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THE DELPHI TECHNIQUE: ITS METHODOLOGY
AND POTENTIAL FOR EDUCATIONAL
PLANNERS IN DEVELOPING COUNTRIES

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Mariama Sarr-Cessay
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ABSTRACT

This study had two objectives:

- (i) To examine methodological difficulties in using the Normative Delphi Technique as a tool for educational planners; and
- (ii) To explore the potential of the Normative Delphi Technique for educational planners in Developing Countries.

To achieve the above objectives, an experimental-type Delphi was carried out, using a group of fourteen New Zealand experts in the field of Educational Planning, who had worked as consultants or advisers in Developing Countries. A three phase Delphi procedure was employed combined with a follow-up evaluation of the study by the respondents.

On the basis of this experimental Delphi study it was concluded that the Technique may be potentially viable as an instrument for gaining consolidation and consensus of respondent opinion, but that methodological difficulties exist within the Technique. These include : the selection of subjects, character and clarity of Round One, type and effect of information feedback and the number of rounds used. It was suggested that these difficulties could easily be overcome and that, the Delphi Technique may complement, and indeed expedite existing educational planning procedures in Developing Countries such as Commissions of Enquiry, Ministry Plans and Research Studies.

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INTRODUCTION

The future of education seems to be universally uncertain, probably more so in Developing Countries where education has often been regarded as a tool for solving such problems as poverty, over-rapid population growth and political stability. It is this uncertainty of what lies ahead in education that has brought to prominence the Delphi Technique as one instrument to generate consensus of opinion concerning the solutions to present and potential problems and issues in education.

Developed during the 1950's, the Delphi Technique has traditionally used experts, via a series of intensive questions interspersed with feedback, to arrive at consensual opinion and judgements.

In education, the use of the Technique has been concentrated in the area of educational planning. Despite its popularity, methodological difficulties in Delphi's use have been identified, and in the present study an experimental-type investigation is carried out to explore some of these difficulties, and to ascertain the potential of the Technique particularly for educational planners in Developing Countries.

The report of this investigation then, consists of four chapters. The first provides background details about the Delphi Technique, its uses and applications, and then highlights the objectives of the present study, and the reasons why these objectives were chosen.

In Chapter Two an outline is given of the design of the experimental-type study used to collect information on some of the methodological difficulties involved with the Delphi Technique. This is followed by a discussion of the results obtained. The report concludes with a chapter on an evaluation of the potential of the Delphi Technique for educational planners in Developing Countries.

CHAPTER ONE

THE DELPHI TECHNIQUE

The Delphi Technique is a method of eliciting from a selected group of (expert) informants, opinions or judgements and subjecting them to a process of refinement. The typical Delphi procedure consists of a series of questionnaires, of which the second and subsequent rounds feed back information to participants (who remain anonymous to each other) while giving them the chance to rethink, and if necessary to re-state, their opinions or judgements in the light of the feedback.

The original 'Project Delphi' was pioneered by the United States Air Force and sponsored by the Rand Corporation, during the early 1950's. The objective of this Project was to generate consensus amongst a group of experts concerning the number of Soviet Atomic bombs required to reduce, to a specific degree, the munitions output of industrial targets in the United States.

A panel of seven experts was selected for this defence experiment: there were four economists, a physical vulnerability specialist, a systems analyst, and an electronics engineer. Altogether, five rounds of questionnaires were used with the second and following rounds providing feedback to the seven respondents. A detailed description of that 'Project Delphi' is given in Appendix A.

In discussing the findings of the experiment, the pioneers of Delphi, Dalkey and Helmer (1963), argued that the Technique avoided many of the disadvantages common with the more conventional use of experts in round table discussions and other forms of meetings. They maintained that confrontations in these face-to-face encounters

... often induce hasty formulation of preconceived notions, an inclination to close one's mind to novel ideas, a tendency to defend a stand once taken or, alternatively and sometimes alternately, a predisposition to be swayed by persuasively stated opinions of others.

(Dalkey & Helmer, 1963, p.459)

They suggested further that the Delphi method enabled one to explore systematically some of the factors which influenced a person's judgements. Thus, the technique made it possible to correct any misconceptions harboured by a person, as well as to draw his/her attention to factors which may have been overlooked in the first analysis of the situation. Among their criticisms of the Delphi Project, Dalkey and Helmer mentioned that some of the experts did not remain anonymous to each other, and their responses therefore were not strictly independent. They also suggested that vague questions asked in the second round of the study produced 'literary outpourings' of little value for analysis. Despite the shortcomings, Dalkey and Helmer were convinced that the Delphi Technique was 'highly conducive to producing insights into the subject matter at hand' (p.467).

CHARACTERISTICS OF THE DELPHI TECHNIQUE

As an instrument to generate consensus of opinion, most applications of the Delphi Technique are characterised by response anonymity, information feedback and a number of iterations which are often referred to as 'Rounds'. The general features of the different rounds of the Delphi Technique are outlined below:

Round One: In this first round, a questionnaire outlining the problem under investigation is sent to a respondent group whose members remain anonymous to each other. They are usually instructed to offer an opinion or judgement in response to the problem.

Round Two: The replies from the first round are summarised and provide the basis for the second questionnaire. Once developed, this questionnaire is sent to participants along with their round one replies. Respondents are usually asked to reconsider their previous opinions

or judgements in the light of the new information they are given. As part of the exercise, some of the respondents, whose Round One replies deviated from the opinion of the majority, may be asked to provide a brief rationale for their previous answers, and for their new responses.

Round Three: In this round, all replies to the previous round are summarised and fed back to respondents in the form of a new questionnaire. The same procedure of asking respondents to reconsider their views is repeated. Rating scales are sometimes employed in this round to enable respondents to indicate the 'importance' of an issue or the 'desirability' of an event should it occur.

Depending on the complexities of the problem being investigated, and the clarification required, additional rounds may be employed. Their structure and administration is similar to that adopted in the previous rounds.

While most applications of the Delphi technique display the characteristics as outlined above, two distinct types of Delphi have emerged over the past three decades. The first of these, which has been classified by Weaver (1971) as the Exploratory Delphi, seeks to generate consensus concerning a set of events that is expected to occur, as in the original 'Project Delphi' (see Appendix A). The second type of Delphi, referred to as the Conventional or Normative Delphi, is more common and is designed to arrive at consensus about a set of events, issues or goals that is desired, rather than expected.

In summary, then, both Normative and Exploratory Delphis are characterised by the use of rounds of questionnaires, the feedback of information, and the opportunity afforded respondents (who remain anonymous to each other)

to revise previously held opinions or judgements.

DELPHI'S USES AND APPLICATIONS

During the 1960's and 1970's, the Delphi Technique became widely known for its use in government management and industry. By 1975, 600 investigations using the Technique had been published. Linstone and Turoff (1975) report that, while many of these applications had applied Delphi as a forecasting tool, it had also been used for a variety of other purposes such as gathering current and historical data, examining the significance of historical events, evaluating possible budget allocations, planning university campus and curriculum development, delineating pros and cons associated with policy options, and exposing priorities of personal values.

In commenting on the plethora of Delphi studies, Uhl (1971) made the observation that a small number of these investigations sought to explore the methodology of Delphi, including such aspects as the influence of feedback on participants and whether Delphi did represent an improved method for generating consensus. Before discussing further these and other methodological issues, and how they influenced the direction of the present study, it is necessary to refer briefly to the applications of Delphi in Education.

APPLICATION OF DELPHI IN EDUCATION

In the field of Education, Delphi has primarily been used for

- (i) forecasting;
- (ii) searching out goals and objectives;
- (iii) campus and curriculum planning; and
- (iv) developing evaluative criteria.

In reviewing the applications of Delphi in these areas, McGaw et al (1976) categorise the studies according to the type of respondent group used. For instance, a number of Delphi investigations in Education have employed a

single group of expert respondents, while others have relied on either several different groups of experts, or a range of client interest groups, as respondents. Employing these respondent group categories, in conjunction with Weaver's Normative - Exploratory classification discussed previously, a listing of Delphi studies in Education was derived by Elms and Battersby (1979, p. 14 and 15) and is shown in Table 1.

Two general observations can be made about the studies cited in Table 1. First, the majority of the investigations are of the Normative type focussing on a set of events, issues, or goals that are desired. And second, most of the studies directly or indirectly are allied with the field of educational planning. It is this popularity of the Normative type Delphi procedure for educational planning that prompted the present investigation which had as its focus two major objectives. The first, and more important, was to examine methodological difficulties in using the Normative Delphi Technique as a tool for educational planners. The second objective and one related to the foregoing, was to explore the potential of the Normative Delphi Technique for educational planners in Developing Countries. The rationale for selecting these objectives is discussed below.

RATIONALE FOR THE STUDY

(a) Methodological Questions Concerning Delphi

It was noted earlier that Dalkey and Helmer (1963), in their critique of 'Project Delphi' highlighted some of the methodology problems in using the Technique. They mentioned, for instance, that anonymity between respondents was not maintained, and that vague questioning in the second round produced replies that were of little value.

Since the publication of Dalkey and Helmer's report on 'Project Delphi', a number of methodological questions have been raised concerning the use of Delphi. The selection of a respondent group is a case in point. In the

TABLE 1: A SELECTION OF DELPHI STUDIES IN EDUCATION

Researcher(s)	Year	Object Of Study	Country	Type
Single Group of Expert Respondents				
T.J. Gordon R. Sahr	1968	To collect conjectures about prospective developments which might have an impact on educational administration, their dates of occurrence, and the desirability of such developments, should they occur.	U.S.A.	Exploratory
A. Reisman	1968	To reach a consensus on the relative importance of various publications for the American Society of Mechanical Engineers	U.S.A.	Normative
H.J. Dyck G.J. Emery	1970	Preparation of a series of forecasts on social conditions which tend to be important in Educational Planning	CANADA	Exploratory
S.G.T. Clark H.T. Coutts	1971	To formulate statements about the future of teacher education	CANADA	Normative
A.M. Fox W.K. Brookshire	1971	To list the ingredients of effective college teaching	U.S.A.	Normative
W.E. Moore R.M. Wines	1973	To determine the reaction among secondary school inspectors to proposed changes in high school examinations, and the effects of these changes on school assessment procedures	AUSTRALIA	Normative
Several Groups of Expert Respondents				
O. Helmer	1966	To produce a list of goals and innovative futures for education	U.S.A.	Normative
S. Cochran M.M. Crumley B.N. Overby	1970	To evaluate a list of teacher characteristics	U.S.A.	Normative
R.C. Judd	1970	To sample a variety of attitudes within a liberal Arts College towards an experimental curriculum		
D.P. Norton	1970	To look into university needs	U.S.A.	Normative
D.F. Berghofer	1970	To examine the relationship between general education and society within next thirty years	U.S.A.	Normative
R.E. Peterson	1971	To refine the Institutional Goals Inventory developed by N.P. Uhl	U.S.A.	Normative
Range of Client Interest Groups as Respondents				
D.P. Anderson	1970	To stimulate speculations about desirable goals for a country school district in Ohio	U.S.A.	Normative
F.R. Cypert W.L. Gant	1970	To clarify and assess the wishes, aspirations and opinions of clientele respecting objectives for the School of Education of Virginia	U.S.A.	Normative
D. Hudspeth	1970	To study the perceived needs of vocational education in New York State	U.S.A.	Normative
T. Barrett J. Roa R. Browne D. Hayes T. Krepel W. Heinicke W. Samuelson	1970	To determine the school and community attitude to year-round school operation in Nebraska	U.S.A.	Normative
S.T. Deutsch	1975	To determine whether educators, students, community teachers, collectively and individually, differ in their opinion of the importance of secondary educational goals.	U.S.A.	Normative

original Project, 'experts' were chosen on the criterion that they were people 'highly knowledgeable' in their fields. However, a number of researchers (for example, Weaver 1972, and Battersby 1977) have not only questioned this definition of an expert, but have suggested that, in some Delphi studies, the use of so-called experts may make no real difference to the results obtained.

Further difficulties about respondent groups have been raised by Judd (1970) who suggests that one or more of the following problems often characterise Delphi studies:

- (i) Inbreeding, where panel members with the same background and training arrive at consensus too readily;
- (ii) Loss of panel participants; and,
- (iii) The absence of sampling theory relating to the selection of respondents.

Judd, along with Weaver (1970) and Lonsdale (1974) also raises questions about another aspect of Delphi methodology, namely, the character and clarity of round one, and the effect this first round has in shaping participants' opinions or judgements in response to the problem statement. These researchers note that some Delphi investigators use lists of prepared statements as the initial probe in round one, while other studies are more open-ended and less specific in the first round.

A related methodological issue concerns the number of rounds required in Delphi studies to arrive at consensus of opinion. Cypert and Gant (1970) and Weatherman and Swenson (1975), for instance, suggest that in most Delphi studies, consensus occurs by the third round. However, reports of investigations which have employed more than three rounds (for example, Project Delphi) indicate that a three phase Delphi may, in certain situations, be insufficient in reaching an authentic consensus among respondents.

In achieving consensus of opinion in a Delphi investigation, the influence

of feedback on participants seems to be a crucial factor. Little is known about the influence various forms of feedback (e.g., statistical analysis, open-ended response summaries, etc.) have on participants, and the way feedback can influence previously held opinions and judgements.

While the above methodological problems have been mentioned by a number of researchers, as Table 2 shows, rarely have there been attempts to focus on these, and other problems associated with the use of Delphi, in an experimental-type study. From Table 2, four major methodological concerns about Delphi can be identified as being most frequently mentioned. These are:

- (i) Selection of subjects
- (ii) Character and clarity of Round One
- (iii) Type and effect of information feedback
- (iv) Number of rounds used.

The first objective of the present study, then, was to explore the above methodological issues and to do this a Normative experimental Delphi study, investigating the tasks of educational planners in Developing Countries, was undertaken.

The rationale for choosing to investigate the tasks of educational planners in the Developing Countries is discussed below.

(b) Educational Planning In Developing Countries

The second objective of the present study was to examine the potential of the Delphi Technique for educational planners in Developing Countries. Because of this, it was decided that the experimental Delphi study should probe tasks that needed to be undertaken by educational planners in the Third World.

There were two reasons for focussing on the topic of educational planning in the Developing Countries. First, the researcher, as a national from a

Table 2: STUDIES THAT HAVE RAISED METHODOLOGICAL QUESTIONS IN DELPHI

Researcher(s)	Year	Methodological Questions Raised
Dalkey & Helmer	1967	<ul style="list-style-type: none"> - Experts' responses not being strictly independent - Vague questions inviting general critical comment - Statistical computations used in Delphi lack a firm theoretical grounding - Nature of feedback information: Possibility of bandwagon effect which can affect consensus of opinion reached
R.E. Overbury	1969	<ul style="list-style-type: none"> - Delphi methodological loopholes be in the kinds of questions asked
Cypert & Gant	1970	<ul style="list-style-type: none"> - Delphi as typically employed provides no evidence that convergence of respondent opinion finally obtained in a study results from exercise of reasoned judgement - Suspect the nature of feedback - Disturbing absence of effort to probe beneath surface in technique
T. Weaver	1970	<ul style="list-style-type: none"> - Sterility of summarizing diffuse information into narrowly terse statements - Nature of feedback
Lonsdale	1974	<ul style="list-style-type: none"> - Interaction and movement toward consensus - Summaries for feedback - Clarity and ambiguity of questions - The rating scales employed
Weatherman & Swenson	1974	<ul style="list-style-type: none"> - Whether experts will have a chance to probe into problems in regard to the area of concern before arriving at to "What ought to be"
D.C. Spencer	1975	<ul style="list-style-type: none"> - Interval between questionnaires - Suspects feedback plays a big part in Second Round, for in his study 80% of the membership changed their answers after receiving feedback
G. Welty	1975	<ul style="list-style-type: none"> - How to choose a "good" respondent group - A particular Delphi design for a particular application is taken as representative of all Delphis - Honesty of Monitor Team - Misunderstanding arising from differences in language and logic, with participants coming from diverse cultural backgrounds
J. Coates	1975	<ul style="list-style-type: none"> - Methodological deficiency as failure to push hard enough on the challenge to concepts and underlying assumptions - More attention should go onto the basis of divergence rather than convergence

Third World Country, The Gambia, was predisposed to the view that solving the problems of education in Developing Countries may, in part, be linked with the application of more effective educational planning within these countries. Indeed, support for this observation can be found in much of the literature relating to the deteriorating educational standards in Developing Countries (see, Fanon, 1965; Freire, 1970; Curle, 1973; D'Aeth, 1975; Rodney, 1976; Havelock and Huberman, 1978; Botkin et al, 1979).

One way, then, of seeking to improve the quality of educational planning may be found in employing new and innovative strategies such as the Delphi method, to complement existing procedures (e.g., Commissions of Enquiry).

The second reason for choosing educational planning in the Developing Countries, as the experimental Delphi probe, related to the lack of interest shown in the issues and problems of the Third World by past users of the Delphi Technique. From Table 1, which lists a representative selection of Delphi studies in Education, it can be seen that only issues concerning aspects of education in Developed Countries, have been studied.

SUMMARY

In this chapter, the characteristics and applications of the Delphi Technique have been discussed, and a classification of Delphi studies in Education produced in Table 1. This table showed that Normative-type investigations, in the field of educational planning, were the most popular. Using this observation as a basis, it was decided to conduct an experimental-type study which had two objectives:

- (a) To examine methodological difficulties in using the Normative Delphi Technique as a tool for educational planners; and

- (b) To explore the potential of the Normative Delphi Technique for educational planners in Developing Countries.

In the later part of this chapter, a rationale was provided for selecting these two objectives.

In the chapter which follows, the research design for collecting data to achieve the two objectives of this study, is described.

CHAPTER TWO

RESEARCH DESIGN

In developing the Research design for the present study, Trow's (1957) well known phrase was adhered to, namely, that "... the research problem under investigation properly dictates the method of investigation," (p.3). In adhering to this principle, it was obvious that the objectives of this study necessitated an experimental-type Delphi investigation. Furthermore, in order to explore the potential of the Delphi Technique for educational planners in Developing Countries, it would be necessary inter alia to elicit the opinions of a sample of planners concerning the Technique.

To fulfil both these aims it was decided to conduct the experimental-type Delphi study using a sample of educational planning experts who were currently resident in New Zealand and who had had experience in Developing Countries, and then, once the experimental study was completed, to seek the opinion of these experts concerning the potential of Delphi for educational planners in Third World Countries.

The selection of this sample of experts, the Delphi format adopted, and the eliciting of opinion from the experts concerning Delphi, are discussed below.

THE SAMPLE

Potential respondents for this study were selected on the basis of three criteria:

- (i) Knowledgeability in the field of educational planning
- (ii) Experience of having worked in a Third World country as an expert or educational adviser; and
- (iii) Resident in New Zealand at the time of the study⁽¹⁾

(1) Because of the time constraints on the study it was decided not to approach educational planning experts currently working in Third World Countries and not resident in New Zealand.

On the basis of these three criteria, a group of 14 respondents was chosen, invited to participate in the project, and subsequently agreed. (2)

A group of 14 was considered to be an adequate number given that the original 'Project Delphi' used seven experts, and that the number of known available experts in educational planning in New Zealand was limited.

Of the 14 participants chosen, five were current or past UNESCO Consultants in Developing Countries, while the remainder had had experience as educational planning advisers/researchers in Developing Countries, particularly in the Pacific. Only one of the participants was a woman.

Because of the constraints of time on the researcher, and the respondents, it was necessary to limit the number of Delphi rounds to be used.

In view of this, and in the light of Cypert and Gant's (1971) and Weatherman and Swenson's (1974) findings on the adequacy of three round Delphis in arriving at consensus, it was decided to employ a three phase Delphi procedure in the following way:

Round One

In this round, the group of 14 respondents was sent an explanatory letter, accompanied by an outline of the problem they were to consider (see Appendix B). The letter informed them, among other things, that the project would employ three rounds of questionnaires, that the second and third rounds would use information given by them in the first round, and that, to protect their anonymity, no attempt would be made to identify individual respondents during the course of the study.

Attached to the letter was an outline of the problem, which read as follows:

(2) The respondents were not informed of the selection criteria nor who else was participating in the study.

At the 37th session of the International Conference on Education, the Director-General of UNESCO, Mr. Amadou-Mahtar M'Bow, pointed out that educational standards in Developing Countries were deteriorating, and that this was reflected in the increasingly high dropout rate of children from school. Mr. M'Bow was of the opinion that those responsible for education in Developing Countries had two major objectives: (i) democratization, and (ii) the transformation of education systems to make them more relevant to the needs of society. He went on to suggest that equality of access to education alone could not assure democratization; it must be backed by equal chances for success.

In the light of the foregoing, and in view of your own experiences, what do you think are the most important tasks that need to be undertaken by those who are responsible for education in Developing Countries?

An open-ended first round was used on the assumption that, as Curle (1973,) D'Aeth (1974,) Havelock and Huberman (1978,) point out, a diversity of tasks need to be undertaken by those responsible for education in Developing Countries. The statement by Mr. M'Bow was used to indicate to respondents the importance of setting tasks or objectives to overcome the deteriorating educational standards in Developing Countries.

Twelve of the participants replied to the first round. Their responses were analysed in the following way. All the tasks nominated by the respondents were listed (N=52) and then screened to eliminate duplicate statements. This resulted in the compilation of a summary list (N=21) of the participants' Round One replies. This list was then used as feedback in Round Two.

Round Two

In this round, the summary list of statements obtained from Round One, was

sent to each of the 12 respondents who replied to the first round, and was accompanied by his/her Round One responses, and a reply-paid envelope. A covering letter and instructions for the completion of this round, were also included (see Appendix C). These instructions were as follows:

In Round One, you were asked for your views on what were the more important tasks that need to be undertaken by those who are responsible for education in Developing Countries. Attached are the views you expressed, and also a summary list of the comments made by you and the people who are participating in this study.

Keeping in mind your Round One comments, and those made by the group, you are asked to compile a short list of succinct statements (say about five or six) relating to what you think are the more important tasks that need to be undertaken by those who are responsible for education in Developing Countries. You may wish to choose key statements that were made by the group. On the other hand, you can modify, add to, delete from, or summarise the comments you made in Round One. Please write or type your response to this Round below.

The twelve participants involved in this round returned responses, which were analysed by using a frequency distribution of the tasks noted by the participants. Nineteen of the 21 tasks mentioned in this the first round, were nominated as being important, along with four new, additional tasks. A listing of each of the 23 tasks derived from Round Two, along with the percentage of respondents who mentioned each task constituted the feedback for Round Three⁽³⁾ (see Appendix D).

Round Three

In this round, the 12 respondents who replied in Round Two were

(3) Percentages rather than raw scores were used so as not to provide an indication to respondents as to how many of their colleagues in the field of educational planning may have been involved in the research, and thereby hopefully protecting further the participants' anonymity.

provided with feedback in the form mentioned above, as well as a covering letter and instructions (see Appendix E). The instructions were:

Please indicate your opinion, on the scale provided, of the relative importance of each of the following tasks in relation to the tasks that need to be undertaken by those responsible for education in Developing Countries.

As in the previous rounds, the return of responses was facilitated by a reply-paid envelope.

Again, the 12 respondents who participated in this Third Round returned their questionnaires. Their replies were analysed by calculating the mean response and standard deviation for each of the tasks listed. These Round Three results were then compiled and used as an input for the final phase of the study.

FOLLOW-UP EVALUATION

As a follow-up to this three round experimental type Delphi Study, an evaluation was carried out by eliciting the opinion of those involved in the study. Inter alia, comments were sought concerning the potential of the Delphi Technique for education planners in Developing Countries.

For this follow-up phase, the results from the Third Round of the Delphi study were returned (see Appendix F) to the participants accompanied by the following instructions and a reply-paid envelope:

In the first round you were asked to list the most important tasks that you thought needed to be undertaken by those responsible for education in Developing Countries, both in the light of Mr. Amadou-Mahtar M'Bow's remarks, and in view of your own experiences. The analysis of returns from this round resulted in a combined list of 21 tasks.

In Round Two, you were asked to compile a list of succinct statements relating to the more pressing tasks that need to be pursued by those responsible for education in Developing

Countries. In this round you were fed back your reply to the previous round as well as the combined list of 21 statements from the First Round.

As an outcome of Round Two, a list of 23 tasks was compiled from the group's responses. In the Third Round you were asked to consider this list of tasks and to indicate (on a Likert type Scale) the relative importance of each in relation to education in Developing Countries. The results of this Third Round are attached.

In view of the above, you are now asked to respond to the following:

1. What are your comments on the outcome of Round Three?
2. What were some of the problems and issues you faced as a participant in this Delphi Study?— Please be critical.
3. In view of your participation in, and the outcomes from, this study do you think the Delphi Technique is a viable instrument for educational planners? What about for education planners in Developing Countries?
4. Do you have any general comments about the study, or the outcomes of your participation?

The open-ended responses obtained from the 12 respondents in this follow-up evaluation are discussed in a later chapter.

THE OVERALL DESIGN OF THE STUDY

At the completion of data collection in December 1981, it was possible to retrace the various stages of the research. These are set out in the table below.

Table 3: OVERALL DESIGN OF THE STUDY

Questionnaires/Rounds	Date of Despatch	Dates Returns Received
Round One	23rd July 1981	Between 4th-14th August 1981
Round Two	18th August 1981	Between 26th Aug.-2nd Sept. 1981
Round Three	14th September 1981	Between 23rd Sept.-5th Oct. 1981
Follow-up Evaluation	27th November 1981	Between 2nd-8th Dec. 1981

SUMMARY:

This experimental type Delphi investigation, and the follow-up evaluation, was designed to meet the objectives of the present study. Accordingly, this chapter outlined the research design which provides a basis for the discussion in the next two chapters.

The chapter which follows elucidates in more detail the mechanics of this three round Delphi investigation and highlights some of the methodological issues raised by the study. These issues are then discussed in the context of the literature of the Delphi Technique.

CHAPTER THREE

RESULTS AND DISCUSSION

In the preceding chapter, attention was focussed on the planning and implementation of the research design to meet the objectives of the present study. These objectives were:

- (i) To examine methodological difficulties in using the Normative Delphi Technique as a tool for educational planners; and
- (ii) To explore the potential of the Normative Delphi Technique for educational planners in Developing Countries

This chapter deals primarily with the first of these objectives. To this end, the procedures adopted in each round of the Delphi study are outlined in detail along with the results obtained. These procedures and results are then discussed in the context of methodological concerns relating to the selection and performance of respondents, the character and clarity of round one, the feedback of information, and the number of rounds used.

ROUND ONE RESULTS

For Round One, the respondents were asked to list the most important tasks they thought needed to be undertaken by those responsible for education in Developing Countries, both in the light of their experiences and also in view of Mr. Amadou-Mahtar M'Bow's remarks about the deteriorating educational standards in these countries. The Round One returns (examples of which are shown in Appendix G) yielded a combined total of 52 tasks.

This list of 52 tasks was then screened to eliminate duplicate responses. The remaining tasks were then given a second screening. This latter procedure was carried out in the following manner. First, cluster statements or phrases which appeared to have similar meanings or sentiments .

were summarized into a single statement. For instance, the four tasks below, each given by a different respondent, were able to be reduced into one generic task:

Make a detailed examination of the structure and functioning of the existing system for reasons of particular elements serving positively, acting negatively, are neutral, or need to be introduced to make progress.

Analysis of demographic data including manpower surveys for future needs.

Examine the tuition system to see whether it discriminates between certain classes of people.

Examine the structure of the educational system's suitability for change.

These were combined into the following:

Undertake a close examination of the structure and functioning of the existing educational system.

As an outcome of these twoscreenings, a summary of 21 tasks was obtained and these are listed - in no order of priority - in Table 4.

Table 4: A SUMMARY OF THE GROUP'S RESPONSE FROM ROUND ONE

Task Number	Tasks
1	Reduce poverty.
2	Control over-rapid population growth.
3	Improve teacher training and teacher supply.
4	Improve training for those in management, leadership, decision-making and teacher education positions.
5	Bring together planners, administrators, politicians, the community and educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with the available resources; and (c) the free flow of information within and between the various groups brought together.
6	Bring about a closer relationship between formal education and the needs of the society in question.
7	Undertake a close examination of the structure and functioning of the existing education system.
8	Examine the applicability of educational models and plans prior to implementation.
9	Give 'good' teachers incentives to prevent their rural exodus.
10	Create a balance between local/regional/national and international interests through: (a) the spread of resources (e.g., libraries, finance) to the rural areas; and (b) reducing differences in access to education between boys and girls.
11	Determine general educational goals for a date 20 years ahead and increasingly specific subsidiary goals for each five year period moving toward the present, ensuring that each set of goals is realistic in the light of social and fiscal constraints.
12	Bring together administrators, specialist educators and teachers in the planning and building of curriculum.
13	Redesign courses of instruction so they meet the needs of the community.
14	Change the syllabus through a redefinition of the examination structure.
15	Change the curriculum to take into account the different backgrounds of pupils in different schools.
16	Ensure a fair system of national assessment.
17	Select assessors of the syllabus and examination structure from suitably qualified people.
18	Define educational objectives - at the national, institutional, classroom and individual level - in performance terms.
19	Use master teachers and team methods to reduce pupils' constant exposure to poor teachers.
20	Set up in each school a committee to examine the present syllabi and to formulate new syllabi.
21	Define exactly who are those responsible for education in developing countries.

The tasks listed in Table 4 seemed to fall within four broad categories: 'National Planning' (Tasks 1, 2, 3, 4, 9, 10, 11); 'Preparatory Steps to National and Educational Planning' (Tasks 5, 6, 7, 8, 12, 21⁽⁴⁾); 'Educational Change' (Tasks 13, 14, 15); and 'Examination and Classroom Procedures' (Tasks 16, 17, 18, 19, 20⁽⁴⁾).

ROUND TWO RESULTS

For Round Two, the list of 21 tasks shown in Table 4 plus each respondent's own original comments, provided the feedback for this round. The participants were asked to reconsider their own opinions in the light of the group's comments and their own first round replies, and to compile a succinct list of tasks they thought needed to be undertaken by those responsible for education in developing countries.

Upon return, the Round Two responses (examples are shown in Appendix H) were screened in order to eliminate duplicate tasks. This screening resulted in a list of 23 tasks, 19 of which had been mentioned in the previous round, with four new tasks being introduced in this round. The two tasks dropped from Round One, and these four new tasks mentioned by respondents in this round are shown in Table 5.

Table 5: The Two Tasks Dropped and Four New Additional Tasks Introduced in Round Two.

TASKS MENTIONED IN ROUND ONE BUT DROPPED IN ROUND TWO	THE FOUR NEW TASKS INTRODUCED IN ROUND TWO
Set up in each school a committee to examine the present syllabi and to formulate new syllabi.	Identify inept teachers and apathetic or corrupt administrators.
Define exactly who are those responsible for education in Developing Countries.	Extend the use of radio, rather than printed materials (as a method of communication and learning) by means of small, do-it-yourself radio stations in rural communities.
	Develop continuing education for those who have completed primary school and to relate it to the social and economic needs of society.
	Establish complimentary adult education programmes to reduce adult illiteracy and to support early school leavers.

(4) As an outcome of Round Two, these tasks were dropped and replaced by four new tasks which were subsequently numbered 20, 21, 22, 23.

From Table 5 it can be seen that the two tasks mentioned in Round One but dropped in Round Two were from the task categories 'Examination and Classroom procedures' and 'Preparatory Steps to National and Educational Planning respectively'; while each of the four new tasks introduced in Round Two were from the category 'National Planning'.

The fact that there were so few changes to the initial list of tasks derived from Round One, would tend to indicate that consensus may have been reached amongst respondents concerning a list of the most important tasks that needed to be undertaken by those responsible for education in Developing Countries.

Following the screening of the responses, the number and percentage of participants who mentioned each of the 23 tasks was calculated, and the results obtained are shown in Table 6.

In Table 6 the four new tasks introduced by respondents in the second round, are listed, and these tasks are numbered 20, 21, 22 and 23 respectively. Table 6 also shows that the tasks mentioned by approximately half the respondents, or more, (i.e. tasks 3, 4, 5, 11, 12, 13) were from the three categories of 'National Planning', 'Preparatory Steps to National and Educational Planning' and 'Educational Change'. Tasks in the category 'Examination and Classroom procedures' were listed by a minority of the respondents as being important for educational planners in Developing Countries.

TABLE 6: THE 23 TASKS OBTAINED FROM ROUND TWO RETURNS

Task No.	Tasks	Task Category	Freq. of Mention	Percentage	Task No.	Tasks	Task Category	Freq. of Mention	Percentage
1	Reduce poverty	National Planning	1	9%	12	Bring together Administrators, Specialist Educators and Teachers in the planning and building of curriculum	Prep. steps to Nat. & Educ. Planning	5	42%
2	Control overrapid population growth	National Planning	2	18%	13	Redesign courses of instruction so that they meet needs of the community	Educational Change	6	50%
3	Improve teacher training and teacher supply	National Planning	9	75%	14	Change the systems through a redefinition of the examination structure	Educational Change	1	9%
4	Improve training for those in management, leadership, decision-making and teacher education positions	National Planning	5	42%	15	Change the curriculum to take into account the different backgrounds of pupils in different schools	Educational Change	3	25%
5	Bring together Planners, Administrators, Politicians, the community and Educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with the available resources; (c) the free flow of information within and between the various groups brought together	Preparatory steps to National and Educational Planning	9	75%	16	Ensure a fair system of National assessment	Examination & Classroom Procedures	2	18%
6	Bring about a closer relationship between formal education and the needs of society in question	Prep. steps to Nat. & Educ. Planning	3	25%	17	Select assessors of the syllabus and examination structure from suitably qualified people	Examination & Classroom Procedures	2	18%
7	Undertake a close examination of the structure and functioning of the existing education system	Prep. steps to Nat. & Educ. Planning	4	33%	18	Define Educational Objectives - At the National, Institutional, Classroom and Individual Level - In performance terms	Examination & Classroom Procedures	3	25%
8	Examine the applicability of educational models and plans prior to implementation	National Planning	2	18%	19	Use Master Teachers and team methods to reduce pupils' constant exposure to poor teachers	Examination & Classroom Procedures	3	25%
9	Give 'good' teachers' incentives to prevent their rural exodus	National Planning	3	25%	20	Identify inept Teachers and apathetic or corrupt Administrators	National Planning		
10	Create a balance between Local/Regional/National and International interests through (a) the spread of resources (e.g. libraries, finance) to the rural areas. And (b) reducing differences in access to education between boys and girls	National Planning	4	33%	21	Extend the use of radio, rather than printed materials (as a method of communication and learning) by means of small, do-it-yourself-radio stations based in rural communities	National Planning		
11	Determine general educational goals for a date 20 years ahead and increasingly specific subsidiary goals for each five year period moving toward the present, ensuring that each set of goals is realistic in the light of social and fiscal constraints	National Planning	7	58%	22	Develop continuing education for those who have completed Primary school and to relate it to the social and economic needs of society	National Planning		
					23	Establish complementary adult education programmes to reduce adult illiteracy and to support early school leavers	National Planning		

ROUND THREE RESULTS

In this final round, the 23 tasks derived from the previous round, along with the percentage distribution of the respondents who mentioned each task, were fed back to participants. They were instructed to consider the 23 tasks and then to indicate their opinion of the relative importance of each task in relation to the tasks that needed to be undertaken by those responsible for education in Developing Countries. A five point Likert-type Scale, from 'Extremely Important' to 'Of No Importance' was used.

The returns from this round showed that the distribution of participants' responses to the list of tasks, as a whole, was negatively skewed. This was not unexpected, however, as the two previous rounds had ensured that only tasks which were designated as "important" by respondents were included on the Third Round list.

Because of the atypical nature of the response distribution and the small sample size, the various statistical procedures initially trialled in analysing the results of this round (e.g. Spearman's Rank Correlation Coefficient and chi square), proved unsatisfactory. It was therefore decided that a simple measure of the mean response and standard deviation would be sufficient to provide some insight into the responses of the group to this round. Having calculated the mean response and standard deviation, it was then possible to use these measures for ranking⁽⁵⁾ the 23 tasks which were rated by respondents in Round Three. The results are shown in Table 7.

(5) The tasks were ranked in order of importance using the means as a basis; where there were tied means, the task with the smallest standard deviation, and therefore the highest consensus, was ranked higher.

TABLE 7: RANK ORDERING OF TASKS

Task No.	Tasks	Task Categorisation	Mean	S.D.	Rank Order	Task No.	Tasks	Task Categorisation	Mean	S.D.	Rank Order
1	Reduce poverty	National Planning	1.87	0.8453	20	12	Bring together Administrators, Specialist Educators and Teachers in planning and building of curriculum	Prep. steps to Nat. & Educ. Planning	3.18	1.2481	=7
2	Control overrapid population growth	National Planning	2.27	1.3531	15	13	Redesign courses of instruction so that they meet the needs of the community	Educational Change	3.45	1.2148	5
3	Improve teacher training and teacher supply	National Planning	3.73	0.9274	2	14	Change the syllabus through a redefinition of the examination structure	Educational Change	1.6	1.088	23
4	Improve trainins for those in management, leadership, decision-making and teacher education positions	National Planning	3.45	1.116	3	15	Change the curriculum to take into account the different backgrounds of pupils in different schools	Educational Change	2.0	0.9534	18
5	Bring together Planners, Administrators, Politicians, the community and Educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with the available resources; (c) the free flow of information within and between the various groups brought together	Preparatory steps to National and Educational Planning	3.90	0.4056	1	16	Ensure a fair system of National assessment	Examination & Classroom Procedures	2.6	1.3045	13
6	Bring about a closer relationship between formal education and the needs of society in question	Prep. steps to Nat. & Educ. Planning	3.45	1.16	4	17	Select assessors of the syllabus and examination structure from suitably qualified people	Examination & Classroom Procedures	2.18	1.2339	16
7	Undertake a close examination of the structure and functioning of the existing education system	Prep. steps to Nat. & Educ. Planning	3.0	1.2431	9	18	Define Educational Objectives - At the National, Institutional, Classroom and Individual level - in performance terms	Examination & Classroom Procedures	2.36	1.9848	14
8	Examine the applicability of educational models and plans prior to implementation	Prep. steps to Nat. & Educ. Planning	2.64	1.0825	12	19	Use Master Teachers and team methods to reduce pupils' constant exposure to poor teachers	Examination & Classroom Procedures	1.72	0.8286	21
9	Give 'good' teachers' incentives to prevent their rural exodus	National Planning	2.09	1.2740	19	20	Identify inept Teachers and apathetic or corrupt Administrators	National Planning	1.72	0.8286	22
10	Create a balance between Local/Regional/National and International interests through (a) spread of resources (e.g. libraries, finance) to the rural areas. And (b) reducing differences in access to education between boys and girls	National Planning	2.90	0.6802	11	21	Extend the use of radio, rather than printed materials (as a method of communication and learning) by means of small, do-it-yourself-radio stations based in rural communities	National Planning	2.3	1.567	14
11	Determine general educational goals for a date 20 years ahead and increasingly specific subsidiary goals for each five year period moving toward the present, ensuring that each set of goals is realistic in the light of social and fiscal constraints	National Planning	3.18	1.2481	6	22	Develop continuing education for those who have completed Primary school and to relate it to the social and economic needs of society	National Planning	3.18	1.2481	=7
						23	Establish complementary adult education programmes to reduce adult illiteracy and to support early school leavers	National Planning	3.0	1.7888	10

The results from Round Three, as shown in Table 6, reveal that tasks relating to 'National Planning' (tasks 3, 4, 11, 22) and 'Preparatory Steps to National and Educational Planning' (tasks 5, 6, 12) had the highest ranking. The three tasks with highest ranking in this round were also those most frequently mentioned in Round Two. These tasks were:

- Task 5: Bring together planners, administrators, politicians, the community and educators to discuss in some detail:
- (a) the kind of Education appropriate for societal needs;
 - (b) what can be achieved with the available resources;
 - (c) the free flow of information within and between the various groups brought together.
- Task 4: Improve training for those in management, leadership, decision-making and teacher education positions.
- Task 3: Improve teacher training and teacher supply.

From Table 7 it can also be seen that two of the four new tasks (i.e. tasks 22, 23) introduced as an outcome of Round Two were ranked seventh and tenth respectively. Excluding task 13, those tasks from the categories 'Education Change' and 'Examination and Classroom Procedures' were not ranked within the first ten tasks. Similarly, these same tasks did not achieve a high frequency of mention in Round Two.

DISCUSSION

In carrying out this three round Normative Delphi Study, and in analysing the results obtained from each round, several methodological issues were discussed. The first concerned the selection and performance of the sample of respondents.

SELECTION AND PERFORMANCE OF RESPONDENTS

The 14 respondents involved in this study were selected on the basis that each was knowledgeable in the field of educational planning, s/he had worked in Developing Countries as a consultant/adviser, and s/he was resident in New Zealand during the time of the study.

During the course of the investigation two methodological outcomes relating to the performance of these respondents was noted.

First, there was a high return rate for each round of the study. Twelve of the 14 respondents returned the first round. In the second and third rounds, the same twelve people also returned their questionnaires. Indeed, in each round most of the respondents posted their questionnaires on time, and thus there was no necessity for follow-up reminder letters.

Second, and related to the foregoing, letters attached to a number of the respondents' replies seemed to indicate that they developed more enthusiasm as the study progressed, and that they were keen to see the outcomes of the third round. This enthusiasm and sense of obligation toward the study, which may have developed because of the iterative nature of the Technique and the influence of feedback, is a phenomenon which has not been reported in previous Delphi investigations. However, the existence of this phenomenon seems advantageous from the viewpoint of gaining a high response rate and for promoting in respondents a commitment toward the study in which they are involved.

Another set of methodological outcomes from this investigation related to the character and clarity of Round One.

CHARACTER AND CLARITY OF ROUND ONE

Two issues arose during the study concerning the character and clarity of Round One. The first of these related to the decision whether to use an open-ended or close-ended first round. This option, as Judd (1972) points

out, requires a choice to be made concerning the use of a prepared general statement to which participants can respond to freely, or a list of statements or items each requiring a specific type of response (e.g. Agree or Disagree). In the case of the present study, the first option was chosen because there was reported to be a lack of consensus concerning the diversity of tasks that needed to be undertaken by those responsible for education in developing countries (see, for example Curle, 1973; D'Aeth 1975; Havelock and Huberman, 1978).

This choice to use an open-ended format in the first round raised an unforeseen methodological problem concerning the preciseness of the statement used as the probe. This statement, which began with a *précis* of a speech made by the Director-General of UNESCO, Mr. Amadou-Mahtar M'Bow, asked respondents the following:

In the light of the foregoing [the *précis* of Mr. M'Bow's speech] and in view of your own experiences, what do you think are the most important tasks that need to be undertaken by those responsible for education in developing countries.

On receipt of the first round replies it became clear that, for at least three of the respondents, the above statement was imprecise. For example one of the respondents questioned the impreciseness of the term "developing countries". Although he nominated tasks he thought important, he devoted much of his attention arguing for the use of a more appropriate term. Two other respondents, while having listed tasks, spent much of their first round debating the implications of Mr. M'Bow's speech.

These occurrences, then, suggested that the clarity of Round One could have been improved, and highlight the fact that the statement(s) used in an open-ended first round deserve close scrutiny before being sent to participants.

The decision to use an open-ended first round also had methodological implications for the feedback in subsequent rounds. The discussion now focusses on the issue of feedback.

FEEDBACK OF INFORMATION

Judd (1970) points out that one of the little understood areas of Delphi procedure is the editing of responses from an open-ended first round:

The situation is not unlike the problem of whether to use a butcher's knife or a scalpel in trimming the responses to a portion that can be served up in Round Two.

(Judd, 1970, p.183).

The editing approach adopted for the first round of the present investigation was subjective in nature, and entailed listing all tasks nominated by respondents, and then screening and summarizing these tasks. This summary list (see Table 4) was then fed back to each respondent along with a copy of his/her Round One reply. In the light of this feedback, the participants were requested to respond to a probe similar to that used in Round One.

A comparison of the returns from Round Two with those in Round One showed that more than half the respondents had made some modification to their Round One opinions on those tasks that needed to be undertaken by those responsible for education in Developing Countries. However, four of the participants made little change to their opinions from Round One to Round Two, while for one respondent a substantial shift in opinion was noted. These changes are shown in Table 8, which also records the changes in opinion which occurred from Rounds Two to Round Three.

The feedback for the third round consisted of a list of 23 tasks (see Table 6). This list, which was derived from screening the second round responses, contained 19 of the 21 tasks listed in the Round Two summary. As an outcome of analysing the Round Two replies four new tasks were subsequently added to this list of 19 tasks.

The list of 23 tasks fed back to respondents in Round Three was accompanied by information on the percentage of respondents who mentioned each task in

Table 8:

THE OCCURRENCES OF CHANGES IN OPINION

Res- pondents	CHANGES OF OPINION: ROUNDS 1 - 2			CHANGES OF OPINION: ROUNDS 2 - 3		
	Little or no change	Some change	Considerable change	Little or no change	Some change	Considerable change
1	x			x		
2	x			x		
3		x			x	
4	x			x		
5		x		x		
6	x			x		
7		x		x		
8		x		x		
9		x			x	
10			x		x	
11		x			x	
12		x		x		
TOTALS:	4	7	1	8	4	0

the previous round. On the basis of this feedback, participants were requested to indicate the importance of each of these tasks for those responsible for education in Developing Countries. A Five-point Likert-type scale was provided.

In analysing the returns from Round Three it was found that, as Table 7 shows, the majority of the respondents showed little change in their opinions, in that they attributed to those items they mentioned in Round Two a higher level of importance than the other tasks they had to rate in this third round. Some of the respondents, however did change their opinion in the third round, as is indicated in Table 8.

On the basis of Table 8 then, several observations can be made about the influence of feedback on the respondents, and the changes in opinion which occurred in Rounds Two and Three.

First, during the second round, a number of the respondents modified their first round opinions. This may have occurred because of the opportunity provided the respondents to rethink their opinions in the light of both the feedback of the group's responses and their first round replies.

According to Waldron (1971) and Weaver (1972), respondents who modify their opinions in the second round of a Delphi Study, often do so because of the influence of feedback. They also suggest that this type of participant may be conceptualising the problem to which they may have been asked to respond, at a 'concrete level'.

In comparison, those participants who did not alter their opinion significantly from Round One to Round Two, such as those four respondents (respondents 1, 2, 4 and 6) shown in Table 8, are referred to as 'abstract conceptualizers'. Waldron and Weaver are of the opinion this type of participant tends to be more objective and independent of feedback.

While the Waldron and Weaver classification of respondents as 'concrete' and 'abstract' conceptualizers needs to be further investigated, these researchers nevertheless draw attention to different influences of feedback, and the opportunity to rethink one's position, on a respondent's opinions and judgements.

A second observation that can be made about Table 8 is that by the third round, respondents appeared to have consolidated their opinion about the most important tasks that need to be undertaken by those responsible for education in Developing Countries. This was evidenced by individual respondents tending to attribute a higher level of importance to those tasks on the Round Three listing which they had personally chosen in Round Two. This suggests that respondents may not have been significantly influenced by feedback information

on the percentage loadings on each task (see Table 6). By the third round, then, most of the respondents may have been engaged in conceptualizing the problem at an 'abstract' rather than 'concrete' level.

In summary, it does appear that more of the respondents were influenced by feedback in the second round than in the third; that the type of feedback in Round Three did not significantly alter respondents' opinions; and that most of the respondents had consolidated their opinions by Round Three.

These observations which also seem to apply to several other reported Delphi studies (e.g. Cypert and Gant, 1972; Barnette, Davidson and Algozzine, 1978) point to the importance of, and the need for accuracy in, first round feedback. Indeed, on the basis of this study, it could be suggested that the feedback in Round Two of a Normative Delphi investigation, which had an open-ended first round, may have a strong influence in the shaping of respondents' opinions and judgements. Therefore, the introduction of spurious, or inaccurate information in the first round feedback may subsequently distort opinions or judgements and lead to a specious consensus being reached.

The above observations about the influence of feedback in the present study also point to the fact that consolidation of respondents' opinions, and the development of group consensus, can, as Weatherman and Swenson (1974) point out, be satisfactorily reached within a three round Delphi Study. Before discussing this issue further, one other methodological problem concerning feedback should be mentioned.

On compiling the feedback for Round Two, some tasks listed comprised more than one idea (see Table 4: tasks 3, 5). This did not seem to affect the respondents replies to Round Two. However, the use of a similar list of tasks in Round Three, in combination with a Five-point Likert-type Scale, may have jeopardised the accuracy of some participants' responses. For instance, Task 5 read as follows:

Bring together planners, administrators, politicians, the community and educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with the available resources; and (c) the free flow of information within and between the various groups brought together.

Because there are several components to this task, it would have been more appropriate to have asked respondents to have rated the importance of each component rather than the task as a whole.

The discussion now turns to the methodological concern mentioned previously, namely, the number of rounds required in Normative Delphi studies before consolidation and consensus of opinion occurs.

NUMBER OF ROUNDS

The number of rounds employed in a Delphi study may depend on several factors such as the nature of the problem being investigated, the character and clarity of Round One, the performance of respondents and the type of feedback they are given. However, probably the most salient factor dictating the number of rounds used in a Delphi investigation is the degree to which consolidation and consensus of opinion has been reached.

In the present study, this consolidation and consensus of opinion seemed to have been achieved by the third round. Evidence of this can be seen in the similarity of tasks mentioned in Rounds Two and Three (see Tables 6 and 7), and in the fact that the majority of respondents did not significantly alter their opinions between Rounds Two and Three (see Table 8). The third round, therefore, served a two-fold purpose of confirming that consolidation and consensus had been reached, and also enabled the use of a rating scale to differentiate between degrees of importance attributed to the various tasks listed in Round Three.

These particular outcomes indicate that there may be some merit in Cypert

and Gant's (1970) and Weatherman and Swenson's (1974) suggestion that there is little need to go beyond three rounds in a Delphi Study. However, this suggestion should be regarded with some caution since there may be a necessity, in some situations, to go beyond three rounds in order to confirm that consolidation and consensus of opinion amongst respondents has occurred.

SUMMARY

In the first part of this chapter the procedures adopted in each of the three rounds of the study, as well as the results obtained, were outlined. These results were then discussed in the context of methodological issues relating to: (i) the selection and performance of respondents, (ii) the character and clarity of Round One, (iii) the feedback of information, and (iv) the number of rounds used.

The chapter which follows focusses on the outcomes from the follow-up evaluation of this Delphi study, and explores the potential of the Normative Delphi Technique for Educational Planners in Developing Countries.

CHAPTER FOUR

THE POTENTIAL OF THE DELPHI TECHNIQUE

The purpose of this final chapter is to examine the potential of the Delphi Technique in the light of both the discussion in the previous chapter and follow-up respondent evaluation of the three round Normative Delphi used in this study.

Accordingly, in the first section of this chapter a brief outline is given of the results obtained from the follow-up evaluation. This is then followed by a discussion focussing on the second of the two research objectives for the present study. This objective was stated as follows:

To examine the potential of the Normative Delphi Technique for educational planners in Developing Countries.

THE FOLLOW-UP EVALUATION

In the follow-up exercise, participants were given a summary of Rounds One, Two and Three. This was accompanied by the results of the third round. In view of this information the participants were then asked to respond to the following questions:

- (i) What are your comments on the outcome of Round Three?
- (ii) What were some of the problems and issues you faced as a participant in this Delphi Study? - Please be critical.
- (iii) In view of your participation in, and the outcomes from, this study, do you think the Delphi Technique is a viable instrument for educational planners? What about for educational planners in Developing Countries?
- (iv) Do you have any general comments about the study, the outcomes, or your participation.

Excluding question three, comments received from the participants related to the generality of the first round, the feedback received, the problem of

time in responding to the questionnaires, the advantages of the Technique and suggestions for improvement.

The generality of the problem statement, a methodological issue discussed in the previous chapter, surfaced in responses from the participants in this follow-up evaluation. Of most concern, was the broad scope of the problem:

I suspect the question is unanswerable in isolation and even an attempt to give a sensible answer to such a question is dependent on a particular location being specified.

Similarly another respondent said:

The topic you have chosen, covering a wide range of developing countries is particularly difficult to handle by the Delphi methods, because so many generalizations are correct about some and wrong about others.

The second theme to emerge from the respondents' replies to this follow-up evaluation was that of feedback. Here, several participants commented on ambiguities in, and the imprecise nature of, some of the feedback. For instance:

Some of the terms were used by different participants to mean different things and there seems to be no method within Delphi to get these different connotations sorted out.

The reference group for the question was not defined, and this made a coherent reaction to some propositions difficult or impossible.

On the issue of feedback, only one respondent remarked on the outcomes of Round Three. In this case uncertainty was expressed about interpreting the results:

I am not sure what I would do with the results of round three. The standard deviations of the Likert scores are hard to interpret, and weighting of respondents' mentioning any given task against the mean importance score attached to that task, seem to create some difficulties, since the tasks which were included by respondents in Round Two, were already by definition, the ones they saw as most important.

Problems associated with the availability of time to complete each round of the study were mentioned by three respondents:

It was much more time consuming than I had expected, taking an average at least of two hours per round.

The greatest problem I faced was time - the rounds seem to arrive when I was about to go overseas or had a writing deadline.

Sometimes I would receive the material on Monday afternoon, and was asked to return it by Friday. But it would take me a full day to reply adequately, and I cannot afford that time at such short notice.

While the above comments reflect the problems discerned by the respondents about the Normative Delphi Technique used in this investigation, the remarks below highlight their opinions about the advantages of, and improvements that can be made to, the Technique.

For one respondent, the advantage of the Delphi Technique was in its iterative nature which made him think more deeply about the problem being investigated:

The biggest gain was the participation which made me think more about issues involved, and this was good for me.

A more general comment about the advantages the Delphi Technique has over

more conventional methods of arriving at group consensus, was noted by another respondent:

Ideally, the technique allows professional judgement to be brought to bear on a situation in an economical and democratic way, without the expense of a round of meetings, and prevents personality conflicts or the status impact of an influential participant.

Suggestions concerning improvements to the technique were also mentioned and in each case comment was made about feedback:

Rounds should be interspersed with interviews or round table discussion - operation clean-up for semantic complications as they arise.

I would have preferred the items to have been processed a little more so that the respondent was faced with fewer categories and less overlap.

I think a round-table meeting of the participants might have been a useful way to conclude the study, if this could have been arranged.

DISCUSSION

In the latter part of the previous chapter, the discussion focussed on some of the methodological problems which arose during the course of the present study. Similar methodological concerns were identified as an outcome of this follow-up evaluation with the respondents. In particular, the lack of clarity in the first round statement, and difficulties with feedback and how it is interpreted by respondents were mentioned. However, the problem some participants had with the lack of time to respond to each round did not surface until the follow-up evaluation. Indeed, mention of this particular problem seems to highlight the need for Delphi users to be aware as much as possible, of contingencies such as the time it takes

individual respondents to complete each round, and respondents' work commitments during the period of a Delphi Study. This information may prove to be crucial in interpreting the outcomes of a Delphi investigation, particularly that which has utilized the opinions and judgements of experts, people whose time is usually committed because of their executive and/or managerial responsibilities.

In summary, then, it can be recommended that, on the basis of the present study, the Normative Delphi Technique may be a useful tool to bring about the consolidation and consensus of group opinion, but that educational planners who use the Technique should pay particular attention to the following:

- (i) The selection and performance of respondents, including their commitments (e.g. work).
- (ii) The character and clarity of the first round.
- (iii) The nature and type of feedback.
- (iv) The number of rounds used.

In the light of the above, what is the potential of the Normative Delphi Technique for educational planners in Developing Countries?

POTENTIAL OF THE DELPHI TECHNIQUE FOR EDUCATIONAL PLANNERS IN DEVELOPING COUNTRIES

In chapter one, the observation was made that most applications of the Delphi Technique in Education were in the area of educational planning, and were directed towards the solution of problems within developed, industrialized countries. Furthermore, it was found that there had been no reported Delphi studies, in Education, being undertaken in Third World Countries. In view of this, the remainder of this chapter explores the potential of the Normative Delphi Technique for educational planners in Developing Countries by drawing attention to the processes of educational planning within Developing Countries, and how these process might be assisted by the use of the Delphi Technique.

In Developing Countries, education has often been regarded as a tool for economic, social and political development (Havelock and Huberman, 1978). Indeed, education is sometimes seen as the solution to a diversity of problems such as the population explosion, self sufficiency in food, and political stability. The complexity of these problems as D'Aeth (1975) points out differs for each developing country:

Each developing country has its own characteristics and educational problems; even those in the group within the lowest income per head of population differ widely from one another

(D'Aeth, 1975, p.2).

Thus, in Developing Countries educational planning is often inextricably linked with processes of social, economic and ideological control (Nyerere, J, 1967). Because of this, and the prominence given to the role of education in solving the problems of Developing Countries, educational planners are often pressured by governments in Third World Countries and the public to arrive at consensual solutions to the tasks they are given (Havelock and Huberman, 1978).

These solutions are often developed as a result of employing one or more of the following methods:

- (1) Relying solely on judgements and opinions: Orata's (1972) report on the establishment of Barrio high schools in the Philippines provides an example of how, on the basis of public opinion alone, a major educational innovation can result.
- (ii) Commissions of Enquiry: The Ashby Commission in Nigeria (1960) and the Ominde Commission in Kenya (1961) were both established to assist educational planners to transform the education systems in these respective countries.
- (iii) Employing Overseas Experts: Officials from organisations, such as UNESCO, IIEP and the World Bank are often contracted

to the governments of Developing Countries to assist with educational planning.

- (iv) Using Ministry Plans and Surveys: the introduction of the 'Integrated Curriculum' in Primary Schools in the Gambia was an outcome of a Ministry of Education plan that had been developed and instigated on the basis of a survey of all Primary Schools in the Capital, Banjul.
- (v) Carrying out individual and/or team research work: the setting of mobile training schools in Thailand as a result of Ahmed's (1976) research on education for rural development, is an example of the utilization of research for educational planning.

In each of the above areas, the Normative Delphi Technique would appear to be potentially useful. For instance, in Commissions of Enquiry or Ministry of Education surveys, and research work, Delphi could be used to generate opinion concerning various policy options or solutions to a particular problem. The Technique could assist, and at times replace round table discussions which often characterise Commissions of Enquiry and the gathering together of experts for the purpose of educational planning. Where educational planners are inclined to rely solely on judgements and opinions, the Delphi Technique could aid in bringing about consensus, and at the same time, highlight potential issues on which there is lack of agreement.

Rather than replace, or act as an alternative to techniques used by educational planners in Developing Countries, the potential of the Normative Delphi lies in its adaptability to complement these existing procedures. Although the present study has highlighted some of the methodological difficulties in using the Technique, it has also shown that Delphi may have much to offer particularly as a method for developing consolidation and consensus of opinion, and as such may be of great

assistance to educational planners in Developing Countries.

In the follow-up evaluation with the respondents who participated in the present investigation, the following question was asked:

In view of your participation in, and the outcomes from this study, do you think the Delphi Technique is a viable instrument for educational planners? What about for educational planners in Developing Countries?

The responses to this question indicated that most of the participants were of the opinion that Delphi may be a useful tool for the educational planner in developing countries. Some of the more general comments were:

The Delphi Technique could be a viable instrument for educational planners anywhere.

This technique is useful as a starting point although is not a substitute for creative thinking.

I would believe that some planners would find the technique useful.

Several of the respondents indicated that Delphi may have specific uses for educational planners in developing countries:

Its use may thwart politicians who are particularly liable to run into trouble by looking for shortcuts in planning.

Planners in developing countries could use it to determine objectives and priorities, or at least general lines to follow.

The Delphi Technique can provide an agenda for consequent discussion i.e. as a method by which a chairman and secretary can do their homework.

Two of the participants expressed cautionary optimism about Delphi's usefulness:

I think it can be a viable instrument for educational planners if it could be used wisely and understood by people in developing countries.

It may work much better when questions are more specific e.g. grounded in the realities of a particular country and region - and the perspective from which the question is to be approached is more closely defined.

Finally, one respondent expressed a rather negative opinion of the Technique:

This seems to be an extremely limited technique for planning development. It can produce a list of priorities in skeleton form which does not necessarily have to be relevant to the country in question.

SUMMARY

The aim of this final chapter has been to discuss the potential of the Normative Delphi Technique for educational planners in Developing Countries. As a preface to this discussion some of the outcomes from the follow-up evaluation of the Delphi Study were given. Inter alia, the comments from the respondents related to the generality of the first round, feedback and the problem of time in responding to the questionnaires.

In focussing on the potential of the Delphi Technique reference was made to some of the more conventional methods (e.g., Commissions of Enquiry, Using Ministry Plans and Surveys) used by educational planners in Developing Countries. It was suggested that rather than act as an alternative to these existing methods, Delphi be used to complement them and examples were cited as to how this might be achieved. The chapter concluded with excerpts from the follow-up evaluation which showed that most of the respondents in this

study were of the opinion that Delphi may be a useful tool for educational planners in Developing Countries.

A brief concluding statement to the report of this investigation follows. A bibliography of the research and literature that was consulted during the study is then provided, along with a series of appendices containing material referred to in earlier chapters.

CONCLUSION

This study had two objectives: the first was to examine methodological difficulties in using the Normative Delphi Technique as a tool for educational planners; and second to evaluate the potential of the Technique for Educational Planners in Developing Countries.

To fulfil the above objectives, an experimental-type study was carried out, using a group of fourteen experts selected on the criteria that they were knowledgeable in the field of Educational Planning, had worked in Developing Countries as consultants or advisers, and were resident in New Zealand at the time of the study.

A three round Delphi was administered to the participants. In the first round, they were asked to list the most important tasks they thought needed to be undertaken by those responsible for education in Developing Countries. The tasks they generated were summarized and fed back to them in the second round.

In Round Two, the participants were again asked to provide a list of tasks, but to do so in the light of their original responses and also the combined listing of the group's Round One replies.

In the final round, the respondents were fed back the combined list of tasks derived from the previous round, and requested to rate the importance of each task on a Likert-type Scale.

After the completion of these three rounds, a follow-up evaluation was carried out, where respondents were requested to comment on the outcomes of the third round, the problems they encountered as participants during the study, and the potential of the Delphi Technique for educational planners in Developing Countries.

The results obtained from this three round Delphi study suggest that educational planners should be cautious about the four methodological aspects

associated with the Technique. These are (i) the character and clarity of Round One, (ii) the selection of subjects, (iii) the type and nature of the feedback given, and (iv) the number of rounds used. In particular, the character and clarity of Round One seem to be crucial factors in that they influence the nature of the subsequent rounds, the type of feedback given to respondents, and ultimately, the results of a study.

While these methodological issues surfaced during the present study, it was suggested that they were not serious deficiencies as such, but rather were issues to be kept in mind by educational planners using a Normative Delphi Technique. Indeed, in the light of the present Delphi Study and in view of the follow-up evaluation exercise, the Technique seems to be most viable in bringing about consolidation and consensus of opinion, and as such it was suggested the Technique may have potential for educational planners in Developing Countries. In particular, Delphi may be advantageous in complementing existing educational planning processes such as Commissions of Enquiry, Ministry Plans and Research Studies.

Two directions for further research arise from this study. First, the four methodological issues explored in the investigation provide the impetus for a further, more extensive and intensive Delphi Study which may have as its objective the need to isolate effects that different forms of Round One probes, and feedback, have on participants. In this way, it may be possible to ascertain the most effective and efficient probes to use in Round One, as well as types of feedback to employ. The second area for research concerns the use of the Delphi Technique by educational planners in Developing Countries. To date, there have been no reported applications of Delphi in this context, and it would seem appropriate, on the basis of the present study, to implement a pilot Delphi Study to provide input into one or more existing educational planning programmes within a Developing Country.

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APPENDIX A:

(Details of the original 'Project
Delphi')

The original "Project Delphi" was pioneered by the United States Air Force, and sponsored by the Rand Corporation during the early 1950's. The aim of this Project was to generate consensus amongst a group of experts concerning the number of Soviet Atomic bombs required to reduce, to a specific degree, the munitions output of industrial targets in the United States.

A group of seven experts was selected for this experiment: there were four economists, a vulnerability specialist, a systems analyst, and an electronics engineer. The questions put to this group of seven, all centred around an estimate of bombing requirements by the United States. Altogether five rounds of questionnaires were used, with the second and subsequent rounds providing feedback to panelists. The questionnaires were designed to elicit the respondent's reasoning that went into his reply to the primary question, factors considered relevant to the problem, his own estimate of these factors, and the information as to the kind of data he felt would enable him arrive at a better appraisal of these factors, and, thereby, 'arrive at a more confident answer to the primary question'.

These five questionnaires are as follows:

The particular problem studied concerned the effects of strategic bombing of industrial targets in the United States. The participants were asked not to discuss this study with the other respondents while the experiment was in progress, but they were free to consult whatever data that might help them in forming an opinion.

The questionnaire was outlined in the following manner:

The experts were to assume a war broke out between the United States and the Soviet Union, on 1st July 1953. The experts were also to assume that the total rate of U.S. military production (defined as munitions output plus investment) at that time was 100 billion dollars and that, on the assumption

of no damage to the U.S. industry, under mobilization it would rise to 150 billion dollars by 1st July 1954 and to 200 billion dollars by 1st July 1955, resulting in a cumulative production over that two year period of 300 billion dollars. The experts were to further assume that the enemy during the first month of the war (and only during that period) carried out a strategic A-bombing campaign against United States industrial targets, employing 20-KT bombs. Within each industry that was selected by the enemy for bombardment, the experts were to assume that the bombs delivered on target succeeded in hitting the most important targets in that industry. After all the above assumptions, the experts were to estimate the least number of bombs that will have to be delivered on target for which they would also estimate the chances to be even that the cumulative munitions output (exclusive of investment) during the two year period under consideration would be held to no more than one quarter of what it otherwise would have been.

As a follow-up to the above questionnaire, each respondent was interviewed, and asked to provide a breakdown by industries of the number of bombs specified by him and to reproduce some of the reasoning for his estimate. He was further asked to estimate the number of bombs needed to do the job with 10% and with 90% confidence of success, and to indicate the kind of data he would consider most helpful to arrive at a better appraisal. The table below shows the total number of bombs estimated.

CONFIDENCE-OF-DESTRUCTION ESTIMATES

	RESPONDENTS						
	1	2	3	4	5	6	7
Primary 50% Confidence	125	50	150	300	200	1000	500
10% & 90% Confidence	75-200	25-150	100-175	250-800	70-500	—	2500-10000

Questionnaire 2:

For the second round, the problem outlined in the previous questionnaire, where the experts were required to make estimates, was broken down in the following manner:

- A. The vulnerability of various potential targets.
- B. The recuperability of various industries and combination of industries.
- C. The expected initial stockpiles and inventories.
- D. Complimentaries among industries.

With this breakdown taken into consideration, the experts were to:

- (1) Determine the optimal target system and for reducing munition output to one fourth
- (2) Estimate for this target system the munition number of bombs on target required to create 50% confidence of accomplishing that aim.

Then the experts were asked the following questions:

- 1. Does the preceding breakdown agree with your intuitive approach to a solution? If not, explain in detail; in particular, are there any major items in addition to A B C D which should be taken into consideration?
- 2. What additional factors, if any, do you consider relevant to the problem of vulnerability? Which of the factors listed do you consider irrelevant?
- 3. What additional factors, if any, do you consider relevant to the problem of recuperability? Which of the factors listed do you consider irrelevant?
- 4. What factors should be taken into account for our problem in assessing the size and role of initial stockpiles?
- 5. What factors should be taken into account in our problem as regards determining complimentaries among industries?

6. Are there any general comments which you wish to make?

The response to this second questionnaire consisted of a large volume of comments. The most significant among these pointed out the difference between economic and physical vulnerability, the influence of the planned munitions product mix, the importance of substitutabilities of plants and materials, and the dependence of the lead times of components on the damage done to the industries producing these.

Questionnaire 3:

Here the experts were asked to consider their original estimate. The question restated below, together with a few explanatory comments which consisted of some facts and estimates, were listed. The experts were asked to take this list into consideration in forming a revised opinion, if they wished. The primary question was restated and comments were given for clarification of terms such as "industrial target", "bomb on target" and some of the assumptions to be made by respondents in forming their estimates, were also given. The list below was data on the United States economy.

- (a) Number of plants presently (i.e., in 1951) accounting for indicated percentages of various industries' output.
- (b) Percentages of metals output going into munitions, consumption, and gross investment.
- (c) Percentages of munitions value constituted by value of metals inputs: Then the structural vulnerability was also given.
- (d) Examples of damage with 20-KT bombs obtained from Japanese bombing.
- (e) Vulnerability estimates for specific industries.

After giving this data on U.S. economy, the following questions were then put to the experts:

- 1. What is your revised answer to the primary question of questionnaire one?
- 2. Do you consider the tabulation of industrial plants given under

- (a) above reasonably correct? (If not, please specify).
3. What changes, if any, in that tabulation do you expect by mid-1953?
 4. Do you roughly agree with the estimates of physical vulnerability expressed under (a) above? (If not, please specify).
 5. For the following industries, how would you allot the minimum number of bombs on target called for in the primary question?

Steel, Petroleum refining, Aluminium, Copper, Power, A-bombs, Aircraft engines, Heavy steel fabrication, Machine tools, Electron Tubes, Aviation fuel, Anti-friction bearings, Other industries.

The follow-up interviews served to clarify a few uncertainties and produced further minor revisions. The table below shows the responses to the primary question.

	REVISED ESTIMATES						
	RESPONDENTS						
	1	2	3	4	5	6	7
To Question 1	158	89	200	250	256	800	450
To Interview	158	106	184	250	256	525	450

Questionnaire 4:

In this round, the experts were asked to make a critical comparison between their own bombing schedule and two others to be specified below. They were to give their revised answers as to the numbers of bombs allotted to various industries - their revisions were to be based upon consideration of the information supplied below as well as any other thought they might have given to the matter.

Additional information on the target system....

Information on stockpiles

Information on the power system

Information on the uses of steel

Information on the bombing of Europe after World War II

Information on Japanese recuperation

The experts were to consider the following questions in the light of the above information.

1. In the last column of the following table, indicate your revised bombing schedule:

PLANT PRODUCING				BOMBING SCHEDULE			
50%	75%	100%	INDUSTRY	A	B	Your Former Figures	Your Revised Figures
17	37	215	STEEL				
25	85	437	PETROLEUM				
2	5	12	ALUMINIUM				
4	6	12	COPPER				
125	325	3700	POWER				
		7	A-BOMBS				
4	8	21	A/C ENGINES				
20	55	9	STEEL FABRIC				
8	17	316	MACH. TOOLS				
		53	ELECTRON TUBE				
8	6	14	AVIATION FUEL				
		19	BALL BEARINGS				
			OTHERS				
TOTAL:							

- 2 & 3. Draw graphs indicating the estimated progress of steel and of munition output recuperation after bombing according to your revised schedule (Co-ordinate systems you were provided with).
4. Compare your proposed schedule with that given under (A) above while you estimate your own schedule to reduce munitions output over two years to 25%, a reduction to how many percent do you

expect from schedule (A) ?

Briefly, why is your proposal superior to schedule (A) ?

5. The same for schedule (B).

The revised total number of bombs, obtained to question 1, are shown in the table below. The comparison with other bombing schedules brought out a number of interesting points, the most important of which were brought to the group's attention in the subsequent questionnaire.

	RESPONDENTS						
	1	2	3	4	5	6	7
No. of Bombs	166	153	200	250	300	332	500

Questionnaire 5:

At this juncture, the experts were informed that they would have a last opportunity to revise once more their earlier estimates if they felt so inclined, in this final questionnaire. Their previous response sheet was attached to this questionnaire. They were supplied with a graph which represented the answer to question 3, the munitions output under normal wartime expansion without bombing was indicated by a dotted line; this corresponded to the assumptions stated in Dalkey & Helmer's original formulation of the problem in the first questionnaire. The approximate munitions output, in percent of the normal output, computed from the experts' graph, was also indicated in the graph, in red. The experts were told that if this number differed substantially from 25, this may have been due to their having drawn the graph freehand, or to a difference of opinion as to the amount of munitions output under normal expansion. If however the difference was due to their having attempted to reduce munition output to 25% of what it would be without expansion, then they would have in fact overbombed and may wish to revise their estimates accordingly.

The experts emphasized the following considerations in the previous questionnaire:

1. The effect of industrial expansion in the number of plants producing 75%.
2. Use of the principle of equal marginal utility in assigning bombs to industries.
3. Observation of intra-industry complimentaries (e.g. Aluminium).
4. The possibility that concentrating the attack allows concentration of the recuperation effort.

Question: Please fill in the blank columns in the following table (here the table of the previous questionnaire was reproduced, with the left hand as before, and the right hand half replaced by column with the following headings):

Estimate number of Plants in mid-1953 producing		If this industry were to be bombed, estimate no. of bombs on target to destroy		Give your finally revised bombing schedule
75%	100%	75%	100%	

The table below shows respondents final bombing estimates.

	RESPONDENTS						
	1	2	3	4	5	6	7
No. of Bombs	177	159	200	255	312	314	494

These final responses were corrected on the basis of replacing some of the individual component estimates by a consensus of estimates. The median of respondents was taken as consensus whenever this was done. The experimenters, first of all tabulated for each of the industries considered the medians (i) the expected number of plants respectively producing 50%, 75%, & 100% of the total output in mid-1953, and (ii) the number of plants requiring

two rather than one bomb on target for destruction.

Then they listed (iii) the percentage of damage to each industry that each expert intended as indicated from figures he gave above for the number of plants in mid-1953, the number of bombs needed to destroy 75% and 100% and of bombs to be allocated to each industry; and (iv) the corresponding numbers of bombs as computed with aid of the tabulation obtained under (iii). The total of these latter numbers, for each respondent was taken his final answer, as shown in table below:

FINAL BOMBING ESTIMATES							
ESTIMATE	RESPONDENTS						
	1	2	3	4	5	6	7
FINAL	177	159	200	255	312	314	494
CORRECTED FINAL	167	179	206	276	276	349	360

The five successive sets of responses given by the experts, plus the corrected totals, according to Dalkey and Helmer, clearly brought out the gradual convergence of the answers. The smallest answer increased from 50 to 167, while the largest decreased from 5000 to 360. The median advanced slightly from 200 to 276. The researchers (Dalkey & Helmer) believe that there are strong indications that if the experiment had been continued through a few more rounds of questionnaires, the median would have shown a downward trend and the ratio of the largest to the smallest answer would have shrunk to two or less.

Whether this belief would have materialized if the experiment had been continued, has yet to be empirically proven. But, however, Dalkey and Helmer in a critique of their experimental study of this original Delphi discovered the following loopholes:

1. The experts' responses were not strictly independent.
2. One of the respondents was also used by the experimenters as a consultant on one aspect of the subject matter of the experiment.

3. Some "leading" by the experimenters inevitably resulted from the selection of the information supplied by the experts.

APPENDIX B:

(Round One letter and questionnaire)



Massey University

PALMERSTON NORTH, NEW ZEALAND

TELEPHONES, 69-099, 69-089.

In reply please quote:

Education Department

23 July 1981

Dear

Thank you very much for consenting to participate in my research project.

May I give a brief indication of what is entailed. The study is designed to elicit your opinions on the most important tasks that are needed to be undertaken by those who are responsible for education in developing countries.

The project employs the Delphi Technique, and involves three rounds of questionnaires. The first, brief questionnaire is attached. The second and third questionnaires will be based on information provided by all respondents in the previous round(s). As each successive round depends on the returns from the preceding one, and as my time is relatively limited, an early response would be very much appreciated. If the responses to Round One (a stamped-reply envelope is provided) were received by 4 August, Round Two should be in your hands by 12 August.

I would like to assure you that your views expressed during this study will be regarded as strictly confidential, and no attempt will be made to identify individual respondents.

Please feel free to contact me should any problems arise. Again, may I express my appreciation of your participation in the study.

Yours sincerely,

Ms Mariama Sarr Ceesay,
Postgraduate Student in Education,
(Commonwealth Scholar from the Gambia),
Massey University

Encl: Round One Questionnaire

ROUND ONE

Please indicate your name and the forwarding address for the next Round:

NAME

ADDRESS

.....

THE PROBLEM

At the 37th session of the International Conference on Education, the Director General of UNESCO, Mr. Ahamdou Mahtarr M'Bow, pointed out that educational standards in developing countries were deteriorating, and that this was reflected in the increasingly high drop-out rate of children from school. Mr. M'Bow was of the opinion that those responsible for education in developing countries had two major objectives: (1) democratization, and (2) the transformation of education systems to make them more relevant to the needs of society. He went on to suggest that equality of access to education alone could not assure democratization; it must be backed by equal chances for success.

In the light of the foregoing, and in view of your own experiences, what do you think are the more important tasks that need to be undertaken by those who are responsible for education in developing countries? Please write or type your response below, and feel free to use additional pages if necessary.

APPENDIX C:

(Round Two letter and questionnaire,
together with a summary of the
Round One responses which served as
feedback in this round)



Massey University

PALMERSTON NORTH, NEW ZEALAND

TELEPHONES, 69-099, 69-089.

In reply please quote:

Department of Education
Massey University
Palmerston North
18 August 1981

Dear Respondent:

RE: Delphi Study (Mariama Ceesay)

Thank you very much for returning Round One. The response was excellent and appreciated.

Enclosed is Round Two of this Delphi Study, along with a stamped-reply envelope. If the responses to Round Two were received by 25 August, then the Third and final Round should be in your hands by 28 August.

Please feel free to contact me should any problems arise. Again, may I express my appreciation of your participation in this study.

Yours sincerely,

Ms Mariama Sarr Ceesay
Postgraduate Student in Education
(Commonwealth Scholar from the Gambia)
Massey University

Encl: Round Two Questionnaire

ROUND TWO

Please indicate your name and the forwarding address for the final Round.

NAME

ADDRESS

THE PROBLEM

In Round One, you were asked for your views on what were the more important tasks that need to be undertaken by those who are responsible for education in developing countries. Attached are the views you expressed, and also a summary list of the comments made by you and the people who are participating in this study.

Keeping in mind your Round One comments, and those made by the group, you are asked to compile a short list of succinct statements (say about five or six) relating to what you think are the more important tasks that need to be undertaken by those who are responsible for education in developing countries. You may wish to choose key statements that were made by the group. On the other hand, you can modify, add to, delete from, or summarise the comments you made in Round One. Please write or type your response to this Round below.

A SUMMARY OF THE GROUP'S ROUND ONE RESPONSES

Task Number	TASKS
1	Reduce poverty.
2	Control over-rapid population growth.
3	Improve teacher training and teacher supply.
4	Improve training for those in management, leadership, decision-making and teacher education positions.
5	Bring together planners, administrators, politicians, the community and educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with the available resources; and (c) the free flow of information within and between the various groups brought together.
6	Bring about a closer relationship between formal education and the needs of the society in question.
7	Undertake a close examination of the structure and functioning of the existing education system.
8	Examine the applicability of educational models and plans prior to implementation.
9	Give 'good' teachers incentives to prevent their rural exodus.
10	Create a balance between local/regional/national and international interests through: (a) the spread of resources (e.g., libraries, finance) to the rural areas; and (b) reducing differences in access to education between boys and girls.
11	Determine general educational goals for a date 20 years ahead and increasingly specific subsidiary goals for each five year period moving toward the present, ensuring that each set of goals is realistic in the light of social and fiscal constraints.
12	Bring together administrators, specialist educators and teachers in the planning and building of curriculum.
13	Redesign courses of instruction so they meet the needs of the community.
14	Change the syllabus through a redefinition of the examination structure.
15	Change the curriculum to take into account the different backgrounds of pupils in different schools.
16	Ensure a fair system of national assessment.
17	Select assessors of the syllabus and examination structure from suitably qualified people.
18	Define educational objectives - at the national, institutional, classroom and individual level - in performance terms.
19	Use master teachers and team methods to reduce pupils' constant exposure to poor teachers.
20	Set up in each school a committee to examine the present syllabi and to formulate new syllabi.
21	Define exactly who are those responsible for education in developing countries.

APPENDIX D:

(A Listing of Each of The 23 Tasks
Derived from Round Two, Along with
the Percentage of Respondents who
Mentioned Each Task; Both of Which
Constitutes the Feedback for
Round Three)

ROUND THREE

Please indicate your opinion, on the scale provided, on the relative importance of each of the following tasks in relation to the tasks that need to be undertaken by those responsible for education in developing countries.

The tasks that need to be undertaken are to:

% of Respondents who
mentioned this task
in Round Two

		Extremely Important	Very Important	Of Some Importance	Of Little Importance	Of No Importance
Reduce poverty.	9%					
Control over-rapid population growth.	17%					
Improve teacher training and teacher supply.	75%					
Improve training for those in management, leadership, decision-making and teacher education positions.	43%					
Bring together planners, administrators, politicians, the community and educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with available resources; and (c) the free flow of information within and between the various groups brought together.	75%					

Bring about a closer relationship between formal education and the needs of the society in question.

25%

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Undertake a close examination of the structure and functioning of the existing education system.

33%

--	--	--	--	--

Examine the applicability of educational models and plans prior to implementation.

17%

--	--	--	--	--

Give 'good' teachers incentives to prevent their rural exodus.

25%

--	--	--	--	--

Create a balance between local/regional/national and international interests through: (a) the spread of resources (e.g., libraries, finance) to the rural areas; and (b) reducing differences in access to education between boys and girls.

33%

--	--	--	--	--

Determine general educational goals for a date 20 years ahead and increasingly specific goals for each five year period moving toward the present, ensuring that each set of goals is realistic in the light of social and fiscal constraints.

58%

--	--	--	--	--

Bring together administrators, specialist educators and teachers in the planning and building of curriculum.

42%

--	--	--	--	--

Redesign courses of instruction so they meet the needs of the community.

50%

--	--	--	--	--

Change the syllabus through a redefinition of the examination structure.

9%

--	--	--	--	--

Change the curriculum to take into account different backgrounds of pupils in different schools.

25%

--	--	--	--	--

Ensure a fair system of assessment.

17%

--	--	--	--	--

Select assessors of the syllabus and exam structure from suitably qualified people.

9%

--	--	--	--	--

Define educational objectives - at the national, institutional, classroom and individual level - in performance terms.

25%

--	--	--	--	--

Use master teachers and team methods to reduce pupils' constant exposure to poor teachers.

25%

--	--	--	--	--

ADDITIONAL TASKS

Identify inept teachers and apathetic or corrupt administrators.

-

--	--	--	--	--

Extend the use of radio, rather than printed materials (as a method of communication and learning) by means of small, do-it-yourself radio stations based in rural communities.

-

--	--	--	--	--

Develop continuing education for those who have completed primary school and to relate it to the social and economic needs of society.

-

--	--	--	--	--

Establish complementary adult education programmes to reduce adult literacy and to support early school leavers.

-

--	--	--	--	--

APPENDIX E:

(Round Three letter, questionnaire
and the results of Round Two.)



Massey University

PALMERSTON NORTH, NEW ZEALAND

TELEPHONES, 69-099, 69-089.

In reply please quote:

Department of Education
Massey University
Palmerston North
14 September 1981

Dear Respondent:

RE: Delphi Study (Mariama Ceesay)

Thank you very much for returning the second round of this Delphi study.

Again, the response was excellent and appreciated.

Enclosed is the final round together with a stamped-reply envelope.

I would be grateful if you could send your responses by Wednesday,

23 September. When your responses are returned, I will analyse the results and send you a copy for your comment.

As before, please feel free to contact me should problems arise.

Thanking you for your participation in the study.

Yours sincerely,

Ms Mariama Sarr Ceesay,
Postgraduate Student in Education
(Commonwealth Scholar from the Gambia)
Massey University

Encl: Round Three

ROUND THREE

Please indicate your name and the forwarding address for the results.

NAME

ADDRESS

THE PROBLEM

In the second round of the project, you were asked to reconsider your Round One responses, in the light of the group's responses, and to compile a succinct list of the most important tasks you thought needed to be undertaken by those responsible for education in developing countries. Attached is a combined list of all Round Two comments made by you and those participating in the study. (Several respondents listed additional tasks to those mentioned and these have also been included.) As well, the percentage of respondents who mentioned each task is noted.

In this final round, you are asked to consider the list of tasks on the following pages, and to indicate your opinion (on the scale provided) on the relative importance of each task in relation to the tasks that need to be undertaken by those responsible for education in developing countries.

APPENDIX F:

(Follow-up respondent evaluation
of the Three Round Normative Delphi
Study. Results of Round Three)



Massey University

PALMERSTON NORTH, NEW ZEALAND

TELEPHONES, 69-099, 69-089.

In reply please quote:

Education Department
27 November 1981

Dear Participant:

RE: Delphi Study (Mariama Cessay)

Thank you very much for returning the first, second and third rounds of the Delphi study in which you have been involved. Your responses were very much appreciated.

Enclosed is an analysis of the third round, together with an explanatory sheet for this fourth and final round and a stamped-reply envelope. I would be most grateful if you could respond to this final round with some urgency and post your reply by Friday 4 December.

I shall also take this opportunity to record my sincere gratitude for your time and patience as a participant in the study.

Thank you for your co-operation,

Yours sincerely,

Ms Mariama Sarr-Cessay
Post-graduate Student in Education
(Commonwealth Scholar from the Gambia)
Massey University

FOLLOW-UP RESPONDENT EVALUATION OF THE STUDYThe Problem

In the first round you were asked to list the most important tasks that you thought needed to be undertaken by those responsible for education in developing countries, both in the light of Mr. Amadou-Mahtar M'Bow's remarks, and in view of your own experiences. The analysis of returns from this round resulted in a combined list of 21 tasks.

In round two, you were asked to compile a list of succinct statements relating to the more pressing tasks that need to be pursued by those responsible for education in developing countries. In this round you were fed back your reply to the previous round as well as the combined list of 21 statements from the first round.

As an outcome of round two, a list of 23 tasks was compiled from the group's responses. In the third round you were asked to consider this list of tasks and to indicate (on a Likert Scale) the relative importance of each in relation to education in developing countries. The results of this third round are attached.

In view of the above, you are now asked to respond to the following:

1. What are your comments on the outcome of round three?
2. What were some of the problems and issues you faced as a participant in this Delphi Study? - Please be critical.
3. In view of your participation in, and the outcomes from this study, do you think the Delphi Technique is a viable instrument for educational planners?
What about for educational planners in developing countries?
4. Do you have any general comments about the study, the outcomes or your participation?

I would be most grateful if you could post your reply by Friday 4 December.

ROUND THREE RESULTS

The tasks that need to be undertaken are to:

% of Respondents who
mentioned this task
in Round Two

Scale used: 4=Extremely Important;
3=Very Important; 2=Of Some Importance;
1=Of Little Importance;
0=Of No Importance

		<u>Mean</u>	<u>Standard Deviation</u>
Reduce poverty	9%	1.87	0.8453
Control over-rapid population growth.	17%	2.27	1.3531
Improve teacher training and teacher supply.	75%	3.73	0.9274
Improve training for those in management, leadership, decision-making and teacher education positions.	43%	3.45	1.16
Bring together planners, administrators, politicians, the community and educators to discuss in some detail: (a) the kind of education appropriate for societal needs; (b) what can be achieved with available resources; and (c) the free flow of information within and between the various groups brought together.	75%	3.90	0.4056
Bring about a closer relationship between formal education and the needs of the society in question.	25%	3.45	1.16

		<u>Mean</u>	<u>Standard Deviation</u>
Undertake a close examination of the structure and functioning of the existing education system.	33%	3.0	1.2431
Examine the applicability of educational models and plans prior to implementation.	17%	2.64	1.0825
Give 'good' teachers incentives to prevent their rural exodus.	25%	2.09	1.2740
Create a balance between local/regional/national and international interests through: (a) the spread of resources (e.g., libraries, finance) to the rural areas; and (b) reducing differences in access to education between boys and girls.	33%	2.90	0.6802
Determine general educational goals for a date 20 years ahead and increasingly specific goals for each five year period moving toward the present, ensuring that each set of goals is realistic in the light of social and fiscal constraints.	58%	3.18	1.2481
Bring together administrators, specialist educators and teachers in the planning and building of curriculum.	42%	3.18	1.2481
Redesign courses of instruction so they meet the needs of the community	50%	3.45	1.2147
Change the syllabus through a redefinition of the examination structure.	9%	1.6	1.088

		<u>Mean</u>	<u>Standard Deviation</u>
Ensure a fair system of assessment.	17%	2.6	1.03045
Select assessors of the syllabus and exam structure from suitably qualified people.	9%	2.18	1.2339
Define educational objectives - at the national, institutional, classroom and individual level - in performance terms.	25%	2.36	1.9848
Use master teachers and team method to reduce pupils' constant exposure to poor teachers.	25%	1.72	0.8286

ADDITIONAL TASKS

Identify inept teachers and apathetic or corrupt administrators.	-	1.72	0.8286
Extend the use of radio, rather than printed materials (as a method of communication and learning) by means of small, do-it-yourself radio stations based in rural communities.	-	2.3	1.567
Develop continuing education for those who have completed primary school and to relate it to the social and economic needs of society.	-	3.18	1.2481
Establish complementary adult education programmes to reduce adult literacy and to support early school leavers.	-	3.0	1.7888

APPENDIX G :

(Some examples of respondents'
replies to the first
questionnaire)

28 July 1981

Ms Mariama Sarr Ceesay
Postgraduate Student in Education
(Commonwealth Scholar from Gambia)
Massey University
PALMERSTON NORTH

Example 1

Dear Mariama

My experience in Fiji was in further education and I will limit my comments to this area.

Many developing countries have inherited a further education system that the initial organisers/educators considered appropriate to enable the students in that country to obtain a standard acceptable not in that country but in overseas countries such as Britain.

The main reason for this is that the organisers of the further education system were familiar with the British further education system and assumed that this standard should be introduced. Further aid officers recruited on short term contracts continued this process and even if they recognised the inappropriateness of such a policy were able to do little to adjust the situation due to a lack of time and "red tape". In the developing countries in the Pacific area Australian Aid officers managed to change syllabi but only to what they were familiar with.

One reason for a failure to change these syllabi was that having introduced the examination structure with the accompanying qualifications local employers had accepted this qualification as a standard. The administrators in further education had the task of re-educating employers if the present system was changed. As the top administrators in further education continued to be expatriate there was little incentive to take this step.

Pressure eventually was brought to bear on the education administrators through employers who criticised the teaching syllabus and demanded a more appropriate training course. Local employers were now local rather than expatriate and education administrators, or a large proportion of these administrators, were local community representatives. The time for such an event would be approximately 5 - 10 years after independence. The necessity for appropriate syllabi was clearly evident and support was forthcoming from both employer and educator.

The next step was to design an appropriate syllabus suited to the needs of the community. Each school can set up an examination committee to examine present syllabi and formulate new syllabi. Assessors of this syllabus and examination structure can be selected from suitably qualified local trade and professional people.

This did take place in Fiji and was successful and has fulfilled Mr M'Bows major objectives.

Yours sincerely

EXAMPLE 2

Curriculum Development

1. The central task of education in developing countries (as elsewhere), is the planning and building of curriculum, that is, the designing of the experiences, both in context and specific form, in and through which effective learning is to take place. This refers to the creating of learning experiences for all engaged in or by education - administrators, specialist educators and teachers as well as students and pupils at all levels.

Management Training

2. Of equal importance is the training of those who are to "manage" educational development and have as their common concern the setting and the means by which most citizens will learn to best advantage. Leadership training assumes special importance. Decision-makers will need a clear concept of "curriculum" and how training and curriculum building can and must proceed concurrently. The training of teacher educators will be as critical as that of teachers while having priority in time.

Defining Educational Objectives

3. What has to be undertaken as the starting point and strategy for both training and curriculum development is the defining of objectives - national, institutional, for classroom and individual - in performance terms. The planning of a system of education must follow from what citizens are expected to be able to do. The training of teacher educators and teachers is best approached by clarifying and stating what these learners have to be able to do as an outcome of training and as professional educators. The task of orienting education towards this functional approach is basic, and best achieved by systematically defining objectives as curriculum building and training proceed.

APPENDIX H:

(Some examples of respondents'
Round Two returns.)

EXAMPLE 1

In responding to this second round of your Delphi study, I continue to emphasize the following points, which are those specifically related to DEMOCRATISATION and RELEVANCE. Many other important tasks exist, of course, but I believe the following are some of the more important in relation to these two objectives.

- a) Control over-rapid population growth. While perhaps not strictly a function of the education ministries themselves, this certainly is a function of government, and has a definite educative component. It is critical in many developing countries, if education services are to deliver what the country requires. (See my point 1 (a)).
- b) Improve teacher training and teacher supply. (See my points 1 (a) and 2 (b)).
- c) Redesign courses of instruction, so that they become relevant to the needs of the country (See my point 2 (a)). This would obviously need to be done as a collaborative effort in curriculum development, between educators at the central and provincial level, teachers and wise representatives of the various communities to be served.
- d) Create a balance between local/regional/national and international interests through: (a) the spread of resources (e.g., libraries, finance) to the rural areas; and (b) reducing differences in access to education between boys and girls. (See my point 1 (f)).
- e) Improve training for those in management, leadership, decision-making and teacher education positions.

EXAMPLE 2

Dear Mariama Ceesay

I've been away from my office for some time and have only just seen your Second Round questions. Here are my responses. I hope they're not too late for you to use.

On the assumptions that the developing countries we are talking about have a predominantly agricultural economic base, and that future developments must depend on the surplus from primary production, then the most important tasks for those responsible for education are:

- (1) To give support to the traditional informal learning processes in rural communities, particularly those related to food production;
- (2) To review the ways in which the school system can strengthen the ability of individuals and communities to contribute to increased food production, the longterm improvement of the environment, and, therefore, to the quality of life (in effect, I am suggesting that much less concentration be given to individual performance in an examination-oriented school system);
- (3) To extend adult and community education resources, particularly those initiated by communities themselves, and those related to health care, including dissemination of knowledge about population control;
- (4) To strengthen the links between the formal education system and the world of work, with opportunities for active involvement of students in productive activity (as part of the learning process);
- (5) To emphasise, in teacher training, the ways in which communities can help themselves to learn what they need to know; and to show teacher trainees how to work with such communities;
- (6) To extend the use of radio, rather than printed materials, as a method of communication and learning, by means of small do-it-yourself radio stations based in rural communities.

Yours sincerely