

PLANNING RESEARCH: WEAK SIGNALS
AND BACKGROUND INFORMATION

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Introduction

During discussion in Darwin on educational research in the Northern Territory, just prior to the N.T. taking over control of education from the Federal Government, Mr S. Dunn mentioned the idea of "weak signals", minor events or trends which presage educational crises, and which, if noticed in time, can provide advance warning.

For example, the Research and Evaluation Section of the Department is currently engaged on an urgent and very hurried study of the needs of isolated children in the N.T., with a view to providing information on whether a secondary correspondence school, or similar provision, is justified. If such a school is started, it may have to commence operation in 1980. In retrospect, there were a number of weak signals - mostly ignored at the time - which should have alerted us to the need for this study. The fact that other states were examining provision for isolated pupils was one such signal; West Australia was developing the Isolated Students' Matriculation Scheme, for example. Within the Department, steadily increasing applications for Isolated Childrens' Allowances, and increasing evidence - from South Australian Correspondence School figures - that these allowances were being under-utilised by potential beneficiaries, again should have awoken us to the need. Had we not been preparing to change from the control of the Federal Government to that of the N.T., there would have been clearer political signals also, as the Minister's ideas and wishes would have been known at a much earlier stage.

These signals should have led to action of various kinds, among them the research study now being pushed through. But the lead time required for research to be planned and undertaken, especially if, as in this case, the results of research are needed to provide data for decision-makers, implies a need for sensitive detection systems to collect the early, weaker signals in time for rational planning and development of research studies.

In fact, any mechanism built into the system to allow the use of weak signals in research planning must have three elements. It must, first, collect the weak signals. Second, it must discriminate between those which are important and those which are not. Third, it must operate on a time scale which allows sensible planning and resource allocation by the group doing the research, following analysis and interpretation of the weak signal information.

The sort of time scale implied here is that it may take a year for an education system to reallocate resources - including staff - to enable a research study to be mounted. Thus if the study itself is to take a year, the weak signal mechanism must be such as to allow a two-year warning period

before the decision deadline.

Collecting weak signals.

In the Northern Territory, the weak-signal-collection mechanism would involve collection of data from four major areas. Some data would be 'hard' data, in the sense that it was statistical information or statements of intent or policy by, for example, the Secretary of Education or the N.T. Minister for Mines and Energy. But other data, equally if not more important, would be 'soft': assessments of the ideas and perceptions of crucial individuals or groups; beliefs about the way a senior administrator might react to a situation; judgements of the likelihood of a rise in the price of uranium, or a change in policy by the ALP. Such 'soft' data is hardly ever made explicit and almost never acknowledged by decision-makers, yet it forms a vital part in shaping decisions at a policy level and must be taken into account if one is trying to predict events.

The first main set of data needed for weak-signal-collection in the N.T. is data internal to the N.T. education system - attendance rates, pupil mobility, teacher retention and mobility, pupil achievement and other testing records, and so on. This 'hard' data is already collected, but in the N.T. as in other educational systems a multitude of people collect the data for their own purposes and there is no-one who has a total overview; nor, presently, is there any easy way of gaining an overview.

It would be possible to utilise the N.T. Government's ADP section and (perhaps via terminals in high schools) build up a bank of system-level statistics which, given, say, five years to build up from a baseline, would provide evidence as to trends and discontinuities in the data. This data-set could then be matched against other information. The N.T. is small enough - only a dozen High schools, for instance - for virtually all the data generated by running schools to be fed to the ADP system. A larger system would have to operate on selected statistics, and it would be interesting to speculate on what the crucial areas might be.

A number of problems - apart from the sheer mass of data - are already evident. The GIGO syndrome (garbage in, garbage out) is one; for example, enrolment statistics have been known to be inflated (to get more staff). The washback effects of recording selected records of pupil achievement - for whatever reason - can be immense. Problems of privacy and confidentiality of information abound.

But answers to most of the problems are also around, and in use, since all the information I am now discussing is already collected, in one way or another; the major new difficulty would relate to the new mode of recording the data and the fact that cross-checks between different variables would be easier (e.g. stated enrollments against attendance records).

A second area for data collection would be data held by, and policies pursued by, other N.T. Government agencies. One might envisage a data pool to which the Health Department, welfare agencies, Education, Department of Aboriginal Affairs and perhaps the Police all contribute - Education Department statistics are as potentially useful to other agencies as theirs are to Education. This pool would be

scanned, perhaps on an annual basis, for comparison with that held by the Education Department.

One would not expect the Health (or any other) Department to make all its information available, of course, and the privacy problem would be immense, but the benefits are potentially substantial also. If a high percentage of Aboriginal pupils at school X suffer from hearing loss, for example, then one might expect their academic performance to have suffered - and to continue to suffer; truancy rates matched against records of juvenile crime might be of interest; if the catchment area of school Y has a high proportion of sub-standard or temporary dwellings, or will in three years be the site for a major civil works projects which will affect enrolments for some reason, then school Y will need help, or at least special treatment of some kind.

This sort of data does get into educational systems now, of course, but on an ad hoc and very partial basis. Further, though governmental agencies sometimes tell each other of their decisions, they rarely discuss their plans unless those plans require the active assistance of the other agency. I doubt very much if the N.T. Department of Education has been given any hard information on the scheme to generate power for Darwin on the Ord River, for example, because it is not immediately evident how such a scheme could affect the Department. But consider: Ord River power will mean new road links in the area, cheaper power for some rural areas, and a new mode of power generation. This may mean population shifts, with consequent changes in projections for siting and building schools; it will mean a shift in emphasis in requirements for skilled tradesmen, and hence a shift in Apprentice training patterns; and what of the interaction between the Ord River scheme and the mining industry, and what will the consequences of that be, in social as well as economic terms?

Once again, the kind of information pooling I am suggesting is easier in the N.T. than may be the case elsewhere - because of our size, and also, because we are just starting up as a State-type organisation, there may be a greater willingness to accept unusual ideas.

The third area where data will need to be collected is that available outside the N.T. Here I am thinking, for example, of details of research being undertaken (and the reasons for it being undertaken) elsewhere, or new entries in the Australian Education Index. Much data in this area will be 'soft' data; much also will not be directly educational in nature. Changes in the price of oil, for example, will shape decisions made in educational systems even though one would not normally list this as an indicator of importance in educational decision-making.

The fourth area is of data related to predictions of national or international trends. Perhaps the price of petrol fits more readily here; but data in this area might include (at very much the 'soft' end of the scale) predictions about the social changes which would be consequent on the much reduced scale of private motor-vehicle ownership which might emerge when the price of petrol rises to, say, \$1 per litre, rather than (as in the third area) the current effects of the last OPEC price-rise. Slightly harder data might be the predictions of effects of developments in, say, power generation by nuclear fusion rather than fission, or the consequences for Australia of a Russia/China rapprochement.

Assessing weak signals.

The information obtained would then need to be examined. It would be fairly easy, for the 'hard' data at least, to note trends and dis-continuities - indeed an appropriate computer program would serve. But it will be difficult to match these trends against the 'soft' data, and the task of deciding which trends are significant will require a good deal of skill and intuition. What is involved is an exercise in disciplined imagination by someone - or more likely a group of people - familiar with the system and its problems, and familiar with the data to the extent of knowing which figures are most reliable and which items are missing.

It needs to be borne in mind that practice is likely to improve the quality of assessment quite markedly. One is more likely to be aware, the third or fourth time one comes to judgement, of the relationships between variables, and the nature of their interaction. One also will have feedback from previous efforts - that this prediction was borne out by events, while that one was not, and that in consequence these factors assume new importance.

It is also likely that, given practice, some data sets will emerge as more sensitive predictors than others. Maybe, for instance, a change in teacher mobility is less - or more - useful as an indicator than a change in pupil mobility. Thus, with practice, one will be better able to decide which data are crucial and which peripheral to the assessment of a particular problem area.

This, however, does not mean that over a period of time it will be possible to routinise the process of weak-signal-assessment to the extent of paying little or no attention to some sets of data. Rather I think the reverse is likely: that because some sets of data enable fairly reliable predictions in certain areas, one will be able to seek out increasingly more sensitive weak signals and improve the reliability of the forecasting process by building a steadily more sophisticated model of the interactions between parts of the educational system.

In any case the object of the exercise is to avoid being taken by surprise, to predict events as reliably as possible. To ignore some types of information might be to avoid learning about a problem at an early stage, so anything which closes off possible uses of data is to be avoided.

Using Weak Signals.

From the study of the data would come predictions about what will be happening in the system, and hence a delineation of areas for research. In the N.T. (and most other systems) this will mean in practice a set of suggestions to senior officers that it seems that decisions may have to be made in certain areas within a particular time scale, coupled with research proposals which seem likely to yield appropriate data for decision-making.

This presupposes that the time-scale of the forecasts is adequate for mounting a study; if it is not one would be looking for a less ambitious proposal, on the ground that some information is better than none, or a study planned to give crude estimates at an early stage. In our current Isolated Children

Study, referred to above, we have gone for an initial estimate of numbers and ages of children which we can refine at a later stage.

One has to bear in mind, of course, that given the embryo state of the act the risk of being wrong in a forecast is high. Thus when 'selling' the idea one has to avoid protestations of omniscience, and one should tie forecasts down to shorter periods of time rather than longer ones if this is consistent with lead time needed for research studies. Forecasts of next year's events are likely to be a good deal more accurate than forecasts of events in five year's time.

For short-term planning, however, one has to use existing research and interpret this for its relevance to local conditions (another point made by Mr Dunn). But given the weak-signal-gathering and assessment procedure discussed above it would be likely that a search for existing material would have been started as the problem began to emerge as one worth considering, so that even here one is better off.

In the N.T. I would envisage an annual forecast timed to be available to administrators at an appropriate point in the budget cycle, but updated during the year as changes - probably minor ones - need to be made. The forecast might be split up by financial year, and should contain estimates of reliability. Each forecast will build on the previous one, with a brief discussion of the evidence on which each facet of the forecast is based.

Senior Departmental staff would need training in handling the information as a means of deciding research priorities and as an aid to policy development, and I mean here a good deal more than training in how to read a computer print-out. A disciplined imagination will be needed to prepare the forecast; there is an equal need for those using it to be able to use imagination, to play the game of 'what happens if', and consider alternative futures. This is not easy for senior administrators whose experience has been that of facing problems which had reached near-crisis proportions, and to whom current concerns are paramount.

Future possibilities.

If/when the type of weak-signal utilisation system discussed here is in use, there seem to me to be two ways in which it can be improved. One might add different sorts of data to the 'mix' or one might improve the methods of analysis, though neither of these can be attempted until a system is in use since, until we try it, we know neither what data is crucial nor which analyses are most reliable.

But one development could come from monitoring attitudes in some systematic way, with a view to predicting conflict situations - say between ethnic groups - before they reach flashpoint. One can imagine computer-assisted simulation gaming of potential conflict situations - a development of the war-game concept, with the results of 'games' being fed into the larger, system-wide picture to produce alternative scenarios.

Conclusions

This paper is based, in part, on a proposal made to the N.T. Department of Education. I do not yet know whether or to what extent the Department will accept it, but it is likely that acceptance or rejection will hinge more on attitudes of mind than on the technology needed. For the technology exists; the problems are human ones. Any good teacher can read the weak signals from his class in time to take controlling action before a crisis. I am arguing for the mechanisms and attitudes of mind to make this possible at system level.

Bibliography

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(The views expressed in this paper are those of the author and do not necessarily represent those of the N.T. Department of Education.)