Quantitative research methods in educational planning

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Module 2

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From educational policy issues to specific research questions and the basic elements of research design

UNESCO International Institute for Educational Planning

Quantitative research methods in educational planning

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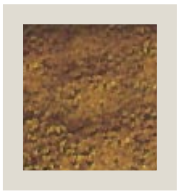


Introduction

1

In an ideal world, educational research has a vital role to play in the improvement of education, whether this be in the development of theory to better explain why things occur the way they do in particular learning situations, or stimulating ideas for innovative practices, or developing new procedures and materials to enhance the efficiency and effectiveness of instruction. Educational research also has the role of providing attested information to improve the quality of decision-making for educational policy. It is this last objective which forms the object of this module.

At the outset it should be admitted that this happens all too rarely, for reasons which will be explained in the next section. Policy decisions are often taken in the absence of good research, and sometimes in spite of the findings of available research. Furthermore, creating a well-researched policy does not mean taking any action on that policy! But at least it is a beginning. It is the objective of this module to assist researchers to interact with policy makers in fruitful ways, so that gaps are bridged and research results made available in forms which are helpful to all.

Numerous definitions of policy research exist. A simple and useful one is 'research undertaken by qualified researchers in order to produce evidence on issues of importance to policy-makers'. The hope is that such evidence can then be used to help in formulation or revision of laws or educational policy guidelines. The intention always is that decision-oriented research should provide results which are useful for resolving current problems in education.

The distinction is sometimes made between 'basic' research and 'applied' (or mission-oriented or decision-oriented) research.

The following definitions may be helpful here: (Wallen, 1974)

"The findings of a basic research study:

- should apply to a great many people and/or situations;
- should be related to many other studies and/or theories;
- need not have obvious or immediate implications for practice.

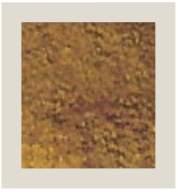
In contrast, the findings of an applied research study:

- are applicable to a specific situation (they may or may not apply elsewhere);
- need not relate to a broader field of knowledge or other research;
- have immediate and obvious implications for practice".

The distinction is not a hard-and-fast one, of course, and both types of research have an important place. Both have their own standards of rigour and validity. But it is likely that research carried out to inform policy makers will lie towards the applied, decision-oriented or mission-oriented end of the research spectrum.

This module concentrates on such decision-oriented research, and seeks to help researchers identify important issues needing attention, through a systematic 'mapping' of the educational territory. It then proceeds to find ways to establish priorities, using a consensus-building approach to select projects from the infinite number of problems which exist 'out there'. Finally it comes down to specifics, with a discussion of ways to develop specific aims from

general aims, and operationalize these through the use of research questions and hypotheses. The last section gives some illustrations of exactly how this can be carried out in a systematic way.



2 The systematic identification of educational policy research issues

Preparing the ground

Since most policy research budgets are limited, it is desirable to have a sound procedure for identifying general issues needing research, to ensure that all important problem areas are considered and to allow for the setting of research priorities. For this to occur, it is helpful to know right at the beginning exactly who are the parties involved, and what their various expectations of the research may be.

Who are the policy makers?

They are likely to be:

- politicians, senior government officials, or Members of Parliament;
- chief executives and senior administrators in ministries and government agencies;
- influential people in national associations representing various interest groups, e.g., Employers Associations, Chambers of Commerce, Trade Unions.

Who are the researchers?

They could be:

- staff of research divisions which are part of government departments, ministries or agencies;
- staff of universities or other tertiary institutions who carry out research, either as part of their own work or on contract;
- consultants employed by international agencies;
- staff of private research institutions or R&D establishments;
- individual, independent, self-employed research workers.

Bringing people together

It is very necessary to bring the people involved in the research together at an early stage, and create a climate of dialogue. The different conditions under which policy makers and researchers work can often lead to tension between the two groups. This must not be allowed to occur, if the outcomes of the research are to be fruitful.

1. Policy makers

- want research to deal with their own particular problems, and may not necessarily be interested in the relationship of these issues to the broader socio-political context, the 'fabric' of society.
- are not usually trained as social science researchers, and are likely to be unfamiliar with the content, methods or jargon of educational research. This is one important reason for early consultation.

- characteristically want results immediately! They tend to work on a different time scale, and are impatient of the slowness of the educational research process, when urgent decisions are needed.

- need to realise that research cannot answer value questions. Some examples of such value questions which are politically determined would be: how to design the 'best possible' entry examination to junior high school; whether comprehensive secondary schools are 'better' than, say, separate academic and vocational schools; and whether the 'mainstreaming' of handicapped children into regular classes should be introduced.

2. Researchers, on the other hand

- are specialists, skilled in a relatively narrow range of paradigms, or ways of approaching research problems. Some prefer intensive qualitative methods, others are more comfortable with quantitative research techniques. It is advisable not to get involved in intense debates over such matters. Most problems can be answered best by a blend of a variety of approaches, making full use of the expertise, and resources of both time and money available.

- may be somewhat remote from the 'real' world of social conflict, political pressure and financial constraint, and come up with recommendations offering solutions which are not feasible in practical terms. Or they may offer short-term solutions, addressing immediate problems, where alternate recommendations may be more appropriate to solve likely future problems.

- often write in a particular research jargon, which means that they find difficulty in communicating to the policy makers who are interested in their findings. Training is needed in writing

simply and clearly, and in presenting findings in such a way that they are not misinterpreted and distorted, and yet at the same time, do bring out what the outcomes of the research are, however cautiously.

- may not be used to tight deadlines. They may come from an academic environment of scholarly research, and find they under-estimate the time needed to do a thorough job, and so require time extensions.

- find their role unclear. For example: Should they present their findings as objectively as possible, and leave others to interpret them, and do the necessary lobbying for any changes recommended? Or should they accept that true impartiality is impossible? Even in the choice of problem, selection of measures, methods of data analysis, and interpretation of findings, value judgements are being made. According to this view, researchers should constantly be concerned about the effect of their work on society, and set out to have an impact. In any event, what is certain is that for true research objectivity, the investigator must approach problems with no preconception of what they want to find (as distinct from what they expect to find). This is a subtle but extremely important distinction.

Anticipating difficulties

If the ground is not properly prepared by a good dialogue between the policy maker and the researcher, major difficulties can arise.

- Suppression of research results can occur. Nothing will sour the relationship between a policy maker and a researcher more than the suppression of the findings of the research, because they did not demonstrate what the policy maker wanted to find, or proved an embarrassment to them and their cherished policies. The independence of the researcher needs to be made very clear at the beginning, and accepted by both parties.

- Delaying tactics are another way of avoiding potential embarrassment, if those in authority feel that there may be even a hint of criticism in the research report and recommendations. They deliberately 'drag their feet', there are substantial delays in the final editing, publication and acceptance of the report. It appears to have disappeared down a 'black hole', never to see the light of day.

- Attempted interference with the research process can also occur when it is suggested that certain recommendations should not be made. It is always good practice for the researcher to show an early draft of the recommendations to the policy makers commissioning the research. This avoids the suggestion of possibly naive and unworkable solutions. But a wholesale modification of a series of recommendations, under pressure from the commissioner of the research, is thoroughly undesirable.

The above discussion indicates something of the different worlds from which the policy maker and researcher come, and highlights the question of 'ownership'. Who owns the data, the research, the outcomes, the final report? The policy maker doing the commissioning, the institution paying for it (these may not be the same) or the researcher doing the work? Who is allowed to publish and disseminate the results? In what form may the results be released? When can this occur?

It is crucial to determine all these things at the outset, in a spirit of co-operation, so that mutual tension and distrust are avoided.

Models of research utilization

It is common to criticise policy makers for failing to take research findings sufficiently into account when formulating policy. Such criticisms often fail to acknowledge the complexity of the whole process. Policy makers are required to take into account social, political, economic, and educational realities, as well as the values and attitudes of interest groups and the manifestos of political parties. Research-based information is only one of the inputs into the policy-making process. It would be simplistic to believe that it was the major one. It may simply be one means of contributing to a general discourse on the nature of society, and its current and potential problems.

To avoid the frustrations and weaknesses noted earlier and promote an effective contribution from policy-oriented research it is desirable that:

- the subject of the research be relevant to the concerns of the policy makers. Dialogue between researchers and policy makers is a necessary, but not a sufficient, condition for effective policy-oriented research.
- policy makers should be prepared and able to identify the issues which they wish the researchers to address, and the types of information they seek; this will often relate to variables which can be manipulated by policy.
- information from the research should be provided in time, that is, before the policy decisions have to be made, in a form readily understandable by those who have to make the decisions, preferably in non-technical language and in summary form.
- multi-disciplinary approaches should be used, where appropriate, since social, political or economic considerations are likely to be important.

- policy researchers should be alert to the fact that their research may alter the balance in the 'power structure' between interested parties, and change their levels of influence. An awareness of political and administrative realities is therefore critically important.

In order for research to be utilised, it is therefore necessary to understand exactly how findings are presented and disseminated. This can conveniently be described in terms of 'models', idealised ways in which a complex process can be defined. There is a very large literature on the ways in which research knowledge is disseminated and used (Husen and Kogan, 1984).

Two very simple such models are shown in *Figures*. The first, the *linear model*, may be useful in the physical sciences, but has not generally been found to be appropriate in the social sciences, and education in particular. One does not begin with a problem, devise a research strategy to solve it, obtain a solution, and promulgate the results as *Figure 1* would indicate.

Figure 1. Linear model of research utilization

In the social sciences, the *diffusion model* is more appropriate, in which research knowledge is disseminated over a period of time, and gradually seeps into the consciousness of all the parties affected, perhaps in ways not fully appreciated or recognised. Researchers build on previous research, and action eventually follows a growing perception on the part of policy makers, driven by public pressure, that something should be done. This is often a matter of political expediency, and often in the face of economic constraint. It is altogether a much more *fuzzy* process, as shown in *Figure 2.*

Figure 2. Diffusion model of research utilization

A much more complex series of seven models is given by Carol Weiss (1979). They can be summed up as follows:

1. The first model is the *linear* one referred to above, in which basic research will lead to applied research, which in turn will lead to development, and then application.

2. The second model is the *problem solving* one, in which missing knowledge is identified, and then social science research findings are gathered, either from existing knowledge or from specially commissioned research. The research findings are then interpreted in the context of various decision options which are possible, and the best policy chosen. Typically, this model leads to rather optimistic expectations about what research can actually do in solving real life problems.

3. The third model is the *interactive* one, which assumes that some sort of back-and-forth dialogue will take place between policy makers and researchers (often through intermediaries), and that this will result in a compromise acceptable to all parties, and allow sound policy directions to be determined. This model too tends to err on the optimistic side.

4. The fourth model is the *political* one, in which researchers produce certain findings which are then used as political ammunition both by the ruling party in power and by the opposition (where such a political system exists). A less desirable variant of this model occurs when the politicians make up their minds about what policy they want, and then commission research to 'justify' their conclusions!

5. The fifth is the *tactical* one. Here the policy makers delay making a decision on a matter about which they are

uncomfortable by commissioning a long research study, or maybe several research studies, on the issue. They thus 'bury the problem' under the guise of doing research, and say that they cannot act until research results are forthcoming!

6. The sixth is the *enlightenment* model, in which research findings slowly filter through to the public, and gradually shape the way people think about particular issues or problems. In many societies, particularly open, democratic ones in which the government is prepared to release research findings, even unpalatable ones, an informed public is a very powerful lobby group, and can influence policy decisions gradually over a period of time. The existence of scholarly journals and informed discussion of policy issues through the mass media are characteristic of the enlightenment model.

7. The seventh and last is the *embedded* model. Research is part of the whole intellectual enterprise of the society, embedded in its ways of thinking and behaving. It is only one of the many influences in policy development, and must take its due place alongside many other considerations, political, social and economic.

EXERCISE 1

Go back over the seven models of research utilization above, and find examples of as many as you can from your own country, as they relate to specific areas of policy making in education.

Which model (or models) do you think would be most likely to apply in your own country now? Why?

Defining the issues

Before any issues become the object of research, or any particular project is decided upon, there are some important matters to be taken into account.

- The issue needs to be an *important* one, and not something trivial. Students seeking a post-graduate qualification at a university may have more scope here to choose something of particular interest to them (or perhaps the professor supervising their research dissertations). The topic they choose may push back the frontiers of knowledge a little, but not necessarily be a matter of national concern. But research designed for the consumption of policy makers commonly draws on public funds, or funds from international agencies, and so needs to be seen to be of significance for the education system as a whole.

  The following questions need to be asked: Does the research need to be done so that the system can be improved, either quantitatively with an increased throughput of educated students, or qualitatively by providing for better teaching? Will it result in better classroom practice? Will it generate higher levels of achievement, greater equality of opportunity, or increased equity of outcomes? Will it provide a better-equipped work-force, or more socially aware and responsive citizens in the future? Will it highlight ways to bring about increased efficiency?

- The issue needs to be *researchable*. Many problems which are not researchable exist in education systems. Some of these, such as whether or not a comprehensive secondary schooling system is 'best', have been alluded to above. Others in this category would be questions of whether moral or religious instruction should be given in school, or what values should be incorporated in the curriculum, or whether corporal punishment should be allowed, or whether class grouping or 'streaming' is desirable for instructional purposes. Issues

such as these lie outside the province of empirical, 'testable', educational research. While it is possible to gather information on them, to trace the history of past practices, to survey current public opinion, and make some assessment of what future moves might be acceptable, most of the necessary decisions are essentially philosophical or 'political' ones. Such issues are not easily researchable in the strict, empirical sense.

- The project needs to be *manageable* and workable. The financial and human resources need to be available, so that an outcome is possible within a reasonable time frame. Staff with an interest in the area, and possessing the appropriate methodologies, or consultants with the necessary expertise and sensitivity need to be available. Other questions which need to be answered are: Will it be possible to obtain access to a large enough sample to allow reliable and valid results? Are appropriate methodologies known and data analysis facilities available? Is there reason to believe that something useful will emerge from the research, an 'answer' to the problem.

- *Timeliness* is another important criterion which is easily overlooked. Will results be obtained within a suitable time scale so that they will be of some practical value to the policy maker? Educational researchers characteristically want to carry out a large, long and thorough study, taking as many variables as possible into account, so as to 'milk' the research project of as much information as possible.

  Policy makers, on the other hand, are usually under political pressures, and want the results immediately, if not sooner! The tough question, then, is: Will there be a payoff from this piece of research, and if so what will it be, and when will it occur?

- *Other considerations* which are probably more relevant in a university setting, and less important for research directed at policy makers, are theoretical value, critical mass, and personal interest.

- Firstly, does the problem fill a gap in the literature, and contribute to the underlying theory in a particular area of education? Will it contribute to the advancement of knowledge in the field, and will others recognise its significance? Does it improve on the 'state-of-the-art'?
- Secondly, does it have a critical mass. In other words, is its size and scope sufficiently large to allow something really important to be said? Or is it rather insignificant, with only small sample sizes, few variables, and lack of potential results.
- Thirdly, is it the sort of project that will generate enthusiasm on the part of the researchers, so that they will be committed to it, and willing to work long hours on it? Will it excite their imagination and 'turn them one'? Will it provide them the opportunity to learn further useful skills, and extend their research competence?

The content of policy research

With these comments as a preliminary, it is useful to examine the types of research which policy makers are likely to be interested in. Out of the infinite number of possible research topics, it is necessary to decide which ones are most important, and should be pursued. This means the range of possible projects must be narrowed, and for this to be done systematically so that no possible area of concern is omitted, a classification system is desirable. Numerous such classification systems are possible, and that which follows is only one of many. It appears to be reasonably comprehensive, and allows projects to be classified in a logical way. The procedure described is a modification of one that has been tried out in practice in Indonesia, and there is evidence that it seems to work (Postlethwaite and Ross, 1986).

It begins with the establishing of *six* broad categories:

1. Learning goals and curriculum.
2. Assessment, guidance and selection.
3. Demography, enrolment, structure.
4. Finance and administration.
5. Selection and training of educators.
6. Monitoring the education system.

1. Learning goals and curriculum

The goals of education can be considered at three main levels. At the first level, very general statements can be made, such as 'to produce democratic citizens', 'to produce literate and numerate workers', or the five principles of the Indonesian state philosophy *Panca Sila* (Belief in One God, Humanity, Unity of Indonesia, Democracy and Social Justice). Such broad general goals are often seen in five-year plans. However, these goals need to be transformed into more detailed curriculum goals, for each year of schooling. These curricular goals are characteristically seen in subject syllabuses. This is the second level. Finally, at the third level we have detailed and specific goals, which might be related to what was intended should be covered in a unit or module of work in a particular subject.

The first and second level goals are the ones of interest to policy makers and planners, and are the ones with which researchers in education ministries are most likely to be concerned.

This area relating to the teaching/learning process is clearly a crucial one, and may consume a large proportion of the research budget. Recent studies in mathematics conducted under the auspices of the International Association for the Evaluation of

Educational Achievement (IEA) (Travers and Westbury, 1989) have highlighted the complex nature of curriculum. There are at least three aspects to be considered. First, there is the *intended* curriculum, at the system level - the general goals and intentions of the authorities who prescribe what should be taught, and determine the course outlines, syllabuses, textbooks and so on. Then, at the level of the institution, there is the *implemented* curriculum – the material that is actually taught in the classroom by the teacher or lecturer. This may differ from the intended curriculum, depending on the degree of control exercised by the central authorities over teachers in what is taught. Then at the student level there is the *attained* curriculum – the body of knowledge, skills and attitudes which a student has actually acquired from the educative process.

Some examples of research topics which would fall into this area of learning goals and curriculum are:

a. Needs assessment surveys

If an education ministry is not alert to the needs of its society, and responsive to those needs, the school system may be producing learning which is irrelevant. Students may drop out of school early, and be unable to find suitable work; others who continue on to the upper classes in secondary school may be bored and disaffected, and become a disruptive influence. At the tertiary level, such surveys are vital in a rapidly changing world if industry is to obtain the skilled and up-to-date work force which is necessary for high national productivity.

b. Curriculum development

This follows on naturally from needs assessment surveys. Once the needs of society are known, including both the needs of citizens and the needs of employers, it is necessary to translate these requirements into actual curriculum statements of what shall be taught. A good feedback mechanism between employers

and the education system can help to ensure that what is taught is appropriate, that the curriculum is up-to-date and relevant and not imported from some other, quite different society, or ten years behind the times! There is much research to be done here, and many different curriculum development models exist to guide the researcher. Furthermore, if a policy is made to bring in a curriculum innovation without careful trialing including sound on-going formative evaluation, the new curriculum may be poorly implemented and eventually unsuccessful in bringing about desired results.

c. Provision of resources

Again, following on naturally from curriculum development is the provision of appropriate curriculum resources to allow the curriculum to be implemented as intended. In many developing countries, a very large amount of time and energy has been spent on the production of textbooks, learning packages, and other curriculum materials, and on the setting up of libraries and resource centres. More recently, some countries have set up educational radio and/or TV networks, and have introduced computers to schools, with all the necessary hardware and software. Apart from these, there are the obvious needs for school buildings - classrooms, laboratories, with all their necessary science equipment, and sports facilities and equipment for cultural activities.

d. Special needs students

Another possible topic for research which could be classified under this heading is that of provisions for special needs students; children whose first language is not that of the country in which they are living, disadvantaged ethnic minorities, displaced persons, the physically, intellectually and emotionally handicapped, and the highly gifted. For all of these types of students advanced education systems will attempt to make special provision, on the grounds of catering for the needs of the individual. The policy makers

entrusted with the task will need research to guide them in the sorts of provisions they might make, and the likely costs of those provisions.

2. Assessment, guidance and selection

An integral part of curriculum development is assessment, because it is not possible to know whether the curriculum is appropriate without some form of feedback from the students and teachers. Assessment can be formative, occurring at intervals during the learning process and designed to assist and guide the learner, perhaps with some diagnostic elements. Or it may be summative, occurring at the end of a learning experience, and designed to provide feedback to the individual, educational institution or the community about what learning has been achieved (Livingstone, 1990).

a. Examinations

Virtually every country has written examinations in one form of another. Some have national examinations at several points in the education system, which determine the rate of promotion of students. Results on such examinations provide an indication of the level of education received by the student, and also an indication of attainment relative to other students at this level. But they also act as a filter, a form of selection, a mechanism for rationing of scarce resources, to control the entry of students to higher levels of education, and eventually their career paths into the occupational hierarchy in the world of work. Although examinations may take various forms (a single national examination, a number of regional examinations, teacher-based assessments, or a combination of these), virtually every country has them, at a higher or lower level. In many developing countries, the first such examination is that for selection for entry to secondary school. Whatever the form of the examinations may be, their validity (particularly content

and predictive validity, and freedom from bias) their reliability (precision, replicability), and their comparability (use of moderation, etc.) are all topics for serious and ongoing research. So many important promotion and selection decisions hang on their results, that they must be seen to be entirely fair by all involved: students, teachers, parents, employers and community. A related topic for consideration is the value of positive discrimination, and 'targeted' provisions for disadvantaged communities, e.g., remote rural areas.

b. Other forms of assessment

There are many other types of assessment which are worthy of research. For example, the development of forms of diagnostic assessment, perhaps using computer technology, the preparation of item banks, the development and use of standardised tests of achievement for guidance and placement in particular courses, mastery and competency testing for specialist vocational skills, objectives-referenced or criterion-referenced approaches to assessment and their appropriate uses, and different ways of reporting and certification of levels of achievement. This is a vast field for research.

c. Guidance and selection

Guidance services for students are an important part of a well-developed education system, aiming to cater for the needs of the individual. Some of this will occur informally within an institution, without the need for specialist guidance personnel, simply on the basis of personal acquaintance, and information from tests, and other forms of assessment. For children with special needs, either those who are handicapped or highly gifted, special provisions will be needed, and specialist guidance will be required. The recent trend in some advanced systems to 'mainstream' children with special needs, removing handicapped children from 'special schools' back into regular classrooms, will doubtless lead to

evaluation studies. Vocational or career guidance, the development of suitable instruments and methodologies, and methods of selection for higher education, are all likely to be areas for research.

3. Demography, enrolment and structure

Education systems are located in particular demographic settings, in countries with particular population distributions and patterns of enrolment. More especially in countries where universal primary education has yet to be attained, basic statistical information is necessary, and will form a very necessary part of the research information base for a ministry of education establishing primary schools. It is also vital information for those planning secondary and higher level educational institutions.

Topics for investigation should include:

a. Basic demographic statistics

These should be prepared for the whole country, for each age group from birth onwards, with particular attention being given to accuracy, comprehensive coverage, geographic breakdown (rural/urban, by province), birth-rate and migration trends.

b. Educational enrolments

Once the population base is determined, political decisions are likely to determine the extent of provision for education. But politicians need guidance on what is possible (e.g., in providing a pre-school service, or expanding a system of secondary schools), and basic statistical research can provide that guidance. Information needs to be available (in relation to both the statutory school beginning and leaving age) on such matters as: the percentage of children who are not in school, or some other educational institution, at every level, the rural/urban and male/female balance,

participation of ethnic minorities, special community requirements (e.g., for girls to care for children in the home, and for boys to work on the farm), and their impact on present and future enrolments.

c. Educational structures

Once the characteristics of the relevant population base have been ascertained, it is then possible to proceed to consider the educational structures necessary to cater for those who wish (and are able) to take advantage of them. This is likely to involve studies of the location of schools and other educational institutions (school 'mapping'), the provision of various alternative types of secondary and tertiary education (comprehensive secondary schools, vocational training institutions, teachers colleges, universities). It will be necessary to advise on the likely effects of automatic promotion or grade repetition policies, which are in turn linked to examination pass-rates. Investigations are needed on the prevalence of school truancy, 'stop-out' and 'drop-out' and the reasons for them. Studies should be undertaken on the retention rates of various institutions (including tertiary institutions such as teachers colleges and universities). All of these will have a major bearing on the quantity of education which must be provided.

The structure of a school system is always a matter of debate. There are many matters here which are subject to value judgements, of course. The value of intermediate schools, whether selective or comprehensive secondary schools are better for students, whether or not single sex schools or private schools should be encouraged, the effects on learning and student attitudes of large schools, or large class sizes, or 'streaming' into more homogeneous teaching groups, and so on. Some of the findings to date in these areas of research are equivocal, e.g., the class size issue (Glass, 1985). And yet even here, it is possible for specific, in-country research to be carried out, and for its results to provide an input into the decision-making process, over a period of time.

4. Finance and administration

In most countries, educational costs are growing rapidly. At the same time, there is a concern over educational standards, and a desire to increase levels of performance. This tension has given rise to a particular concern for both effectiveness and efficiency, and a desire to see 'lean' administrative structures in place which will contribute to these two very desirable goals in any education system. When curriculum innovations are being made, too, there are often implied, hidden costs, and trade-offs need to be made when budgets are limited.

Research can therefore address issues such as the following:

a. Unit costs

Policy makers need to know the cost of particular forms and levels of education, and their various economic rates of return, both private and social. This is desirable if the demand is to be estimated accurately. At the same time, it should be appreciated that human beings do not always behave rationally, and traditional rate of return analysis makes strong assumptions. Its results should always be placed alongside other information which takes political and social realities into account before major financial decisions are made. It is also helpful if the actual costs of running institutions are known, to ascertain whether economies of scale are possible (e.g., with small rural schools), and whether the marginal costs of bringing in extra students are likely to be relatively small.

b. Resource allocation

In most countries, education is seen as a public good, to be provided for all its citizens as one of their rights, at least up to a certain level. But when times are tough, there is likely to be some pressure towards user-pays, particularly if it is believed that some students (e.g., those attending university) are receiving an undue share of the

country's tax income to pay for their advanced education. Student loans and the use of 'voucher' systems are examples of mechanisms which have been recommended to achieve increased equity. In the long run, it is a value decision on whether education should be cross-subsidised, and will depend on a number of factors, including how much the country needs highly qualified people for its economic growth, and how much it will go out of its way to locate able students, encourage them by way of bursaries and scholarships, living and boarding allowances, and subsidise their educational costs.

Some more affluent countries are prepared to consider differential resource allocation to disadvantaged groups (ethnic minorities, children from low socio-economic backgrounds, handicapped, etc.) to make their levels of achievement more similar to those of the population at large. The particular way in which such resources are to be targeted is a legitimate subject for research (Ross, 1985), and the outcomes can be of material assistance to policy makers.

When new curricula or teaching/learning strategies (e.g. computers, open plan education) are being tried out, a good estimate of costs needs to be obtained, to find out whether the innovation will be cost-effective or not. It is risky simply to follow other countries, and assume that what works in one setting will work in another, often very different, setting.

Perhaps the most crucial area related to resource allocation is the salary component, which commonly swallows up at least 80% of the education budget in developed countries, and as much as 90% in developing countries. Reliable information on the qualifications, experience, movement and dropout of teachers is a vital ingredient in the costing of an education system, and one upon which good up-to-date information is vital.

c. Administrative structures

Some education systems are highly centralised, others devolve a large amount of responsibility to the local level in administrative matters, and sometimes in curriculum as well. Most achieve a blend between the two. Research can be valuable in determining the best compromise, in determining the cost-effectiveness of various alter-native patterns of administration, and ascertaining the effects of these upon teachers, principals, members of school governing bodies, and parents (Wylie, 1990). The reward and incentive structures for teachers also have a considerable bearing upon the quality of education, and the evenness of its spread across rural and urban areas in any country. Research is also needed on alternative teaching strategies and delivery systems (e.g., distance learning, small group, problem-based enquiry learning) and their impact on costs and the physical environments for learning.

5. Selection and training of educators

A vast amount of research has been carried on into exactly what makes a good teacher, from the pre-school level right through to university. This is to be expected, because teaching and learning form the core of all education. A good teacher can make us happy and inspire us to continue learning, a bad teacher can make us miserable and 'turn us off' further learning altogether. And effective teaching behaviours vary widely, at different age levels, in different subject areas, and in different situations. Teaching also merits study because it uses up a lot of money, and an inefficient teaching service is a heavy drain on the country's educational budget.

a. Teacher selection

Every country must pay considerable attention to the way in which it selects its teaching force, because the lives of its future citizens and its own economic welfare are in their hands. Research is

therefore highly desirable on the qualifications of the pool from which student teachers are traditionally drawn, the competencies and qualifications which are sought in prospective teachers, and in those who are eventually chosen for training. It is important to have good information on the incentives to teaching, the reputation of teaching as a career and the motives of those who select it, as well as the screening processes (overt and covert) which are used to select teachers and other educators.

b. Teacher education

The settings in which pre-service education of teachers is carried out, whether at a university, a teachers college or both, the level and length of training, and the balance between education theory and classroom practice are all legitimate topics for research. In-service education is another issue which is becoming of increasing importance, as new and updated curricula and teaching methods are introduced (e.g., in science) which make much heavier demands, both upon teachers' knowledge of their subjects, their ability to use new equipment and new approaches (e.g., discovery, problem-solving methods), and on their ability to cater for individual needs. They may be required to work in team teaching situations in open plan classrooms, and generally cope with a much more flexible and less-structured teaching environment, in which the traditional 'lock-step' rote learning is no longer acceptable.

c. Teacher effectiveness

All the matters mentioned above have a bearing on the general issue of teacher effectiveness. In spite of the vast amount of research into this area, we still do not know enough about what makes for effective teaching, in any global, international sense. This probably differs at different class levels, in different countries, under different teaching conditions, and with different community expectations. But it is important to have evidence about effective and ineffective teaching behaviours to plan the content

of pre-service and in-service teacher education programmes, because there is no sense in training teachers to adopt ineffective teaching strategies! If apparently successful teacher behaviours are so variable (as they seem to be) a search for general findings is probably unproductive. Specific, in-country research may be necessary to guide teacher educators in their very important task.

6. Monitoring and inspection

One form of assessment takes place at the student level. This has been considered under Topic 2. Another form of evaluation is as an accountability mechanism at the system level. It consists of gathering measures of performance so that policy makers know whether their expectations of the system outputs are being fulfilled, whether standards are being improved (or at least maintained), and (perhaps) how their own country's education system compares with other similar systems.

Some countries have very detailed and formalised ways of obtaining this information, others do it much more informally, but preparation of suitable instruments and evaluating the results is an important research exercise.

a. Monitoring achievement

It is not usual to undertake monitoring of achievement at every grade level, because of the sheer expense of the operation. Some countries do not even undertake formal monitoring at all, through the use of tests or other assessments, because they are not convinced that it is a cost-effective way to maintain standards. They may prefer to use informal methods of quality assurance by concentrating upon teacher in-service training, or by providing standardised tests of achievement to guide teachers in their curriculum and assessment decisions. But many countries do select important 'check-points' in the system at which to

administer various assessment measures on a nation-wide basis, so that policy makers and the general community can obtain some idea of the standards that are being maintained throughout the education system (Livingstone, 1985). Tests of literacy and numeracy commonly form the basis of such assessments, but they can go much broader than this. A further argument is that without monitoring, the policy makers will not know how to improve the internal efficiency of the system, because they do not know how efficient or inefficient it is, nor exactly what are its outputs of well-qualified students.

b. Comparative evaluation

On a slightly broader front, system evaluation studies are desirable, to consider such topics as the following. Is my country investing more or less in the education of its population than other similar countries, seen as a proportion of its GDP? How does the country fare in relation to these other countries on a range of social indicators, such as school enrolment ratios, graduation rates, proportion of enrolment in higher level science and mathematics courses, etc.? Are we producing a sufficient supply of highly-qualified persons to compete with the output from other rapidly developing countries. And even, what proportion of the total educational budget should be devoted to educational research!

To answer such questions will require careful, comparative interpretation of basic statistics against those of other countries, studies of labour market trends, and 'tracer' studies of graduates in particular fields.

c. Inspection

Another traditional way in which educational systems maintain a quality check has been through regular inspection of its teachers, at least at the primary and secondary levels. The quality of education provided in any country is crucially affected by the quality of the

teaching and lecturing force, and research studies of the ways in which such evaluations can best be carried on in a sensitive, on-going way are called for. Such evaluations commonly go along with some inspection of the schools, or other educational institutions, themselves, to ensure that they are well-equipped and capable of delivering the high-quality education which is required.

d. Miscellaneous

An additional Miscellaneous category has been added at the bottom, to cater for such things as research on methods of information dissemination, the preparation of research bibliographies, clearing-house activities, research methodologies, and any other topic which may not fit neatly into the grid. A summary of all these topics is contained in the table below, grouped according to the classification given, and expanded to indicate the sorts of activities which might fall into each category.

An expanded content table

1.	**Learning goals and curriculum**
•	Needs assessment surveys – societal goals, employment requirements
•	Curriculum development/revision
•	Provision of resources – textbooks, learning materials, classrooms, libraries, laboratories, sports and cultural facilities
•	Special needs students – disadvantaged, gifted
2.	**Assessment, guidance and selection**
•	Examinations – validity, reliability, internal assessment
•	Other forms of assessment - diagnostic, mastery, competency-based; standardised tests, item-banks, certification
•	Guidance and selection – career guidance, special needs
3.	**Demography, enrolment, structure**
•	Basic demographic statistics – birth-rate, migration trends, rural/urban balance
•	Educational enrolments – coverage, retention, male/female and urban/rural balance
•	School structure – comprehensive/single sex/private, school and class size, streaming
4.	**Finance and administration**
•	Unit costs – rate of return, economies of scale
•	Resource allocation – equity, targeted aid, 'user-pays', bursaries and scholarships
•	Administrative structures – decentralisation, methods of delivery
5.	**Selection and training of educators**
•	Teacher selection – qualifications, competencies, procedures
•	Teacher education – pre-service, in-service training
•	Teacher effectiveness – teaching and learning strategies
6.	**Monitoring and inspection**
•	Monitoring achievement – system accountability, national assessment, literacy and numeracy, check-points
•	Comparative evaluation – cost effectiveness, output of highly-qualified people, educational budgets
•	Inspection – teachers, institutions
7.	**Miscellaneous**
•	Information dissemination, research methodologies

Filling out the grid

One more stage in the process is necessary before all possible projects which might be undertaken can be accurately and neatly classified. It is necessary to decide at which levels of the system the issue is important, and thus at which levels research should be carried out. Some issues are of specific concern to secondary students (examinations and career guidance, for example), while others may relate only to pre-school education, or to some form of tertiary education. Some issues may span several levels, and research projects, particularly where they involve transitions from one level to the other, must take this into account. The final two-way table therefore includes *five levels* of education, plus an *Other* category coded as below:

A Pre-school

B Primary School

C Secondary School

D Tertiary Education

E Non-formal Education

F Other

These are not the only possible categories, of course. Some countries with selective secondary schools might wish to divide the Secondary School category up into two or more. Others with no organised pre-school services may not need to include this category. But the pattern will remain the same. Every cell in the table now has its own code (e.g. 1.3B would refer to a project on the provision of resources at primary school level, 5.2D would refer to a study of the selection of lecturers for some form of tertiary education (perhaps teacher education), the code 7.0F might refer to a miscellaneous project on establishing an education index for the whole education system, and so on. Projects can span several levels of the system, and should be entered under each relevant level. Occasionally a project may fit more than one content category. In this case, it should be allocated to the category it fits best, cross-referencing it to another category if this is thought desirable.

The content/level grid

	Pre-school A	Primary B	Secondary C	Tertiary D	Non formal E	Other F
1. Learning goals and curriculum						
· Needs assessment surveys						
· Curriculum development						
· Provision of resources						
· Special needs students						
2. Assessment, guidance and selection						
· Examinations						
· Other forms of assessment						
· Guidance and selection						
3. Demography, enrolment, structure						
· Basic demographic statistics						
· Educational enrolments						
· School structure						
4. Finance and administration						
· Unit costs						
· Resource allocation						
· Administrative structures						
5. Selection and training of educators						
· Teacher selection						
· Teacher education						
· Teacher effectiveness						
6. Monitoring and inspection						
· Monitoring achievement						
· Comparative evaluation						
· Inspection						
7. Miscellaneous						

EXERCISE 2

Below are *ten* research projects which you may assume have been suggested to your Ministry of Education. Classify each one onto the grid above, by giving it the correct code. Compare your answers with those of other members of your group.

1. To establish criteria for the identification and categorisation of handicapped children, with a view to deciding which ones should be integrated into normal school programmes ('main-streamed').

2. To develop diagnostic materials in mathematics for primary school children, and a set of strategies for teachers to apply these materials.

3. To study teacher dropout in isolated and rural areas in order to identify those areas where there is, or is likely to be, a severe teacher shortage.

4. To develop indicators of family socio-economic circumstances which would be suitable for making adjustments to school and tertiary fees on the basis of need.

5. To conduct a 'tracer' study of vocational education graduates in order to obtain feedback to improve the relevance of higher education courses.

6. To compile an annotated bibliography of all the reports produced by the research division of your Ministry of Education since 1970.

7. To follow a cohort of teacher education students through their courses of training and out into their first year in the classroom, to find out their perceptions of how well their courses prepared them for teaching.

8. To construct a national test of basic literacy to be used as a benchmark for future tests, and a guide for programmes in non-formal education.

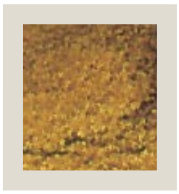
9. To survey local communities on their wishes regarding the extension into their areas of national secondary schools offering a full curriculum up to the pre-tertiary year.

To find out the effects of building a well-stocked 'community' library, readily accessible to secondary school students, on their reading comprehension and vocabulary skills and breadth of reading interests.

EXERCISE 3

Now consider whether there are any variations which you think should be made to the grid to fit the education system in your own country, either to the content categories or the levels.

Think up *ten* new projects which you think would appeal to policy makers in your country, and use your own grid to classify them. (You can stay with the grid above if you think it is suitable for application in your country)



3 Setting priorities for educational policy research issues

When establishing a policy-oriented research programme, it is highly desirable to establish a mechanism to determine national priorities. Researchers are not good judges of what is important nationally. They tend to see research projects in terms of ideas, models or methodologies which are of interest to them. On the other hand, some administrators lack foresight, and are only able to identify projects when problems arise in Parliament or there is a national outcry. It is usually then too late to initiate research which will deliver the desired results on time.

A good procedure is to poll major interest groups well ahead of time, so that the likely problem areas are identified in advance. This will give the necessary lead time to get the required research under way. It is also good to consult the Ministries of Education in other countries at a similar or slightly more advanced stage of development, to find out what problems they have experienced, locate any relevant research they may have done or commissioned, and generally pave the way for sound policies.

The grid should be a helpful device to give a broad picture of the total scope of the research effort in the country, and help to ensure that there is not an undue concentration of resources in just a few areas, with a large number of gaps elsewhere.

EXERCISE 4

Make a list of exactly which groups in your country you would consult in such a polling exercise.

Which education ministries in other countries would you think about consulting? Give reasons for your choice.

It is one thing to have a number of possible projects outlined. It is another thing altogether to decide which projects should be tackled, with what priorities and with what resources. There are really two issues here: importance and feasibility. Presumably only important projects are likely to be tackled, particularly if funds are scarce (as they usually are!). And even it the matter is important, it may not be feasible if the human, financial and other resources are not present. Exercise 5 provides a way to work through these issues, first by a consensus rating method to find out which projects should have priority, and then by a simple statistical technique.

EXERCISE 5

1. Examine the list of ten projects given in Exercise 2 above, which you labelled according to their location on the content grid.

2. Now gather together between 8 and 12 other fellow-students on the course from your own country (or one at a similar stage of development) and by discussion (and argument if necessary!) attempt to obtain agreement on which projects you might consider carrying out in your respective countries next year. List them in order, with the highest priority first, going down to the lowest priority.

   This is the consensus approach to determining research priorities, and may work well if there is little disagreement within the group.

3. Next, try a slightly more systematic approach. Go back by yourself and make an assessment of each project, individually, without consulting other group members. As far as possible, do not take into account the results of the last discussion. Make your own ratings, as outlined below, describing what you yourself think of each of the ten projects.

   First, rate each of these projects on a 5-point scale of importance in your country as follows:

   Use these criteria for your ratings:

   a. The project deals with a relevant educational issue in your country;
   b. The issue is currently a persistent problem being faced by your Ministry of Education;
   c. The project will provide information that can be used in policy decisions.

...

... EXERCISE 5

Extremely important  **not important**	5 An absolutely crucial study; top priority 4 An important project; should be done 3 A moderately important project; could be done 2 A rather unimportant project; probably not a high priority right now 1 An unimportant project; need not be done at this time

Next consider the feasibility of the project, rating each project in a similar way, from 5 down to 1. Note that importance is not the same as feasibility. A project is important if we ought to do it. A project is feasible if we can do it, i.e., it is possible, within the limitations of our resources of personnel, equipment and finance, or those that we can obtain.

Thoroughly feasible  **not feasible**	5 An easy project to carry out; could be started without delay 4 A relative straightforward project; not too much difficulty here 3 A moderately easy project to mount; some difficulty could be experienced 2 A difficult project to get underway 1 A quite impossible project to carry out at this time

Use these criteria to evaluate the feasibility of each project:

a. We have the human resources to carry it out, or we can get them;
b. We have the financial resources to do this project, or we can get them;
c. We have access to the required methodologies and facilities;
d. There appear to be no other practical difficulties (e.g., in getting co-operation from school principals, education authorities);
e. Conditions are right in my country to carry out this type of research.

...

... EXERCISE 5

4. Now add together your ratings to obtain a total score out of 10 for each project.

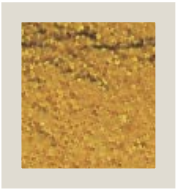
5. Come together with your group again, and on the basis of your ratings, see if you can obtain a consensus on the order in which the projects should be placed, from top priority down to bottom. It is suggested you enter the results of the ratings for the whole group on a chart like the one below. Using a desk calculator, find the mean and standard deviation of the ratings in each row, i.e., for each project, and use this as the basis for discussion.

Project number	**Course student no.** **1 2 3 4 5 6 7 8 9 10 11 12 ...**	**Importance rating**	
		Mean	**SD**
1. **2.** **3.** **... etc.**			

Did you find the same five projects at the top of the list as you did previously? If you did not, can you explain why?

6. Note that the Standard deviation (S.D.) gives a rough measure of how strong the agreement was within the group. A large standard deviation (over 2, say) means there was quite a bit of difference in viewpoint; a small standard deviation means you were all basically in agreement.

7. Discuss with the group which method seemed to be most useful (Consensus or Rating). What were the advantages and disadvantages of each. Can you suggest any improvement in the rating method which would help?



4 Clarifying priority educational policy research issues and developing specific research questions and research hypotheses

Once the general aims of the piece of research have been agreed upon, it is necessary to get down to more specific aims, and establish a suitable methodology for the research. The particular approach chosen will depend to some extent on the experience and preferences of the researcher, but very largely upon the type of problem faced.

To quote David J. Fox (1969) in *The Research Process in Education*. p.45.

In considering the research approach, we must consider two separate and underlying dynamics or dimensions, along which we can structure our research thinking. The first dimension is a kind of time line reflecting whether we believe the answer to the research question is in the past, present or future. The second dimension is an intent dimension reflecting what we intend to do with the completed research.

In the time dimension, if we believe the answer is in the past, we resort to what is called the *historical approach*, a research approach

in which the effort is made to cast light on current conditions and problems through a deeper and fuller understanding of what has already been done. If we believe the answer exists somewhere in the present, we use the *survey approach*. In this approach we seek to cast light on current problems by a further description and understanding of current conditions. In other words, we seek more fully to understand the present through a data-gathering process which enables us to describe it more fully and adequately than is now possible.

If, on the other hand, our interest is in predicting what will happen in the future, that is, if we undertake something new and different, or make some changes in the present condition, we have the *experimental* approach, which is experimental in that it seeks to establish on a trial (or experimental) basis a new situation. Then, through a study of this new situation under controlled conditions, the researcher is able to make a more generalised prediction of what would happen if the condition were widely instituted.

The research question

Usually the matters of concern to researchers in ministries of education are in the form of *questions* to be answered. This is part of the statement of the problem, which simply indicates what the researcher is trying to find out.

A research question is not the same as a question which you could ask an individual who might be part of your investigation. A research question is a way of formulating a problem so that you are directed to the answers. If one person could give the answer to a research question there would be no need to set up a research project to establish the facts.

Usually, the topics of concern to policy makers, or those selected by students for degree dissertations, are too vague to begin with. This does not mean that studying them is not worthwhile or even necessary. It simply means that the topic needs refining.

Examine the following example of a discussion between a policy maker (P) and a researcher (R), limiting and clarifying the topic of concern, and making it more easily researchable.

P. We need to do some research on why boys are not performing as well as girls in mathematics.

R. What exactly is the problem here?

P. Well, teachers I meet with keep telling me that girls do better.

R. Do you have any hard evidence to show this is so?

P. Only the examination results at the end of primary school. The girls score on average about 5% higher than boys.

R. Do all children take this examination?

P. Most of those who are still in school at that time take it.

R. What proportion of these are girls?

P. I'll have to check the figures. I would estimate about two-thirds would be boys, one-third girls.

R. So there is a higher drop-out rate amongst girls in primary school?

P. Yes. There always has been.

R. Why do you think this is?

P. Social factors, largely, I would think. Many girls have to stay at home to help with the younger children; they don't see a career as to be as important as boys do.

R. Would it be the girls with a better home background who stay on longer?

P. Yes, I would think so.

R. Well, perhaps that might be part of the reason. They might have more support and resources at home to do well at school and pursue their education. How could you check it out?

P. I suppose it would be possible to find out the proportion of high-level occupations amongst the parents of boys and girls sitting the primary final examinations, and see whether there was a difference.

R. Yes, that would be useful. Do you have any other information from lower down the primary school which might be of assistance?

P. I think some schools administer standardised tests of achievement at Grade 4 level.

R. Have many girls dropped out by then?

P. No. Most of them are still in school.

R. Do you have universal primary education in your country?

P. Well, more or less, at least up to Grade 4 (that's about age 10 or so). The dropout starts after that.

R. So there should be a roughly equal number of boys and girls in primary school at Grade 4 level.

P. Yes.

R. Could you get the results from boys and girls separately from those schools which administer the tests in mathematics at this level?

P. No central record is held, but I suppose they could be obtained from the schools.

R. Would you have many small rural schools administering the test?

P. Yes, quite a number, but not so many as in large, relatively well-off urban schools.

R. You would need to be careful in drawing your sample so that there was an appropriate balance of various types of school, before you compared the mean scores of boys and girls.

P. Yes, my staff could do that.

R. And then you could compare the mean scores of boys and girls on the standardised test to see whether the same differences in favour of girls occurred at a younger age.

P. Yes I suppose so.

R. Incidentally, why do you want to do this piece of research?

P. Well, actually, now you mention it, I've had a suspicion about the mathematics examinations for Form 3 over the last three years. I have a feeling that these examinations have been prepared in order to favour the performance of girls!

EXERCISE 6

Now that the *real* reason for the request for research has emerged, try to continue the dialogue between the policy maker and researcher. See if you can arrive at a plan of action to solve the problem, which you have started to clarify by this discussion. You will note it was not the problem you first thought it was!

Then pick another completely different topic, one which may be of importance in your own country, and write a similar dialogue between a policy maker and researcher, clarifying the issue little by little, and proceeding in the end to the outline of a research proposal.

This procedure of clarifying the issue and making it researchable is a very important and necessary step before any research is embarked upon. In many circumstances, it can be made more systematic.

Consider the research question below, which relates to a small (imaginary) island called Marino, with a population of about 5000, part of an island nation in the South Pacific.

Research question

What is the need for a secondary school on the island of Marino?

We will assume that the answer to this question is not already known, and that it could not be satisfactorily answered by just one person, e.g., the tribal head on the island. The answer will depend on information from various sources, such as the Minister for Education, policy makers within the Ministry who are responsible for interpreting the Minister's policies and finding the financial

and personnel resources, the views and opinions of people on the island, the views of the principals of the 'feeder' primary schools, population trends in the area, distance from secondary schools on neighbouring islands, ease of transport on the island, and so on.

When surveying opinion, the researcher will not simply want to repeat the research question above. Rather, it will be necessary to ask a series of more specific questions related to it. It may be possible to obtain answers to some of these questions from official records or government statistics. Perhaps some could be obtained from a postal questionnaire. But the most reliable way would usually be to interview key people likely to be affected by the decision. These are sometimes called the 'stake-holders', because they have an interest or 'stake' in the question.

To begin with, the following four questions might be asked by the interviewer:

Is there a need?

Where is the need?

Why is there a need?

What kind of need is there likely to be in the future?

The outline in Exercise 7, which you will be asked to complete, is for an interview with the chief officer of the Ministry of education on the island of Marino. Notice how the general research question has been broken down into separate, more detailed questions. The interview questions help to answer one or more of these smaller questions. Notice also how the interview questions match the detailed research questions and allow informed guesses (hypotheses) to be made about the answers.

Detailed research questions	Examples of interview questions
Is there a need?	How many children attend primary school on the island of Marino? How many of these are in their final year of primary school? ... ...
Where is the need?	Where are the primary schools on the island located? ... ...
Why is there a need?	What is the policy of the Minister of Education on the setting up of secondary schools? ... ...
What about the future?	What is the birth rate in the whole country? Is the birth rate on the island of Marino likely to be any different? Is there much internal migration to or from Marino? ... ...

Note that the research question also leads to the definition of terms. What is intended by secondary school? Is it a full national secondary school with courses going right up to pre-tertiary level, or is it a regional secondary school with courses terminating at a lower level?

EXERCISE 7

Make an expanded version of the above list of questions. Then fill in all the detailed interview questions you can think of that might correspond to these four research questions.

Then add you own, additional research questions, e.g., on funding, personnel, transport, etc. and make up interview questions to fit them. You should end up with a complete interview schedule, dealing with all the important issues which the Minister would want to know.

EXERCISE 8

Now imagine you were interviewing the head man of the local tribe on the island. What research questions would you want to ask him? (Many of them will be different!)

Make up a table in the same way, listing the research questions down the left, and the corresponding interview questions on the right.

Discuss this exercise with your group, and compare your answers

Beware of unresearchable questions!

Try answering: *Is early childhood education a good thing?*

The problem is that it is impossible to tell what would count as evidence to support any one answer over another. Some people would not accept, 'It leads to a child's all-round development'.

Some would not accept 'It prepares a child for primary school'. Some would not accept 'It has economic benefit'. The answer to this question lies in the field of values and is not really a matter for scientific investigation. However, if someone told you what kind of answer they *would* accept as evidence (e.g., it prepares a child for school) then the question could be researched, *within those terms*.

Faced with an unresearchable question, a researcher will sometimes define what answer he or she would accept as evidence, and structure the research around that. For example, an economist might assume that the most important benefit from early childhood education was an economic one. The economist might then evaluate early childhood education in relation to its costs and its benefits. One type of early childhood service might be compared to another, early childhood services might be compared with other services in relation to what the service costs and what benefits result to the users and/or to society as a whole.

EXERCISE 9

Begin with an unresearchable question which people in your country might ask, and turn it into a researchable question by defining the terms of reference more closely. You might like to use as an example (if you wish) the question 'Is having many small rural schools a good thing?' and consider it from the viewpoint of an economist, an educational administrator and a local community leader. For this example (if you chose to use it), you would need three separate, and different, research questions to reflect the three different viewpoints.

The research hypothesis

Sometimes it is helpful to state the issue in the form of a *hypothesis.*

Put simply, a hypothesis is a suggested answer to a problem, expressed in the form of a brief sentence.

It should satisfy at least four criteria:

- It should be *relational*; that is, the hypothesis should state an expected relationship between two or more variables. The researcher will attempt to verify this relationship.
- It should be *non-trivial*; the hypothesis should be sensible and worthy of testing, a likely possibility and not just an idea dreamed up for the sake of having a hypothesis.
- It should be *testable*; that is, it should be possible to state it in an operational form which can be evaluated on the basis of data to be gathered.
- It should be *clear and concise*; the hypothesis should be in the form of a brief, unambiguous sentence.

1. The hypothesis should be relational

In correlational studies, that is, those in which data on two or more variables are collected on the same individuals, a direct relationship is usually stated in the hypothesis. In experimental studies, where an experimental treatment is administered to one group of students but not to another group, differences between the treatments are usually hypothesised, based on means and standard deviations.

In addition to stating a relationship, the hypothesis may also briefly identify the variables and the population from which the researcher intends to select the sample. As a rule, however, it is best not to include too much information of this type in the actual hypothesis, because it makes it too lengthy and less clear.

2. The hypothesis should be non-trivial

After completing the necessary review of the literature, you will have detailed knowledge of any previous work relating to your research investigation. In many cases you will find conflicting results, but they will at least give you some leads so that your hypotheses are sensible and reasonable. It is best to have some basis in theory, fact, or past experience for your hypotheses. A 'shot-gun' approach which gathers large amounts of information unsupported by any underlying rationale is not to be recommended.

3. The hypothesis should be testable

The relationship or difference under consideration should be such that the measurement of the underlying variables can be made reliably and validly, in order to see whether the hypothesis as stated is supported by the research. Do not state any hypothesis which you do not have good reason to believe can be tested by some objective means. The hypotheses of inexperienced researchers often fail to meet the criterion of testability, either because the required measures do not exist, because many other likely factors are at work, or because it would take far too long to obtain results. For example, a hypothesis that taking a particular course in moral education would lead to a reduction in adult crime statistics is unlikely to be easily testable.

4. The hypothesis should be clear and concise

In stating hypotheses, the simplest and most concise statement of the problem is probably the best. Brief, clear hypotheses are easier for the reader to understand, and also easier to test. It is better to have a larger number of simple hypotheses than a few complex ones. Care and precision in the use of language are necessary in order to define the variables and samples clearly. Each separate relationship drawn from the research question needs its own hypothesis, because usually some will be supported by the data and some will not.

In dealing with many education policy issues, researchers are likely to find it helpful to use questions rather than hypotheses for their problem statements. Questions may be more useful because they provide more less mechanistic, more holistic guidance in the framing of a research project. They are closer to real life enquiries, and allow a variety of broader approaches to gathering information, including qualitative methods. The advantage of the research hypothesis lies in the direction and precision which it gives to research. There is no room for sloppy thinking in framing research hypotheses.

In the past, students writing research dissertations have generally been encouraged to frame their questions in the form of hypotheses, in many cases based upon underlying theories. On the other hand, many projects carried out by research staff within ministries of education do not call for hypotheses. They may be baseline studies describing the situation as it exists, or evaluations of particular curriculum innovations, and simple descriptive statistics are all that is required. No cause-effect relationships are being teased out, as with an experimental study.

In passing, it should be emphasised that a demonstrated statistical association is not the same as a proof of causality. Just because

there is a statistically significant relationship between, say, whether or not the school has a science laboratory and the proportions of students achieving high examination pass-rates, does not *prove* that the presence of laboratories *causes* high achievement, simply that it is related to it. There may be other important factors at work as well. Association is not the same as causality, but strong statistical techniques such as path analysis can go some way towards teasing out the relative effects of different variables, and combinations of variables, and allow some cautious generalisations to be made about which hypotheses are *more likely* to be true. Even here, there is a strong body of literature suggesting the 'situation-specific' nature of much behaviour. It depends to a considerable extent on the particular class, school, teacher, and circumstances prevailing at the time.

Researchers commonly use two different kinds of hypotheses. A *research hypothesis* indicates what the researcher expects to find, and substantiate with evidence. It is framed in a positive way, but it is important to note that it is not what the researcher *wants* to find, but what he or she *expects* to find that is the basis of the statement. No researcher operates in a value-free environment. All of us have our own preconceptions about education; the frameworks in which we conceive the research and even the very questions which we ask will reflect that. But the important point here is that there is a 'procedural neutrality', and the researcher is as objective as possible in gathering the necessary data to see whether what he or she expects to find is indeed the case. Researchers sometimes use another type of hypothesis, the *null hypothesis* for reasons of ease in statistical testing. The null hypothesis states that *no* difference or relationship exists among the variables, regardless of whether or not the researcher believes this to be true. If, as a result of the research, the null hypothesis is rejected, the investigator concludes that differences *do* exist, and will then set out to identify those differences, and if possible, their causes.

Two examples will make the difference clear.

Example 1

- *Topic:* The relationship between age of entry to primary school and subsequent school success.
- *Research Question:* How is performance in the English language affected by whether children enter primary school at age 6 or age 7?
- *Research Hypothesis:* Children who enter primary school at age 6 will perform better on standardised tests of English reading comprehension at age 12 than children who enter at age 7.
- *Null Hypothesis:* There are no differences in achievement on standardised tests of English reading comprehension at age 12 between children who enter primary school at age 6 and at age 7.

Note that the general topic has been made more specific by the research question, in that school success has been defined in terms of the English language only. Clearly there are many other definitions of school success, and these would all need their own research questions.

Note next that the research hypothesis has further narrowed the research question, in specifying that performance in English is defined in operational terms as written performance only (not spoken performance or listening skills) and that this performance is limited to what can be measured on a standardised test of reading comprehension (not vocabulary, for example). Other hypotheses would be needed to cover other aspects of English.

Furthermore, the age of 12 years has been set as the point at which the measurement is to be done. If it was desired to see whether the advantage persisted to a later age, it may be necessary to test

students again when they were 14 years or 16 years. These would require further hypotheses.

The null hypothesis matches exactly the research hypothesis, and the same precision is called for in the framing of the statement.

Here, however, no assumption is made as to whether beginning school earlier has a positive effect on learning or not. The hypothesis is entirely neutral.

Example 2

- *Topic:* The use of micro-computers in diagnosing errors in basic arithmetic.
- *Research Question:* Can micro-computers be used effectively to diagnose errors in basic addition and subtraction with primary school pupils?
- *Research Hypothesis:* The number of errors in addition and subtraction correctly located by a computer diagnostic arithmetic programme is more than the number located by a classroom teacher.
- *Null Hypothesis:* The number of errors in addition and subtraction correctly located by a computer diagnostic arithmetic programme is no different from the number located by a classroom teacher.

Note that a number of other hypotheses would need to be tested here as well. It would be important to know how long it took the teacher to do the error diagnosis task, compared with the computer, whether or not the same errors were detected, how much extra information was obtained from the computer printout about the false starts made by the pupil before he or she got the right answer, and so on. (Livingstone, Eagle, Laurie, 1988).

EXERCISE 10

Choose *three* topics as research possibilities. They can be any topics you like.

Now make three problem statements for each, as for the Examples above.

Topic under investigation

Problem statement as research question

Problem statement as research hypothesis

Problem statement as null hypothesis

As you go, check each of your statements against the four criteria given above: relational, non-trivial, testable, clear and concise. When you have finished, exchange your problem statements with those of another member of your group. Can you improve on one another's problem statements? Discuss and critique them together.

Generating research hypotheses

Where do hypotheses come from?

There are three main sources:

- Observation
- Theory
- Literature Review

Hypotheses are often derived as the end result of a series of *observations*. But they are not to be confused with observations. An observation refers to what *is*, and can be seen; a hypothesis refers to something that can be *inferred*, or expected, or assumed from what is seen.

For example, some researchers could visit a primary school, and note that there is no library, there are very few bookshelves round the classroom walls, and there are hardly any books on them. Though they do not *know* the school achievement results are poor (that is, they have no data on examination success, at this stage), they *expect* that in general children from that school will not perform well.

They could then make an explicit hypothesis, setting out an anticipated relationship between two variables, number of books found in school and success in examinations for entry to secondary school. This hypothesis could be tested by visiting a number of different schools, observing the number of books, and whether or not the school had a library, and relating these observations to the proportion of pupils who were successful in entering secondary school. A generalised hypothesis could be framed on the basis of the evidence.

But in visiting the various neighbourhoods, the researchers also observed that some of them showed obvious signs of poverty. There were many broken down old sheds, and the ground seemed not to be cultivated. They wondered whether this might have an even more significant effect on school achievement. Perhaps the majority of people living in these poor neighbourhoods could not afford a newspaper, or any books in their homes. There was no 'literate culture' in the homes, to reinforce what the school taught, and this was the main reason why the children did not do well at school.

This idea would give rise to some *alternative hypotheses*, relating first, total home income, and secondly, the number of books, newspapers, magazines, etc. in the home, to the success of children in their examinations for entry to secondary school. More generalised hypotheses could now be framed and tested, provided that data on home income and home literacy could be obtained and put into an operational form to allow the necessary correlations to be calculated.

And so the process would continue, with more likely hypotheses being generated and proposed for testing, requiring new information to be collected in a form which allowed it to be evaluated with reasonable objectivity.

A hypothesis, then, is an expectation about events, based on a generalisation of an assumed relationship between variables. Hypotheses are abstract and concerned with theories and concepts, whereas the observations used to test them are specific and based on facts.

Another way of generating a hypothesis is from an underlying *theory*, which has been built up over a large number of previous studies by researchers over a long period of time. The theory of mastery learning would be one such example. This states that if learners possess the necessary entry behaviours (prerequisite

knowledge, skills and attitudes) for a new learning task, and if the quality of instruction is adequate, then they should all learn the task, given sufficient time. Two typical hypotheses following from this theory would be:

- *Hypothesis 1*
  Following corrective instruction (mastery learning) the relationship between original learning and corrected learning will be zero.

- *Hypothesis 2*
  Given equal prior learning, corrective instruction (mastery learning) will produce greater achievement that non-corrective instruction.

Theory thus provides a good source from which hypotheses may be derived, for particular sorts of research, because testing the hypotheses will confirm, elaborate or disconfirm the theory, and a new and cohesive body of knowledge will begin to emerge. This source of hypothesis generation may, however, be more suitable for an academic thesis than for the work of someone involved in policy research for a Ministry of Education.

A third, and very common way of generating hypotheses is through a *literature review*. The object of a literature review is to learn from what is already known on the topic, and build on it. There is no point in 're-inventing the wheel'. Reviewing and synthesising the work of others can provide suitable research questions or hypotheses which they have used, suggest forms of wording which have proved successful in eliciting what might be sensitive information, and alert you to additional questions which could be asked if the circumstances of previous research are different from those under which you are working. A literature review can identify suitable target populations, suggest important predictor and outcome variables, and demonstrate tried and tested measurement techniques.

A thorough literature review has another advantage as well; by learning from the work of others, you can avoid repeating their mistakes, if they are honest enough to report them! Finally, you may discover some studies which give clear and unequivocal answers to the very questions you are concerned about. You may not need to do the research you had planned at all, or you may only need to do a small-scale study to check that the results already found somewhere else hold equally true in your own country.

One particular form of literature review is the relatively recent development of *meta-analysis*, which can provide a fruitful field for the generation of research hypotheses. Meta-analysis refers to a method that combines a large number of similar studies testing essentially the same hypothesis in different settings, and thus helps to reveal the overall size of the effect or relationship between the variables involved. In effect, meta-analysis is the analysis of analyses, a distillation of past research on an issue. Not only is this a good way to generate hypotheses, but it also provides an opportunity to pass judgement on the overall quality of the research on a particular issue. It also helps identify variables which ought to be included in future studies, because they have been found to be important in other studies in the past.

A well-known illustration of meta-analysis is that of Gene V. Glass (1985), referred to above, on the effects of class size on school performance. This is a very vexed question, and the last word has by no means been spoken on it. Most national evaluations in developing countries include a measure of class size. Because teacher salaries use up between 80% and 90% of the education budget in such countries, it is a crucial variable for economists of education. But it is a very hard one to interpret. For example, some high quality urban schools may have large classes because they are so popular, and parents want to send their children to them. And if the method of instruction is the same in large classes as in small classes (teacher writes on the blackboard, children copy and learn)

the size of the class makes little difference to learning, although it may make a difference to the amount of marking the teacher has to do, the amount of time he or she can spend helping individual children with their difficulties, and general teacher morale.

A note on qualitative approaches

Researchers and those who consult research information want trustworthy information, whether this is desired to guide educational practice or inform educational policy. In the past there has been a division of opinion over whether qualitative datasets are sound, trustworthy and generalizable. Today, it is generally accepted that quantitative and qualitative research are complementary. Each type of research data has its own authority and rules for establishing validity.

Quantitative research relies upon measurement, using such techniques as questionnaires, interviews, and observational studies which involve the counting of scores, tallying frequencies, and estimating statistical differences and relationships between sets of variables.

Qualitative research refers to a range of activities, but they do have some characteristics in common. Robert Burgess lists four:

- "The researcher works in a natural setting ... and much of the investigation is devoted to obtaining some understanding of the social, cultural and historical setting".

- In certain styles of research, "Studies may be designed and redesigned ... [and] researchers may modify concepts as the collection and analysis of data proceeds".

- "The research is concerned with social processes and with meaning ... the kinds of studies that are conducted using this perspective involve focusing on how definitions are established by teachers and pupils, and how teacher and pupil perspectives have particular implications for patterns of schooling".

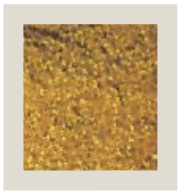
- In some styles, "Data collection and data analysis occur simultaneously.... Hypotheses and categories and concepts are developed in the course of data collection. The theory is therefore not superimposed on the data, but emerges from the data that are collected". (Burgess, 1985)

In the latter, more qualitative approach, with its emphasis on 'context' and 'meaning', the researcher collects the data without a preconceived framework for analysis. Writing a running record of the behaviour of a child in a pre-school institution is an example. A researcher could start with a very general question, without formal hypotheses, collect as much information as possible, and let the data 'speak for themselves', as they gradually accumulate.

In the former, more quantitative approach, the data are fairly well structured, as for example, with a structured observational schedule or an interview schedule. Researchers often start with the second approach, by recording conversations with people on the topic of study, before moving on a more structured analysis.

There are hazards with each method. The more qualitative approach works best if the researcher has the ability to see the underlying 'meaning' beneath the surface of events, but is very time-consuming. The quantitative method allows for standardised data-collection across subjects and samples, and more ready generalisation, but the choice of what to observe and measure can be a source of bias. Something important may be overlooked, or the kind of data collected may not be appropriate to important sub-groups within the population. However, it is likely that this

approach will be most commonly used by researchers working in Ministries of Education and providing information for policy makers, and it is assumed in what follows.



5 Moving from specific research questions and research hypotheses to the basic elements of research design

Putting it into operation

Let us suppose that you have now, after careful consideration of your research priorities, established your general aims for a research project. Following consultation with all the stake-holders, you have outlined your specific research aims and set out some basic research questions or hypotheses. How then do you proceed to put these research aims into practice, or 'operationalize' them?

The research questions or hypotheses are of crucial importance in the design of the research. They will determine every facet of the methodology.

1. Research questions determine the *type of study* which should be carried out: e.g., descriptive, relational or experimental. Is there likely to be some control over the research setting, so that random assignment of students to differing experimental 'treatments' is possible, or must the research simply describe the situation as it is, and attempt to draw conclusions? To what extent are the outcomes likely to be 'situation-specific', and how much generalisation to other settings is hoped for?

2. Research questions identify the *target population* from which any sample will be drawn. Only when it is known exactly about whom the policy decisions are to be made will it be possible to decide the subjects to consult and study. If you do not identify the people you are most interested in, those who are most able to provide the information required, you risk omitting important respondents from the project.

3. Research questions determine the *level of aggregation* of the data to be obtained. Are differences between pupils within classes, with their differing ages, abilities and home backgrounds, the important consideration? Or is it information gathered at the classroom level about levels of performance of groups of children under different instructional environments which is the major focus of the study? Or are you largely concerned with the schools themselves, their location within a particular urban or rural area, their organizational structure, and the effects this may have on attitudes or achievement? If this question is not considered carefully at the outset, there is a risk that there will not be enough data at the right level of aggregation to answer the research questions you want to answer.

4. Research questions identify the *outcome variables*. For example, precisely what definition of adult literacy is being used in a particular study? Does it only include written literacy, or is oral literacy included? Is it in the first spoken language or only in English, which may well be a second language for most people in your country? It is possible to determine appropriate outcomes only if you know exactly what you want to know. Otherwise, there is a danger that you fail to collect data on some significant outcomes.

5. Research questions identify the *key predictor variables*. Does performance in computer-based instruction differ by sex, or reading ability, or attitude to technology in the home? What

other variables may be important? Thinking carefully about all the most likely things which may be associated with your outcomes will help to avoid missing vital predictor variables.

6. Research questions influence the *measuring instruments* which will be used in the study, the ways in which data is collected, whether by access to archival records, questionnaire, interview schedule, observational record, or other means. Do the official records exist in a form which allows for ready analysis? Are there published instruments or other existing measures which are suitable for the task, or will new ones have to be prepared, validated and used? Will a variety of approaches be necessary to gain the rich information necessary to describe this phenomenon?

7. Research questions determine the *sample size*, the number of people you must consult or study. Different questions require different modes of analysis, which in turn require different sample sizes to ensure adequate statistical power to detect effects. Low or biased response rates and clustering effects play havoc with sample sizes, and considerable care is needed to ensure that the research gives definitive and generalizable results, useful to the policy makers who will be interpreting its results.

(Light, Singer and Willett, 1990)

Below are two examples of how these procedures to 'operationalize' the specific research aims can be carried through systematically. Every research project is different, and different types of research require different approaches. But there is good value in being thoroughly systematic about the way in which the project is planned. A tabular approach can be helpful, and the two examples which follow illustrate how this can be done for two different research projects.

Example 1

This is drawn from the illustration in Exercise 7 above, about the new secondary school on the island of Marino.

In studies such as this one, it is first necessary to decide:

- The type of research which would be most appropriate. (It could be a multi-faceted or 'triangulated' study, using several methodologies).
- The target population, i.e. who are you going to consult, interview or survey. (This may be different for different sub-questions).
- The sample size for the study (where this is appropriate).
- the data sources, measuring instruments, etc. which will be required.

Research question:

What is the need for a secondary school on the island of Marino?

Sub-questions:

Is there a need?
Where is the need?
Why is there a need?
What kind of need is there likely to be in the future?
...

Type of study:

Needs-based opinion survey, drawing on archives, official and local viewpoints.

Table 1. Summary of data sources

Code	Target population	Sample size	Data source
A	Official government records	-	Official records
B	Ministry of Education Officials	5	Interview
C	(a) national	3	Interview
D	(b) local	6	Questionnaire and interview
E	All principals of primary schools on Marino	5 (random) from each of 6 schools = 30	Interview
F	Sample of parents of primary school children on Marino Tribal head on Marino, and other local dignitaries	3	Interview

It is helpful to set out your information in the form shown in *Table 1* above, coding each of the data sources, and filling in the entries across the page.

Once such a table is complete, you will have some idea of the size and scope of the project, the number of interviews and questionnaires which will be required, and a rough estimate of the amount of time and money which will be needed. The sample sizes can be modified at a later stage in the planning, of course, when the statistical treatment of the data is finally determined. But it is helpful to have some guide at this early stage.

It is now possible to operationalize the process one stage further, by examining each of the individual questions which you intend to answer and deciding the best way of obtaining the information. In general, the best way is the most efficient way, the one which will

provide the information at least cost, maximum accuracy, and least intrusion on the valuable time of other busy people.

The source of the data for a few of the questions in the sample has been indicated by the codes in the final column of *Table 2* below.

Table 2. Survey questions linked to data sources

Question	Data source
1. How many children attend primary school on the island of Marino?	D,A as cross-check
2. How many of these are in their final year at primary school?	D,A as cross-check
3. Where are the primary schools on the island located? and so on…	D, observation

EXERCISE 11

1. Go back to your own answers to this sample question, and expand and complete the two tables above as appropriate by adding in all your extra interview and other questions.

2. Then return to the three research topics you picked in Exercise 10, and choose *one* of these topics, somewhat different from that about the secondary school on Marino.

3. Write out the main research question again, and then at least *four* sub-questions which follow from it, as in Exercise 7. These give your general and specific aims for the project.

4. Now devise some actual questionnaire, interview, or other questions which will give you the information you need on the problem. Prepare two grids like those above, and enter your information on them in the same way.

Example 2

For some research projects, particularly experimental studies, it is possible to go one stage further, and actually list the outcome variables and key predictor variables which are to be considered. This was less relevant for the question on the secondary school on the island of Marino, because the outcome was simply whether or not a school would be built, and many of the so-called 'predictor' variables were really background demographic information, political intentions by government, and central and local perceptions of need. It would be difficult to carry out an empirical, statistical analysis on such data.

But consider this example, drawn from an actual research project conducted in Fiji. (Elley and Mangubhai, 1981)

The project arose from findings in other studies that children with high achievement levels invariably came from schools with large libraries and/or homes with many books. Access to books seemed to be important for language learning, and it was hypothesised that a substantial increase in the supply of books available to children might improve their language learning. This was actually done by a 'book flood', the donation of a large number of books for use in school classrooms.

It turned out that the resources available were only sufficient to provide 16 classrooms with 250 books each. Eight schools were selected to receive books at two class levels, Classes 4 and 5.

These were divided up into two groups of four schools each, one to adopt what was known as a Shared Book approach to reading, the other to adopt a Silent Reading approach. (These terms are described in the reference above.) A third, matched group of four schools was used as a control group in the experiment.

Here the general research question could have been framed as follows:

Research question

What are the effects of a 'book flood' in school classrooms on the achievement in English language of primary school children in Fiji?

More detailed research questions followed, which are not repeated here.

Finally the various procedures and instruments were selected, and a timetable for the research drawn up (see *Table 3*). This is another use of a table in the form of a 'timeline' to describe how the research was to be 'operationalized', or put into practice.

Tables like this bring system to the research, and show critical points in the timing. It is important that the research does not get behind schedule, particularly if (as in this case) the fieldwork has to take place at particular times to fit in with school holidays. The delay of even a week or two here could set the whole project back a whole term, or even a whole year.

A further use of a table (*Table 4*) would be to describe:

- The level of aggregation of data;
- The main outcome variables;
- The key predictor variables.

Table 3. Project timetable

Experimental group	Shared Book	Silent Reading	Control
August	Development of general research aims following discussion with Ministry of Education officials		
September	Preparation of specific research questions and hypotheses Planning research design, including sampling plans		
October	Construction and trialling of instruments		
January	Briefing of teachers involved in research		
February	Pre-tests	Pre-tests	Pre-tests
March	3-day workshop	No workshop	1-day workshop
	Marking and analysis of pre-tests for all classes		
April	250 books supplied	250 books supplied	Usual programme
	Teacher observation in all classrooms		
November	Post-tests	Post-tests	Post-tests
December	Marking and analysis of post-test for all classes		
January	Further data analysis, comparing pre-test and post-test results		
March	Preparation of research report, including policy recommendations		

Table 4. Relationship between outcome and predictor variables

Class	Predictor variables	Outcome variables
Class 5	*Pre-test*: Reading comprehension (sentence completion test of 35 multiple-choice items	*Post-test: STAF* Reading Comprehension (Form Y) Reading test of 6 passages and 32 multiple-choice items *STAF: Listening Comprehension* (Form Y) 36 multiple-choice items based on 7 short passages read aloud *English Structures Test*: 20 open-ended questions *Composition Test*: short story of at least five sentences on a set topic
Class 4	*Pre-test*: As for Class 5	*Post-test*: Same as the Pre-test *English Structures Test*: 35 multiple choice questions *Word Recognition Test*: Individual interview about background and attitude to English; then for every second pupil only, an orally administered test to pronounce words from a 50-word graded list *Oral Sentence Repetition*: Pupils repeat orally after the examiner a series of 28 English sentences, graded according to complexity of structure

There is no standard pattern for such tables. Each research project will have its own requirements. The important thing is that it should allow the specific aims of the project to be developed and carried out in a systematic way.

A final use of what are sometimes known as 'dummy' tables would be the setting up of a series of 'empty' tables like the ones which will appear in the final version of the report. These tables force the researcher to think very early in the research project about exactly what information will be reported, and how it will be reported.

For example, in the research question outlined in Example 1 above, it would be possible to set up a 'dummy' table like *Table 5*. This table would then be gradually filled in as the information was obtained, and would provide the basis for discussion in the report of exactly how many students were involved. A similar type of 'dummy' table (*Table 6*) could be used for the second question, 'Where is the need?'

Table 5. Student enrolments in Marino primary school, by grade level and tribal region

Grade level	Tribal region				
	A	B	C	D	E
K 1 2 3 4 5 6					
Total					

Table 6. Location of secondary school preferred by various stakeholders

Tribal region	Source of data			
	Ministry National Local	Principals of primary school	Parents	Tribal heads
Region A Region B Region C Region D Region E				

For the third research question, *Table 7* might give a convenient way of recording the information, by classifying the reasons given by various groups in their efforts to justify the location of a secondary school. These reasons would be drawn from open-ended questions asked at interviews, and coded afterwards into a few convenient and logically coherent categories.

Table 7. Reasons given by various stakeholders to justify need for a secondary school

Reason	Source of data			
	Ministry National Local	Principals of primary school	Parents	Tribal heads
Reason 1 Reason 2 Reason 3 Reason 4				

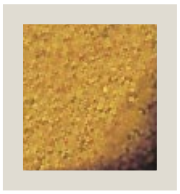
6 Summary

You have now come to the end of this module. In it you have traced the path that a research worker engaged in policy research must tread. You have:

- prepared the ground, by establishing exactly for whom the research is being done, and to whom its results are to be directed;
- examined the issues, and decided what is researchable and what is not, through discussion with the policy makers;
- established priorities for what can be done, and defined the content and level of the proposed research in a systematic way;
- considered appropriate research questions and hypotheses, and decided on a suitable methodology for the projects to be undertaken, after a literature search;
- planned the research projects in outline, and made some decisions on how to operationalize them and present the results.

Other modules in this series will dwell in more detail on some of these matters, such as carrying out a literature search, working out suitable experimental designs, designing interview schedules, analysing results, and so on.

But you should now have a good grip on the aims of research into educational policy issues, and how to get started on it.



Annotated biliography

7

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of Europe and the United States, and finds that in these settings, educational research has not made a large impact on policy formation.]

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and discussions associated with an international workshop on *Issues and Practices in Planning the Quality of Education* organised by the International Institute for Educational Planning in November 1989. Amongst other useful contributions, it contains a chapter on improving the dialogue between the producers and consumers of educational information, and an agenda for international action which has led to the preparation of the current series of modules.]

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Since 1992 UNESCO's International Institute for Educational Planning (IIEP) has been working with Ministries of Education in Southern and Eastern Africa in order to undertake integrated research and training activities that will expand opportunities for educational planners to gain the technical skills required for monitoring and evaluating the quality of basic education, and to generate information that can be used by decision-makers to plan and improve the quality of education. These activities have been conducted under the auspices of the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ).

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These modules were prepared by IIEP staff and consultants to be used in training workshops presented for the National Research Coordinators who are responsible for SACMEQ's educational policy research programme. All modules may be found on two Internet Websites: **http://www.sacmeq.org** and **http://www.unesco.org/iiep**.