or more generally, how should the \$20,000 be allocated to the various programs to maximize total program utility given the asymptotic levels of program utility derived from the individual assigned program-criterion utilities?

The entire process of program evaluation and budget allocation can be processed via computer terminal interaction. The following utilities are assigned by the first evaluator:

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	<u>Relevance</u>	<u>Generality</u>	<u>Assimilation</u>	<u>Urgency</u>
Math.	85.00	50.00	45.00	75.00
Science	90.00	65.00	67.00	78.00
English	95.00	75.00	75.00	85.00
Social Studies	75.00	67.00	56.00	76.00
Language	64.00	56.00	45.00	54.00

The program allows for additional evaluators to assign utilities to the programs based on the same criteria, and the following represents the next evaluator's utility ratings:

Math.	50.00	50.00	60.00	60.00
Science	55.00	75.00	85.00	75.00
English	75.00	95.00	50.00	70.00
Social Studies	80.00	80.00	55.00	85.00
Language	60.00	50.00	50.00	50.00

After all evaluators have entered their utility ratings, a composite evaluation matrix is produced, as well as a standard deviation matrix, as shown in the next two tables:

Math.	67.50	50.00	52.50	67.50
Science	72.50	70.00	76.00	76.50
English	85.00	85.00	62.50	77.50
Social Studies	77.50	73.50	55.50	80.50
Language	62.00	53.00	47.50	52.00

Math.	17.50	0.00	7.50	7.50
Science	17.50	5.00	9.00	1.50
English	10.00	10.00	12.50	7.50
Social Studies	2.50	6.50	.50	4.50
Language	2.00	3.00	2.50	2.00

A weighting factor between 0 and 100 is assigned to each criterion, as follows:

Relevance	— 100
Generality	— 50
Assimilation	— 50
Urgency	— 20

Given this information, the program then calculates the following program utilities:

Mathematics	60.11
Science	73.09
English	79.20
Social Studies	71.86
Language	55.75

Cost-utility curves are then plotted either for individual programs or program combinations (see figures 5, 6 and 7).

Figure 5: Cost-Utility Curve of the Mathematics Program

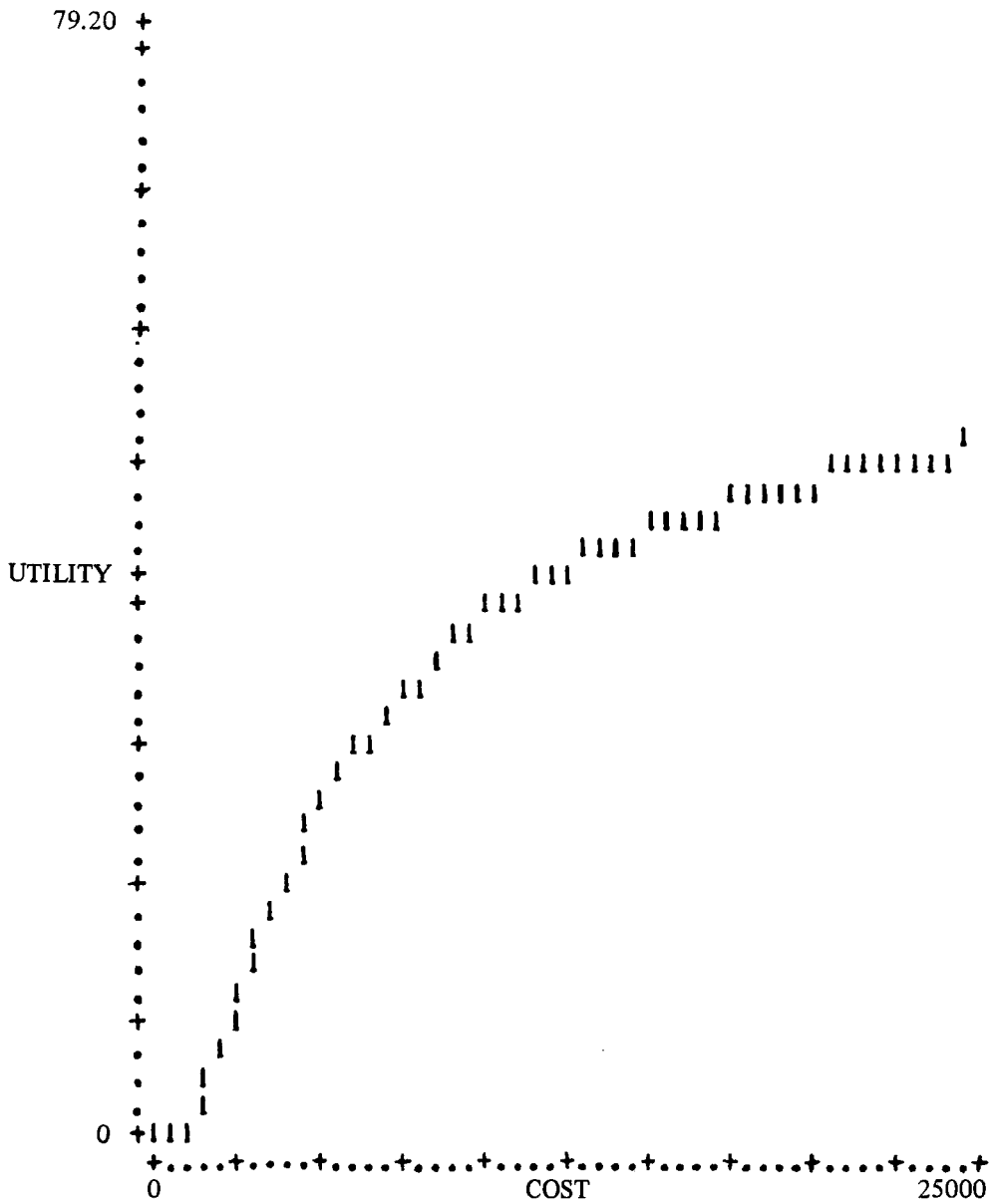


Figure 6: Cost-Utility Curves of the Mathematics and Science Programs

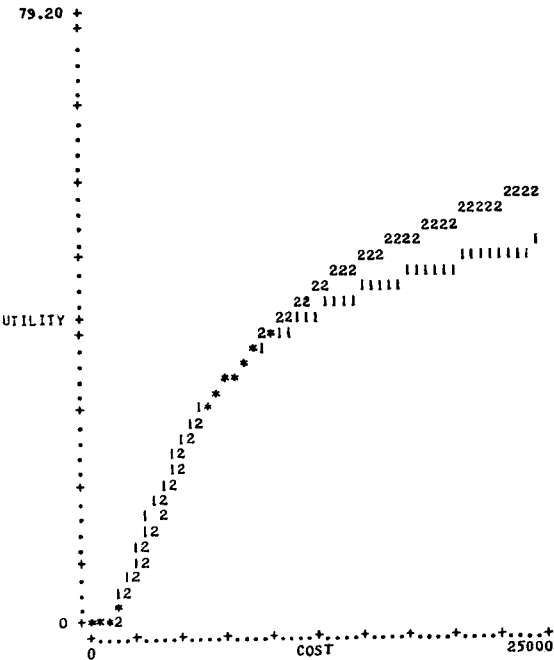
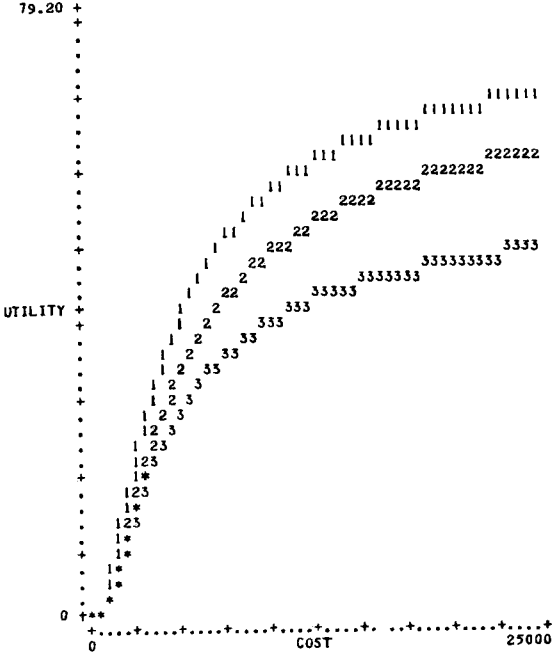


Figure 7: Cost-Utility Curves of the English, Social Studies and Language Programs



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Finally, the program calculates the optimal budget allocation between the programs, given the budget constraint of \$20,000, as follows:

<u>Program</u>	<u>Cost</u>	<u>Utility</u>
Mathematics	\$ 3515.33	15.3
Science	3898.76	14.2
English	4725.73	37.0
Social Studies	4429.31	27.8
Language	3430.87	19.0
Total	20000.00	113.3

The program allows for alteration of the total budget constraint, and prints out the optimal budget allocation to programs, indicating which programs must operate at the threshold level. When the total allowable budget is below that required for the threshold level of operation, a statement to this effect is produced, and the program is terminated.

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Competency-Based Teacher Education. Dan Anderson *et al.* Berkeley: McCutchan, 1973; *Competency-Based Teacher Education: Progress, Problems and Prospects*. W. Robert Houston and Robert B. Howsam, eds. Chicago: Science Research Associates, 1972; *Partners for Educational Reform and Renewal*. George E. Dickson, Richard W. Saxe *et al.* Berkeley: McCutchan, 1973; *Exploring Competency-Based Education*. W. Robert Houston, ed. Berkeley: McCutchan, 1974.

Competency-Based Teacher Education (CBTE) programs have developed in the United States over the past five years so rapidly that a major movement in educational reform must be noted. CBTE, however, is simply a useful rubric for linking a number of innovative threads. Houston and Howsam find these characteristics germane to CBTE:

Competency-based instruction is a simple, straightforward concept with the following central characteristics: (1) specification of learner objectives in behavioral terms; (2) specification of the means for determining whether performance meets the indicated criterion levels; (3) provision for one or more modes of instruction pertinent to the objectives, through which the learning activities may take place; (4) public sharing of the objectives, criteria, means of assessment and alternative activities; (5) assessment of the learning experience in terms of competency criteria; and (6) placement on the learner of the accountability for meeting the criteria. Other concepts and procedures – such as modularized packaging, the systems approach, educational technology, and guidance and management support – are employed as means in implementing the competency-based commitment. For the most part these contributory concepts are related to individualization.

Although there are numerous roots to any movement, CBTE may be said to have begun in 1969 when the US Office of Education funded the development of nine innovative models of elementary teacher preparation. Each model was required to use such planning concepts as systems analysis; to base evaluation on the achievement of competencies (rather than the taking of courses); to center teacher training in the school rather than the university classroom; to develop a team approach to teaching; and to individualize instruction for each teacher candidate, as well as encourage individualization in the schools.

The design process required new and cooperative relationships among the principle decision-makers of teacher education: the local school district, the college of education and the state education department. In particular, the models demanded new forms and processes of planning and management. Individual instruction and self-pacing meant that data on student progress had to be recorded in carefully designed format and, usually, computer stored. Feedback from performance became an important input for program redesign, which came to be seen as a continuing process.

Several other marked changes were precipitated by the models program: the team concept led to a re-analysis of teacher roles and interactions. New and individualized curricula could now be implemented because the team permitted various sized learning groups and modular scheduling. Diagnostic centers, staffed by specialists and located in the school, helped student teachers meet specific needs and sometimes gave feedback on a daily basis. In such a school the principal becomes a manager of the learning process because the structure of the institution must be realigned to meet the requirements of the new programs. What began as a careful design of teacher education has caused major changes in the internal organization of school systems, as well as colleges of education.

The success of the CBTE movement may be traced to several important factors which are part of the process of educational planning. First, each model was required to analyze its social, cultural, and contextual environment and study the implications of its selection of educational processes and techniques

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in terms of the specific environment and purposes of education. Secondly, each model developed a consortium of influences which included personnel of university and cooperating school districts, representatives from industry, community groups, (sometimes) school students, the state education department, and others affected by the development and implementation of the model. By unifying a number of diverse and separate educational developments into broad-based, well-planned (and politically sensitive) models of educational innovation, this program which launched CBTE can now be recognized as a prototype of effective educational planning.

At the national level the U.S. Office of Education worked to involve the major educational and teacher education organizations, especially the American Association of Colleges of Teacher Education and the National Commission on the Accreditation of Teacher Education (AACTE and NCATE). Their involvement and commitment was assured by a regular series of publications and conferences explaining the new developments (funded by USOE, sponsored by AACTE), by the formation of a consortium of model directors, by consultant assistance from the models to other universities, especially the group of small colleges known as developing institutions, by analyses related to the credential process and reviews of research. These last two were particularly significant, because in 1970 NCATE was producing new accreditation standards. In this manner CBTE influenced the standards in the direction of goal-oriented statements of qualifications. When the two-part models development program – planning and feasibility study stages – could no longer be supported by Federal R&D funds, the project director transferred to Teacher Corps bringing his enthusiasm for CBTE into the mainstream of this program which supported the implementation and institutionalization of innovative teacher education programs. It seems clear that CBTE, and the concomitant changes in school districts, owe much to the careful management of the program from the federal level. The style has always been indirect yet thorough, using a number of conceptual and organizational influences, but leading towards some programs of significant change.

The four books which are reviewed here were not intended as a unified literature on CBTE, but they can be usefully regarded in that light. Each helps explain, from a different stance, the ideas and processes underlying the movement. They have several characteristics in common. All are collections of papers by leaders in the field of American teacher education, and except for the Dickson-Saxe work which concerns only the University of Toledo, the breadth of interest in CBTE is reflected by the diversity of contributors. All are clear in their enthusiasm for CBTE; they are movement literature, although Houston (1974) attempts also to explore criticisms and resolve issues relating to CBTE. All were partly supported by federal funds either directly to authors for articles or indirectly because chapters report on federally sponsored events. Nevertheless, since each author writes from his own position, within the works there is considerable variation on the common themes.

The papers in the Anderson volume are chronologically the earliest; each of its contributors was directly involved with the initial phases of model development. The chapters deal with themes common to all the models, e.g., systems analysis, personalization of teacher education, management or instructional technologies; and the authors present a straightforward exploration of their particular subject and its importance to developing effective models of teacher education. They explain philosophical or structural concepts but do not compare their positions with alternative stances. However, the book was not intended as a critical analysis, and the quality and comprehensiveness of the articles recommend it as the preferred work for initially exploring the CBTE field.

Houston and Howsam center on several crucial aspects of CBTE: objectives, curriculum design, evaluation, certification, and consortia. This work is an outgrowth of a conference held at the University of Houston in May 1971, in which participants discussed problems and practices related to CBTE and educational renewal. However the papers do not reflect these discussions; rather, each chapter is the unique creation of its author. The decision not to report the conference itself is disappointing because it dealt well with many critical issues of CBTE, while the authors write only positively about their themes. The conference was sponsored by Task Force '72, a U.S. Office of Education group chartered to explore new ideas and directions for innovation and renewal. In this respect it moved CBTE from the stage of model development to the stage of a reform movement. The expressed concern for certification and consortia indicates the recognition that CBTE must seek to change structures if it will succeed. This volume is useful for introducing the themes of CBTE in a cogent, orderly fashion.

Dickson and Saxe report the development and implementation of CBTE at the University of Toledo by beginning with a statement of principles, examining each of the important components, and then presenting "a comprehensive model for educational renewal." Their presentation emphasizes the inter-

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relationship between the multiunit school (MUS), individually guided education (IGE) – both developed apart from CBTE – and changes in teacher education as major components of a new approach to educational renewal. The linking of these pieces through development of new structural relationships between the college and participating school districts is reported. The book contains specific illustrations, from the Toledo program, of objectives, program descriptions, modules, and management-feedback systems. The examples contribute to our understanding of the report, but the authors' exclusive use of the Toledo experience prevents a critical analysis of the major components of CBTE and restricts the reader to a single expression of the themes dealt with in the preceding works. Even with this limitation, this book provides a very useful history of renewal and implementation – not quite a “how-to” – but clearly valuable for the person who seeks a comprehensive understanding of a CBTE strategy.

Houston's 1974 volume is a complement to the other books on the CBTE movement because it deals with conflicts and opposing approaches to teacher education. Bruce Joyce names three such approaches: the classical teacher education program, the academically oriented approach, and the phenomenological approach (Arthur Combs's process-becoming). Yet what emerges as the major conflict, humanism and the scientific (objectifying) dichotomies, are not clearly resolved. No synthesis of the approaches is attempted. Joyce even considers them noncomparable. Discovering some super-ordinate level of analysis, in which the values of each for contributing to the development of a teacher are clarified, would have been a strong defense of CBTE. Some excellent material on the organization of teaching skills is presented, however, and the discussions of changing American education are interesting. The book's strength seems to be that CBTE persons are taking seriously their critics at the philosophical and conceptual levels; indeed are sponsoring their criticisms!

Educational planners will note that no generalized, empirically tested models of *planning* result from the CBTE movement; rather, the careful selection of processes and essential components produces situation-specific, goal-oriented programs of renewal. While a broad variety of planning techniques are employed – even required – few persons represented in these books have had any formal experience of educational planning. Yet the CBTE movement is producing valuable guidelines for improving structural relationships, management processes, and implementation procedures, areas of considerable interest to the field of educational planning.

Walt LeBaron*
Washington

Canadian Higher Education in The Seventies. Edited by Sylvia Ostry. Information Canada, Ottawa: May 1972.

This is a collection of papers presented at a seminar sponsored by the Economic Council of Canada, at Montebello, Quebec, on October 29-31, 1971. It contains nine abridged articles in addition to the editor's introduction. The main purpose of the seminar was to establish communication between educational decision-makers and researchers. The book deals with most of the main aspects of the economics of education and provides valuable information on the nature of empirical work done in the area.

As in other countries, the decade of the 1960s witnessed exceptionally rapid expansion of higher education in Canada. It was the decade of the 'human capital revolution' as opposed to the 'physical capital investment models' which were so characteristic of the post-war era. But the boom in education seems to have been relatively short-lived. By the late sixties the newfangled approach had started to erode. Problems like the rising costs of education, the educated unemployed, and skill obsolescence

*An educational planning consultant based in Washington, D.C.; chairman of the ISEP Commission on the Training of Education Planners during the past two years.

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had become stark realities for the educational planner. And there were second thoughts about resource allocation to education in face of the increased competition from health budgets, environment and general inflation. It was in this atmosphere that the Montebello Conference on the "Political Economy of Canadian Education in the Seventies" was held. It is to the credit of the participants in the first place, and speaks of the sensitivity of the editor in the second, that the book captures so well the spirit of the time. It takes stock of the field of the economics of education and critically examines developments within and related to the subject.

The first article in the book, by Handa and Skolnik, deals with the demand for education, approaching the problem essentially from an economist's point of view. Though their survey includes eight prominent studies done within the framework of economic analysis, the non-economic issues are acknowledged and authors clearly take note of 'leads' into other areas of the social sciences. The empirical part of the article draws heavily on another book of one of the authors.* The work succeeds in providing a flavour of econometric models and, methodologically, is one of the more rigorous works in the economics of education.

The papers by Sewell and Dodge are good critiques of conventional educational planning models. Sewell examines the relationship between the occupations of workers and their educational attainments, and from his empirical observations concludes that there is no such hard and fast, technologically determined relationship as is assumed in manpower approach models. Dodge examines the rate of returns approach and finds that claimed social returns to investment in education overstate the effect on earnings of differences in educational attainment. He argues that differential returns attributed to education are attributable to imperfections in the labour market and to occupational licensing and, therefore, that policy planning should explicitly focus upon the latter. In view of the evidence that there are no fixed links between education and occupation and, also, that returns are a result of market imperfections, Sewell concludes that "a re-examination of social expenditures on education" is necessary.

The paper by Zur-Mueheen examines various aspects of demand and supply of the Ph.D. market in Canada. The author makes some very incisive and constructive comments about the situation, and presents useful detailed data in the appendix.

Hettich's paper advocates inclusion in the cost/benefit studies of the consumption benefits of education to individuals, drawing attention to a rather neglected aspect of the economics of education and making an important contribution from this point of view.

There are two papers by Stager in this volume. The first is entitled "Allocation of Resources in Canadian Education". It begins with a brief history of educational finance in Canada from 1921 to 1970. In order to analyze only the real change in resources used, the author develops an educational price index. The second part of the paper is a brief survey of cost/benefit analysis of Canadian education. In his second paper Stager focusses upon 'Continuous Education' assessing its likely role in the 'seventies. Since little work has been done in Canada on this subject, this is a positive contribution to the literature of the economics of education, although again most of the analysis is historical and descriptive in nature.

The paper by Stamp on "Vocational Objectives in Canadian Education: An Historical Overview" analyzes the periods from 1880 to 1939 (with the exception of the World-War I period) and from 1960 to 1967. The study concentrates on the pressures for increased vocationalism with the progress of industrialization in Canada, helping us better to understand the participation of the Federal Government in education. It would have been useful for the reader, and would have facilitated his theses, had Stamp also included in his study the period from 1939 to 1960.

The last paper in the volume by Oliver, raises important questions regarding the financing of higher education in the province of Quebec. However, although it lists various aspects of the topic, it can hardly be said to convey any integrated viewpoint of the problem. One must conclude that the problems of financing education in Quebec warrant a better and more exhaustive treatment than this.

On the whole this is a very good collection of readings in the economics of higher education. All of the papers (with the exception of that by Oliver) are of high standard and show rigour in their arguments.

*Handa, M.L., *Toward a Rational Educational Policy* An Econometric Analysis of Ontario, Canada, 1950-65. With tests 1966-68 and projection 1969-75, Occasional Papers/10. The Ontario Institute for Studies in Education, Toronto, 1972.

EDUCATIONAL PLANNING

The book displays some short-comings which could easily have been avoided. It needs a more detailed introduction – an explanatory introduction in terms of the main developments in the economics of education, and in terms the institutional arrangements specific to Canada. This would have helped eliminate the repetition of 'introductory' and 'survey' materials in the articles themselves. The references might also have been listed all together. Since only nine papers were published and there were nearly seventy participants in the conference, there should have been some mention of the titles of the other papers and where they might be obtained – particularly since the participants' names and addresses are given in the book. The editor acknowledges that the book has not attempted to summarize the discussion. In view of the complexity and burden of such a task this decision is understandable. Such a summary is of crucial importance, however, since the seminar was meant to "initiate a dialogue between those who formulate and implement policy and those of the research community."

*Brahm Prakash**
Toronto

Program Budgeting (PPBS). Stephen J. Knezovich. Berkeley: McCutchan, 1973.

Program Budgeting, often referred to by the acronym PPB or PPBS in order to include planning and systems aspects, is a concept much in need of thorough description and examples of application. Professor Knezovich has made a valiant and noteworthy contribution to this end and has made the information offered very understandable, conceptually, to the layman in the fields of fund accounting and management.

The subject of proper budgeting was dealt with primarily through various journal articles published through the decade of the 60s and early into the 70s. This book represents one of the first attempts at drawing together, into one volume, written fragments of explanations and limited experience and making them useful for "those concerned with the management of educational institutions, graduate students, and administrative trainees in education."

Chapter 2, "History and Development of Program Budgeting," offers a great deal of historical and developmental background. Following the treatment in chapter 3 of "Planning as a Process" and classification of the goals and mission to be considered for PPBS, chapter 4 wrestles with the difficulties one encounters in the development of behavioral objectives. As the reader is instructed in the proper design of behavioral objectives, his learning is reinforced by a quiz, the answers to which are presented in a summary at the end of the chapter. It is refreshing to find, in today's world of management systems popularity, that the contents of chapter 5 couple PPBS with Management by Objectives (MBO). The twelve criteria and the general MBO model presented are aids to describing what should be an excellent marriage of concepts.

As steps in programming and plan development are discussed in chapter 6, the illustrations given are beneficial to the reader's comprehension of the information presented. It would have been helpful, however, had this chapter expanded earlier statements made about the folly of forcing traditional interpretation of programs into the PPBS mode with the result that the two do not fit. Since he states that this is one of the prime mistakes made by school systems, the author might well have offered suggestions for avoiding such pitfalls. Nevertheless, the chapter is quite informative and is supplemented by an example of a Program Planning Document.

The next three chapters deal with the accounting and budgeting aspect of PPBS. It would have been helpful had more examples of various types of budget documents been offered in this section. However, excellent information is provided concerning some types of budgets and the terminology and concepts

*PhD. student in Educational Planning, University of Toronto.

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one must be acquainted with to "speak the language" of incremental and zero-base budgeting, unit cost analysis, and cost and program accounting. The tables presented which warn the reader how *not* to develop a program budget are particularly helpful. Chapter 11 offers a well-developed presentation of the world of analysis and statistics as they apply to program budgeting and evaluation, initiating the reader into the application of statistical methods in the sophistication of zero-sum games, decision tree analysis, etc.

During the final sections of the book, the "Total System" is appraised and an evaluation model given. Critical comments are made with respect to academic statements of goals and objectives which, from my experience at institutions of higher learning, should be beneficial to the education of the reader. In discussing strategies for implementing and operating PPBS, implementation guidelines and a PPB change model are provided. The final chapter deals with the "why" of PPBS failures. Problems of evaluating the "effectiveness side" of the PPBS process are discussed. However, this difficulty in assessing output should have received additional treatment.

The Appendix presents some material of the Western Interstate Commission on Higher Education (WICHE) which might be useful to the reader. It would have been preferable had the author reproduced a representation of program classification structure nomenclature, a coding structure, and crossover technique structure, plus examples of one type of taxonomy, the HEGIS taxonomy. The interested reader may see these items in *Program Classification Structure*, National Center for Higher Education Management Systems, Boulder, Colorado. Also the November 1973 issue of *College & University Business* provides a "User's Guide to PPBS," and prints several articles on the manner in which program budgeting is used in institutions today and a bibliography of source material. Knezevich's glossary of PPBS and systems management terminology are informative and the index refers to key topical items in adequate fashion.

From my experience of the past two years in adapting and implementing a WICHE based PPBS system for a large university setting, the availability of this book will be very beneficial to persons in the field. Particularly in its treatment of the jointure of PPBS and MBO, the volume is useful for evaluation of the past and consideration of the future. Professor Knezevich has been successful in writing a book that is easily understood and an excellent source document for the system implementation and evaluation stages of program budgeting.

William L. Sumner*
Pittsburgh

(The International Institute for Educational Planning, established by UNESCO in 1963, publishes a series of booklets entitled *Fundamentals of Educational Planning*. These are written primarily for educational planners and administrators in developing countries, and are used as the basis for seminar discussions in in-service training programs. They cover a wide array of educational planning views related to the political, social, and economic settings characteristic of developing countries. Four are reviewed here. In general, the authors perceive planners as people responsible for drafting plans to be followed by others. Those readers who view the planner as one who facilitates systematic planning by working with persons who must implement the plans, will discover that the reviewer's comments reflect this point of view.)

The Politics of Educational Planning in Developing Countries. C.D. Rowley. UNESCO: International Institute for Educational Planning, No. 15, Paris, 1971, 57 pages.

*Manager of Budget Development, Office of the Budget Director, University of Pittsburgh; currently in charge of the university's PPBS program.

The educational planner who says, "Who needs politics?" ought to listen carefully to the wise advice of Professor Rowley: planners who steer clear of the political mainstream will not make an impact upon either the national or local scene.

Professor Rowley points out that the educational planner cannot work in isolation, and that he must be able to put his educational aspirations into proper juxtaposition with the political realities of the day. Change under these conditions poses many additional problems for the planner who cannot stay within the "ivory tower," free from power, influence and authority. He must not only understand the political process, but know how to influence it. He must maintain a careful balance between political realities and educational desires.

On the other hand, the planner should not bend to every political wind that blows, particularly where political pressures call for the setting of unreal objectives. Realistic planning, to quote Professor Rowley, "makes an honest attempt to set educational standards at a level which is best suited to the social and economic needs of the country, and more particularly, is in accordance with what is possible in the time and with the resources available."

Much of what is suggested in this booklet is directed toward educational planners who make plans. One small slip by the planner who overlooks political considerations could render the plan and its implementation useless, or at best, only partially effective. Likewise, educational planners who facilitate systematic planning by assisting others in their planning should provide them with the kind of guidance and information which keeps political, social and economic realities in full view. Moreover, it would be disastrous if educational planners developed plans or facilitated those which impart quick solutions to very complex problems and, in particular, solutions to improperly identified problems. Discussion of issues such as this makes this brief booklet a "must" for all educational planners, particularly those who work at governmental levels in developing nations. To use Professor Rowley's words, "Every educational plan is a political document."

Planning Education for a Plural Society. Chai Hon-Chan. UNESCO: International Institute for Educational Planning, No. 16, Paris, 1971, 67 pages.

Planning education in plural societies poses very special challenges to the educational planner. Those who do most of their planning within the educational environment, whether members of a plural society or not, would do well to broaden their concepts by reading what Dr. Chai has to say about the political, economic and social complexities and problems which must be recognized, and dealt with, in the educational process. Though leaders in developing countries look to education as the process for modifying, if not eradicating, economic and social ills Dr. Chai points out that educational plans which overlook basic causes of unrest could lead to programs that perpetuate and even aggravate that condition.

Dr. Chai exposes the reader to the highly complex problems of human resource development and makes the point briefly but succinctly, that educational planners and administrators in plural societies must "sharpen a wider range of sensitivities than the usual array of administrative skills." Multi-racial and multi-ethnic groups and their concomitant differences in language, traditions and customs weaken the fabric of national cohesiveness and pose many challenges for the educational planner.

As the author describes the characteristics of such nations, he attempts to clue in the educational planner as to what his role should be. Certainly, Dr. Chai broadens and sensitizes the planner's concept of his role by introducing the broader picture as it includes educational planning and the development of educational programs and school facilities.

However, the educational planner will not learn any special skills by reading this booklet, nor will he necessarily know how to translate Dr. Chai's signals into practical courses of action. Chai does point out the need for educational planners to gather demographic data as a "base" for forecasting (a very real problem in developing countries is the limited nature of such data). However, it is doubtful if data *per se* will help the educational planner deal with the problems which lie behind such matters as racial relations. Gathering data on numbers of different races in the school system and on the numbers of teachers, their experience, course work, and educational professional qualifications is not likely

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to take the planner very far. The *distribution* of the pupils and teachers by racial characteristics, and the attitudes of one to the other must be studied. If these are not known to the educational planner who relies heavily on data collection, then the purpose of this booklet is clearly missed, for the educational planner could collect faulty information leading to solutions that do not address themselves to the "real" problem areas. Dr. Chai sidesteps this by avoiding the "how to do it."

Planning the Primary School Curriculum in Developing Countries. H.W.R. Hawes. UNESCO: International Institute for Educational Planning, No. 17, Paris, 1972, 51 pages.

In the developing countries of Africa, Mr. Hawes points out, the primary school is the largest part of the educational system. It is also the poorest in money and in quality of facilities, instruction, and curriculum. Moreover, the curriculum is weakest in meeting the needs of rural children since the content of the syllabi focus on urban life. Not only is the program content inadequate, the teaching is done traditionally, in rote fashion, formal and unimaginative. These problems are aggravated by difficult physical conditions, with overcrowded classes and a limited supply of necessary instructional aids and equipment. Mr. Hawes concludes that, though everyone agrees change is needed, the immediate and real problem is how to go about it. The educationalists strive to improve the learning environment through curriculum innovations and instructional approaches more suited to the needs of the learners, while those in the political arena see curriculum change as the reorientation of youth to return to the rural community which they are deserting.

Some inroads are being made to improve the present system by revitalizing syllabi and textbooks, and establishing Curriculum Development Centers. But these efforts have little impact in the classroom. Mr. Hawes cites a number of reasons: lack of involvement of teachers, lack of manpower, lack of money, lack of a changeover procedure, lack of teacher training, and community needs which are often in conflict with political needs. In addition to these conditions, in many countries there are problems in local districts related to language policy, the production and distribution of materials, the acceptance of new thought and behaviour, and administration. Planning to change these conditions is desperately needed and the author offers several suggestions for gathering information, determining the objectives to be achieved, working out a strategy for change and implementing curriculum by experimentation and research, with evaluation and feedback for refinement.

Who is expected to do this planning and who is responsible for implementation is not always clear as one reads this booklet. Unfortunately, recommendations for tying the planning activity to an organizational structure are lacking. It seems doubtful whether the planning described by Mr. Hawes would overcome the persistent and pervasive educational problems he describes.

Educational Planning and Unemployed Youth. Archibald Callaway. UNESCO: International Institute for Educational Planning, No. 14, Paris, 1971, 47 pages.

Despite advancements in education in nations within Africa, Asia and Latin America, schools are training people who cannot find work that matches their aspirations and abilities. Professor Callaway places the problem squarely in the hands of the economists rather than, primarily, the educators. The theme of this pamphlet should lay greater stress on the need for economic planners to work *with* educational planners. The pamphlet falls short of specifics which would help the educational planners do their job in association with planners in the political, social and economic fields. Nevertheless, the reader will gain considerable knowledge from Professor Callaway's very elaborate explanation of the various problems connected with unemployment in developing nations, where one-half to three-quarters of the educated young are unemployed.

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The causes of unemployment are complex and vary among developing countries. Professor Callaway's proposed solutions obviously must be adapted to national and local situations. One approach would be to take no action; the idea being that unemployment problems will be self-correcting, youth will then eventually adjust their expectations and work in less preferred arrangements. Such a solution surely would be politically dangerous! Another approach would be to reform the economy and Professor Callaway outlines broad principles of economic reform.

To the educational planner he suggests that the formal education be made more relevant by such means as introducing vocational subjects into the primary schools. But although radical curriculum reforms are needed, he makes it clear that reforms within formal education *alone* cannot solve the problem of unemployed youth in these countries. Even if there are innovative changes in course content and instruction, young people will face the realities of an inadequate employment market.

Though Professor Callaway points to the basic problem, he provides little direction for the course the educational planner should follow in trying to deal with the situation. In the short term the problems seem unsolvable. Perhaps the greatest contribution of this booklet is to put them squarely in the lap of government, who must develop economic policies linked to educational services and programs.

*Mark B. Scurrah**
Albany

Educational Systems and The Labor Market. Edward Harvey. Toronto: Longman Canada Limited, 1974, pp. 223.

The thesis of this book is that in Canada the educational system and the labor market have got out of balance in recent years; and, as a result, there is need for reforms both of education and the labor market to restore a proper linkage between the two. As the author points out in the introduction this is not a new view, having been popularized in the United States in 1970 by Ivor Berg in *Education and Jobs*. However, due to his inordinate reliance on disjointed fragments of data and analysis, Berg's conclusions have scarcely met with universal concurrence. A study, based on cogent theory and a well developed methodology, which examined the nature of the relationship of education to jobs would, therefore, be most welcome. Unfortunately, this is not such a study.

Edward Harvey has, instead, given us an impressionistic examination of the linkage of education and labor markets in Canada. The approach combines a general overview of the post-secondary educational system and of recent developments in employment trends, with an original study of the labor market experience of over 4000 Ontario University graduates. Harvey interprets the results of his study, which show that graduates in 1968 had less favorable job experiences than their predecessors, as indicative of the need for reforms which would promote better articulation between post-secondary education and labor market structures.

The first section (Chapters 1-3) of the book presents the historical development of the labor force in Canada and the evolution of post-secondary education. The revelations here are largely as expected: e.g. decreases in male and increases in female participation rates; shifts to white collar occupations and away from agriculture; increases in median years of schooling especially by those employed in managerial, professional, clerical, commercial, and industrial occupations; and dramatic growth in secondary and post-secondary enrollment rates. Problems arise in Part One of the book, however, once the question of the linkage between the labor force and education is introduced. While there are tables showing data

*Director of the Office for Elementary, Secondary and Continuing Education Program Planning, New York State Education Department. Dr. Scurrah is a member of the Editorial Board of *Educational Planning*.

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on the composition and characteristics of the labor force and on educational enrollments, the conclusion that there has been a decline in the importance of the vocational component of the educational facility is simply accepted as fact for Canada on the basis of conclusions drawn by Martin Trow and Ivor Berg about the United States. Further, Harvey says, "there is now an over supply of [Canadian] University graduates" (p.63) without a reference or the presentation of a scintilla of data or analysis to support the statement.

The source of these difficulties becomes clear in Chapter 3. Harvey has no clear-cut, operational notion of the concept of linkage between education and labor markets. He does discuss five "strategies for analyzing educational system-labor market linkages," (pp. 67-75) and suggests that the one he chooses, called historical cohort analysis, has the advantage of allowing comparisons over time without incurring the very high costs of a genuine longitudinal approach. However, for none of the strategies, including his own, does Harvey define any quantitative measure of "linkage" such that one could distinguish which of two situations exhibits more or better linkage between the education system and the labor market. He writes, "... the bridge linking higher education and jobs is becoming more tenuous. We have suggested that the clearer routes between education and employment that have existed in the past have now weakened and diffused . . . the occupational future for today's post-secondary graduates is much less assured and much less clear than it has been in the past." (p.66) How do we measure the tenuousness of the bridge, the weakness and diffuseness of the route, the less assured and less clear occupational futures?

Harvey does not really provide answers to these questions. Instead, in Part Two of the book (Chapters 4-6) he describes the differences in the labor market experiences of a sample of Ontario university graduates who received BAs or BScs in 1960, 1964, and 1968. The primary intent of the survey is obvious: if the 1968 graduates encounter greater "difficulties" in the labor market than 1960 or 1964 graduates then there is evidence that the linkages between education and labor markets have become more tenuous, weakened, diffused, less assured, and less clear. Let there be no doubt, Harvey's data do appear, with few exceptions, to indicate that the 1968 graduates, in comparison with those of 1960 and 1964, had greater difficulties in finding suitable employment, were more disillusioned with post-graduate study, and were employed in jobs of lower prestige. Do these findings demonstrate a reduced linkage between education and the labor market? Only if one's notion of the meaning of such a linkage is (1) that those with particular educational skills (i.e. BAs and BScs) have direct and immediate access to high salary, high prestige jobs, and (2) that reduction in such access implies reduced linkage. This is a most unusual and arbitrary conception of linkage which, while it might have some uses, has even more serious defects.

The concept of a linkage between school and work can be thought of in two quite distinct ways. On the one hand, the linkage may be "technical" in the sense that schooling may or may not equip a graduate with the skills required to perform a particular occupation or work task. The strength of "technical" linkage could be estimated, empirically, by observing the proportions of workers in different occupations who have specific educational backgrounds. An increase in the variance of educational specializations found in a given occupation would indicate a decreased linkage, while an increased concentration of occupational members in one or another educational specialization would indicate an increase in the technical linkage between work and schooling.

On the other hand, linkage between school and the labor market may be "economic" in that the labor market may or may not be able to absorb the supply of trained manpower produced by the educational system during a particular period of time. The "economic" linkage is quite tricky, however, because the number of graduates which can be absorbed depends on relative rates of pay, and is, therefore, not a fixed quantity. In principle, strong economic linkage between labor markets and education implies that extensive shortages or surpluses do not exist for the graduates of any particular educational programs. That is, poor articulation is found when the graduates of one or another educational specialization are in substantial shortage or surplus. Here we see the major shortcoming of Harvey's concept of linkage. If there were a shortage of BAs and BScs in the labor market their employment situation would be extremely favorable, but it would be most inappropriate to treat this as a sign of high or strong linkage. Yet, this is precisely the conclusion which would be reached under Harvey's approach which considers the favorableness of the labor market situation for university graduates as an indicator of the closeness of the linkage between education and labor markets.

All of this is not to deny that Harvey's survey provides interesting and valuable findings. The many

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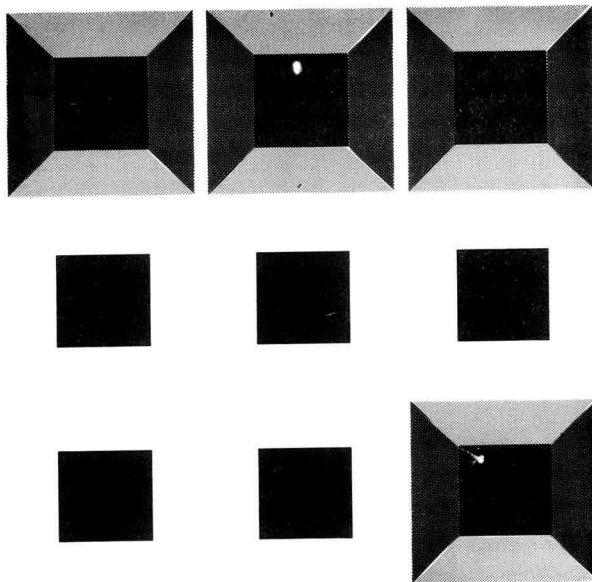
comparisons of the different educational and labor market experiences encountered by the three historical cohorts of graduates reveal important changes in both areas and warrant detailed examination and interpretation. However, to attempt to compress the results into the single framework of providing evidence supportive of the "imbalance thesis" places far too heavy a burden on the findings and, as a result, does injustice to the material.

The final part of the study (Chapters 7-9) contains an extension of the analysis of the survey to the question of social mobility and some concluding remarks on educational planning and labor market policy. Here one finds sensible recommendations for flexibility in training, improved vocational counseling, and changes in the character of work assignments. These recommendations, however, are not necessarily ones that follow from the thesis that linkages are tending to weaken. For example, Harvey stresses the importance of the non-economic benefits of university education (i.e. those not rewarded in the labor market) as a justification for its public support. Yet, in earlier chapters, he took the view that the difficulties incurred in the labor market by graduates are a serious matter casting doubt on whether university training is responsive to economic needs. Another contradiction enters when, in the last chapter, Harvey refers to several studies which have shown that in the United States there is a long history of graduates working at jobs other than those for which they received university training. Thus, the apparent weakness of linkages is an old rather than a new phenomenon.

This book should be read for its report on a survey which provides benchmark data for Canada on certain aspects of the relation of university education to labor market experience. It is less valuable as a verification of the thesis that jobs and education are becoming less closely related. The thesis well may be true, but the formulation of the problem and the methods used in *Educational Systems and the Labor Market* are not powerful enough to provide us with important new evidence.

*Jerry Miner**
Syracuse

*Professor, Maxwell School of Citizenship and Public Affairs, Syracuse University.



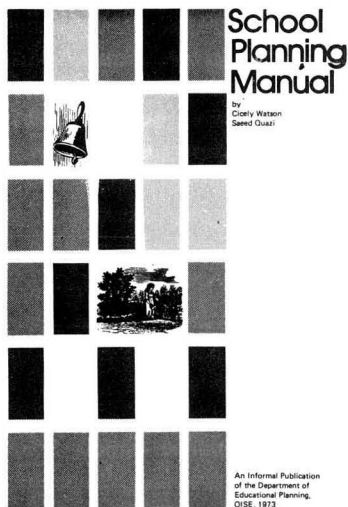
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