

TRIP REPORT for Conrad Wesley Snyder, Jr.

Ghana QUIPS/PME Project
Harvard Institute for International Development
November, 1999

1. Searched the internet and libraries for references on monitoring and evaluation. Talked to the Mid-Continent Regional Education Laboratory about their reference lists for both instruction and evaluation. Got materials from McREL and brought them to Ghana. Assembled a reference list and selected key references for M&E. Ordered a sample of the books from the reference list for TMG.
2. Reviewed materials on evaluation training.
3. Developed a training manual (Volume 1) for M&E with inputs from Tom Welsh, Elizabeth Barcikowski, Rebecca Corn, and George Woode. Worked with George Woode in all phases of the training workshop development.
4. Edited and had printed the workshop materials.
5. Assembled materials for simulated database on a country, called DECIDE. Ms. Corn developed the Access database working with TMG personnel.
6. Ran the workshop for Ministry personnel who are involved or connected with the Division of Planning, Budgeting, Monitoring, and Evaluation. Continued contact and consultation with Patrick Yiriyelleh on the training requirements. The workshop was run over two weeks at the La Palm Hotel in Accra, Ghana, and attendance remained steady and high throughout the sessions. Tom Welsh and Becky Corn helped in various phases of the workshop.
7. Worked with individual personnel on difficulties arising from the workshop work. Briefed Patrick Yiriyelleh on progress and plans.

The first two workshops are intended to provide the elementary foundations for M&E in simple education systems. Workshop 1 focused on the development of problem statements and the constituent components of M&E. Workshop 2 will focus on setting up the context information for M&E, and the use of statistics to analyze the relevant achievement information. We shall then introduce the notion of complexity. Workshops 3 and 4 (if continued) would proceed to address M&E in complex systems. This entails using the simple system information and elaborating it with multiple stakeholders, using the argumentative procedures associated with assumption surfacing and policy analysis. We shall conclude by taking up some 'real' policy issues, building on the 'policy brief' activities introduced in the EMIS project.

Specific Product: *Monitoring and Evaluation: Volume 1: Training Manual, M&E of a Simple System.*

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Introduction

Education is a mess and is not a simple system! The term *mess* is a technical term, first applied in the operations research literature by Russell Ackoff to depict the intertwined nature of complex systems. It refers to the inherent interdependency of educational activities and actions. These interdependencies make it very difficult to study any particular aspect of the education enterprise in isolation of all the others. For example, if you change curriculum, then you have to attend to textbook production, teacher training, examination development, materials and resource support, in-service provision, supervision and advisory support mechanisms, facilities provision, student background and local environment, and so on. Every aspect of education is dependent on all other aspects. Problems cannot be isolated for simple problem solving approaches. Problems are complexly organized, that is, highly interdependent, complicated, ambiguous, resistant to solution, and challenges for continual management.

Any individual in the education system is aware of these complexities. There are two problems we have to deal with first before we tackle the problems of education. First, we have to increase our intellectual skills to handle these complex domains. Humans have bounded rationality, and therefore, can only handle so much complexity without simplifying strategies. In most of life's endeavors, we simplify our situation and hope that the simplification enables us to tackle the most serious or important aspects of our situation. We know that new complexities will arise from our actions but we engage within the limits of our current understanding and learn along the way. In other words, we iterate to tolerable solutions, and we engage others to help as much as possible.

The second problem is the inherent complexity of education in our societies. Over time education has taken on increasing responsibilities for society's ills and aspirations. Every insight into society seems to call for a new initiative in education. Every problem that arises entails a new educational solution. Education continues to grow in its complexity. Because its complexity arises from the extensive interrelationships among its elements and activities, we can say that education is a *mess*. A mess is a system of complexly organized problems that yield to good management that is applied on a continuous basis but don't have ultimate solutions.

Despite the complexity of educational problems, the solutions suffer from fragmented organizational efforts to address the interrelated problems. This produces severe decoupling among the system elements, meaning that it's hard to mount a broad-based program that entails the entire system.

We approach education as if it were a simple system, because we have little choice with our limited cognitive capabilities and techniques. We need to simplify in order to act, and we must act in order to get new information and to probe new possibilities. If we do this cautiously and recognize the need for various and different perspectives, continuous negotiation, open-mindedness, and with a spirit of learning as we go, then we shall understand the education system better and perhaps more effectively deal with its complexities. When we stop and presume we know everything about education, we get caught up in our simplicity and we fall into the quagmire of strange loops.¹ To be successful at education and provide the best schooling possible for our children, we need continually to question our actions and examine our approaches.

¹ If you want to explore the world of *strange loops*, you can access three papers by Wes Snyder at the HIID web site, www.hiid.harvard.edu, under the Publications section and as part of the Development Discussion Papers (DDP) series.

This Simulation

An education system entails many decisions, so we have named our simulated education system, DECIDE. Decide is any country anywhere. We have used some real data but drawn from many different countries. The universality of education has been well-documented by John Meyer and his associates (e.g., Meyer & Scott, 1983; Meyer, Kamens, & Benavot, 1992).² While there are nuances and subtleties to all education systems, they share a large number of problems. The shape of the problems is formed from the local context, and solutions from one part of the world are not necessarily good for another part of the world. In fact, the conclusion from our earlier discussion on complexity and bounded rationality is that there are no *solutions*! That is, there are no permanent answers to any set of problems. Complexly organized systems of problems require continuous management attention. Complexly organized problems are highly interrelated, complicated (with numerous relationships), dynamic, ambiguous (no single correct view is possible, encourage competing claims, and limited in terms of possible solution attempts by systemic constraints that are resistant to immediate correction. And management requires information, technical expertise, political savvy, human relations skills, and leadership capacity.³ So there are no easy answers to the problems of education but the problems are generic and we can share a great deal of our understanding.

The purpose of this simulation is to provide some guided experience at analyzing an educational problem set and

² Meyer, J., & W.R. Scott. (1983). *Organizational Environments: Ritual and Rationality*. Beverly Hills: Sage; and Meyer, J., D. Kamens, & A. Benavot. (1992). *School Knowledge for the Masses*. London: Falmer Press.

³ See the recent paper by Clive White and Malcolm Macpherson on the role of leadership in institutional development. The paper is part of the Development Discussion Papers of the HIID, as cited earlier.

searching for information about the problem. We illustrate and encourage the practice of analytic techniques that can help illuminate complex situations. These techniques do so with many simplifying assumptions. Thus, we advocate these techniques but alert you to the fact that their mastery is not sufficient for the complex tasks of understanding education. But they are necessary. Our experience is that most attempts at research and evaluation, without good technical skills, yield such superficial results that they are not useful and possibly misleading. Understanding is much more complex than mere technique but technique can simplify some aspects of the problem area for us and enable us to see 'behind' the interrelationships to better sort through the complexities.

The country of Decide will not be described in great detail. There are important differences among countries, both along political and cultural dimensions, but we shall ignore those in this simulation because we want you to impose your values and standards to the problems. The education system will look very much like most others but what is considered important, how you probe the system, and how you formulate your responses to the problems is very much a function of your own knowledge about education and ultimately embedded in your experiences in your education system.

Because the data sets are drawn from all over, the linkages are artificial. This isn't a real research exercise, and the relationships you find may not reflect any reality, except our imagined one. You should not place great credence in your findings in these exercises. They are contrived and merely serve as experiences in approach.

Case Study 1 presents a systemic question, 'does teacher quality really influence what students learn?' We shall ignore many complexities as we move through this case study. Our focus is on basic skill development, as well as building literacy

in the language of monitoring and evaluation. Later case studies will both withdraw some supports and introduce more complexities, with new supports to deal with these challenges.

Many of the papers used in these exercises are real but the name of the country has been deleted and 'Decide' inserted. This gives greater semblance of real kinds of information. The findings in these papers are real, and not contrived, so there's much to learn from them in a substantive sense. In fact, John McPeck would argue that critical thinking skills could not be developed independent of substantive content.⁴

In short, what Wittgenstein had observed from a *philosophical* point of view, and what Bruner had argued from a *curriculum* point of view, is now overwhelmingly supported by the available *empirical evidence*; namely, that reasoning is not a generalized detachable skills but is connected to domains of content...

Accordingly, the intimate and deep knowledge and information of fields leads to the maximum transfer to multiple problem domains and the best way to understand *education* is to understand the various domains that contribute to its processes and intents. In the exercises included in this set of case studies, method and content are intertwined—for example, to fully understand the relationship between teacher quality and student achievement, it's necessary to know far more than just the mechanics of a correlation coefficient. The more we know about the content areas of teacher quality and student achievement, the deeper our understanding. A correlation calculation merely summarizes our operationalization of that understanding.

⁴ John E. McPeck. (1990). *Teaching Critical Thinking*. New York: Routledge.

Approach

The Task Force is made up of four or five individuals who collaborate on the exercises and the final production of the conference materials. Each exercise requires approximately 2-3 hours. The final report will require a full day. The presentation timing will vary depending on skills with presentation software. We shall estimate this at 2-3 hours as well. Therefore, this package is approximately a full week of activities.

The effectiveness of groups depends on dynamics that are independent of technical considerations. We would advocate teams that will work together in their domains rather than artificial teams, where this is possible.

Plenary sessions will 'share' information and approaches. The expectation is that even in this common set of tasks, the outputs will be very different from different teams. Noting these perspective differences is an important lesson in the process of dealing with a complexly organized system. There are no singly correct views. A problem is an abstraction, not a real event or entity. We 'create' problems as a function of our perspective. They are therefore constructed rather than exist. They are characterizations of our view of the state-of-affairs with respect to the standards we wish to apply.

This simulation will vary depending on the initial skills of the individuals involved on the teams. If there is little research or statistical skill available, then there will need to be time taken to more comprehensively cover the statistics material. This will greatly lengthen the process. It will add an instructional component. The same thing is true of computer skill. If lacking, then additional time will be added for that instruction as well.

Each individual of a team should keep a log of their thoughts and actions. This log will be helpful in reviewing what they have done and why they have done it, even for their own

reflection on their work. The long-term usefulness of this log will feature in subsequent case studies, as we work to build the necessary skills to deal with the complexity inherent in real education systems.

These activities will culminate in special studies, where teams can try out their newly developed skills on real problems. Learning by doing is, of course, the only way to really become a researcher. Monitoring and evaluation encompasses research and organizational skills. But as we have indicated, there is also no substitute for knowledge of the domains targeted for the research or monitoring and evaluation. We encourage participants to delve into the areas they are studying in order to fully understand their own research. Simply applying the mechanics of research or carrying out some prescribed agenda of monitoring and evaluation will provide only superficial information. To truly *understand* the complexities of education, we have to *know* all about education

Working Procedure

Participants will be divided into groups of 4 or 5 persons, each from a different level of the organization, where possible, and arranged in realistic cells or groups from those who will eventually work together in the real system. We would hope that the team building work in this set of exercises carries over naturally to the work of the Ministry.

The work of the Ministry of Education is can be conceptualized as 'cases' that require attention throughout the academic year. Sets of problems come across the desks of the participants that reflect major issues in the delivery of mass education. These problems are complexly organized and individual attention will not adequately frame or address the problems. Ministry personnel have to recognize their roles in the organization, and develop bridges to other units and individuals who can help

them in their work. Increased cognitive capacity results from cooperative teams, versed in different perspectives and skills, who come together to address these problem sets together. Ministries are notoriously fragmented and decoupled, which presents enormous challenges to effectiveness. The organizational goals shift rapidly under fragmentation to survival of the individual units rather than coupled management of problems.

Communication Experience

Participants will sit around a large table. On the table is placed an object. The object will be irregularly shaped, but no one may move from their seat. Each individual will have a unique vantage point to observe the object.

In the first exercise, no participant may talk to any other. Each must draw their own 'picture' of the shape. Their picture will inevitably draw on the information they have. That will result from their unique vantage point. They will lack other perspectives and other interpretations of the shape.

In the second exercise, participants may talk to each other and must communicate

Case Study 1

Teacher quality in DECIDE has been a continuing concern, especially at the primary school level where basic skills are taught that form the foundation for later educational attainments. Examination raw scores for English and maths tests at grade 4 have been consistently very low across the country over the last few years. Furthermore, a cooperative international testing program found that Decide students were among the lowest scorers on the maths test at grade 6 across the international region, covering five countries. The National Educational Research for Decide (NERD) group reported a national survey that indicated widespread dissatisfaction with the education system among parents and employers. Not surprisingly, teachers were singled out for blame.

Decide has developed some reform activities that will be put into place next year. Teacher union officials have countered the claims that teachers are poorly trained and solely responsible for falling academic achievement. The union has indicated that there is a need to improve pre-service teacher education and increase opportunities for in-service training to better implement the newer instructional programs that accompany the recently improved curriculum. The problem arises because many teachers, in fact, have no teacher education and are hired directly by the rural communities to fill gaps that formally trained teachers will not accept in the remote and impoverished areas of Decide. The union has successfully fought forced placement programs for new teachers that were designed to rapidly address the inequities in teacher quality in country schools. They have argued that higher salaries are required to

entice more talented individuals into education from all areas of the country, and special incentives need to be added to the remuneration package to attract teachers to go and stay in the rural communities.

The newspapers have picked up on the private sector's dissatisfaction with schooling. Employers argue that the foundation laid by the primary school is insufficient for literacy and numeracy. The school leavers are not trainable, and employers are forced to do extensive remedial work before actual job training can take place. They argue that the students never recover from a poor primary school background, and only improvements to basic education will improve the later educational programs and enable them to more efficiently train their potential employees.

Teacher training institutions have responded to the public 'attacks' on teacher quality by pointing out that they operate with few resources. Many good ideas about teacher training are not implemented because of inadequate funds, transport, and materials. While they can teach prospective teachers about teaching, they cannot carry out extensive apprenticeship programs that are key to developing good teachers. In-service programs are virtually non-existent as well. Officials have admitted that the teachers graduating from their programs may not be 'ready' to be teachers, and they appeal for more support from government to build quality programs.

Action Memorandum

To: Task Force on Teacher Quality and Student
Achievement

From: The Minister of Education

Re: Conference Paper and Presentation by Task Force

A national conference has been called to bring together representatives from the various stakeholder groups interested in the quality of primary education. This special task force was assembled to address the following issues.

1. Is teacher quality related to student achievement?
2. Are the scores particularly low in Decide's rural areas, indicating that the under-educated, under-trained teaching cadre there may be the key reason for low performance, which in turn lowers the national average?
3. Do you believe that teacher quality is the key deficit in the system? What argument would you present?
4. Are there other plausible explanations for the poor performance of primary students in various testing contexts?
5. What major recommendations could be made to improve teacher quality in ways that are known to affect student achievement?

Your task force must present a written paper on these topics for review before the conference. The paper limit is five pages but you may add any addendum information you wish to provide more detail on the evidence behind your conclusions. If you cannot come to clear conclusions, then you need to specify the informational needs that would enable some answers to emerge. Additionally, prepare a 20 minute presentation, using MSTM Powerpoint, for the conference proceedings.

Exercise 1: Understanding the Problem Area

Before you begin to address the specific requests for this conference, you are asked to work on some preliminaries to the task. We want to be sure that the response to the conference is of high quality. The Ministry is under scrutiny at this point from the many stakeholders. Let's look at what skills are required and how we might approach this case study to begin to understand the arguments about the role of teacher quality and its deficits in leading to poor student achievement.

- *Understanding of the notion of argument.* You need to know the structure of argument so that you can both recognize arguments, even when implicit, and can formulate arguments, both as position statements and as counter cases.
- *Ability to analyze the arguments inherent in the invitational case study.*
 - What are the claims? Claims are the assumptions we make. They are usually stated as assertions, but they may also be unstated and implied in the text.
 - What assumptions underlie the questions of teacher quality and student achievement?
 - Are the assumptions the same for different stakeholders?
 - What are your assumptions in this area?
 - Is there counter evidence to refute any of the central assumptions of this case study analysis of the current situation?

- Ability to distinguish between verifiable and unverifiable assumptions in the case study. Proposals are better formulated when based on verifiable assumptions.

If you are comfortable with the notion of *argument*, you may move on to the specific assignments that indicate your understanding of the problems surrounding teacher quality in Decide. If you are unfamiliar with arguments or would like to refresh your understanding of this notion, then proceed to examine the additional information on argumentation available in this presentation.

Review material on ARGUMENTATION

To demonstrate your understanding of the problem area, carry out the following specific tasks:

- State your assumptions about teacher quality and its impact on student achievement. Each assertion or claim should be stated separately. Keep this record for later comparison and reflection.
- Identify the assumptions in the case study description. Compare your assertions with these to see which ones agree with your presuppositions to the problem area and which ones disagree.
- Identify the stakeholders responsible for each assumption stated or implied in the case study.

Review material on STAKEHOLDERS

- Specify the verifiable and unverifiable assumptions present in your assertions and in the case study to establish which assumptions may frame your recommendations in the later

analysis. You must keep track of your assertions in a separate log.

Exercise 2: Defining Terms and Concepts

The notions of *teacher quality* and *student achievement* are familiar to everyone in education. Sometimes it's useful to review our terms and carefully articulate just what we mean by these complex concepts. For example, teacher quality might entail:

- Attainment of some formal qualification level or certification from an institution of teacher education.
- Ability to carry out the duties of instruction as perceived by the school headmaster or head teacher.
- Record of successful student performances in the next grade or in formal student assessments.

We might want to add something about currency to teacher quality, and include attendance at in-service training opportunities. Other aspects that might be included:

- Ability to motivate a classroom and inspire students to learn.
- Skill at classroom management to maintain an orderly environment for learning to take place.
- Ability to assess individual capacities and respond accordingly with instructional materials and approaches.

What is your conception of teacher quality? Record your notes on what you mean by teacher quality.

Proceed in the same way to articulate your notion of student achievement. For example, student achievement might entail:

- Consistently high performances on standardized tests or national examinations.

- High attainment on mastery indicators across the instructional program.
- Changes in performance from the beginning of the school term to the end.

What is your conception of student achievement? Record your notes on what you mean by student achievement.

From now on we shall understand your arguments from the point of view of your definitions. Remember that the value of your argument finally rests on your conceptualizations. If they are weak, then later analyses may be unconvincing to those who hold other notions of teacher quality or student achievement. Issues of definitional ambiguity or disagreement plague education and underline the complexity of the field. It is valuable to state your positions up-front and then ascertain the notions carried by those with whom you will be communicating your monitoring and evaluation information. You want to be sure there's no misunderstanding and that you are talking about the same kinds of things. Different definitions can carry different kinds of assumptions and different kinds of evidence.

Whenever you face a problem area, you must spell out what you mean by the terms you use and how you will represent those terms in further analyses.

Specify how you will represent *teacher quality* and *student achievement* in your analyses.

Exercise 3: Analyzing Time-Dependent Information

Education is a time-dependent process. It takes time for learning to emerge and it takes time for teachers to develop teaching strategies. All problem areas have time-dependent features. When we talk about mass education and the education system, we are talking about the entire system. The system changes over time to respond to new demands, to react to different influences and forces in the environment, and to reflect changes in policies and initiatives. So when we increase the availability of education to larger masses of individuals, then the system expands accordingly. As a system expands, it frequently grows in complexity because it requires more complicated management arrangements.

How would you go about characterizing the Decide education system? What information would you want?

Request the information you need to specify the key attributes of the education system in the context of time. You will be given information if it is available.

Monitoring and evaluation do not occur in isolation of systemic constraints. When you request your information, you will depend on your definitions, worked out in the previous Exercise. What do you do if the information you want is not available?

Well, you have two clear choices: change your definition to one of convenience and consider the relationship between the two (that is, one definition may stand in for another one if there is reason to believe that the two are highly related so that results related to one will be similar to results related to the

other) or collect new information around your particular definition.

If you find information available for your approach, then proceed to examine the time-series information. If you are not successful, then try both strategies: change your approach to one for which information is available, and design a study to collect new information based on your specific notions and concerns about the education system. The problem with new definitions is that there is no historic information so you are starting from the current point of departure and you lose the perspective of time and its historic associations. These are the trade-offs that frequently occur when we ask about our education systems.

Now do the same exercise for student achievement.

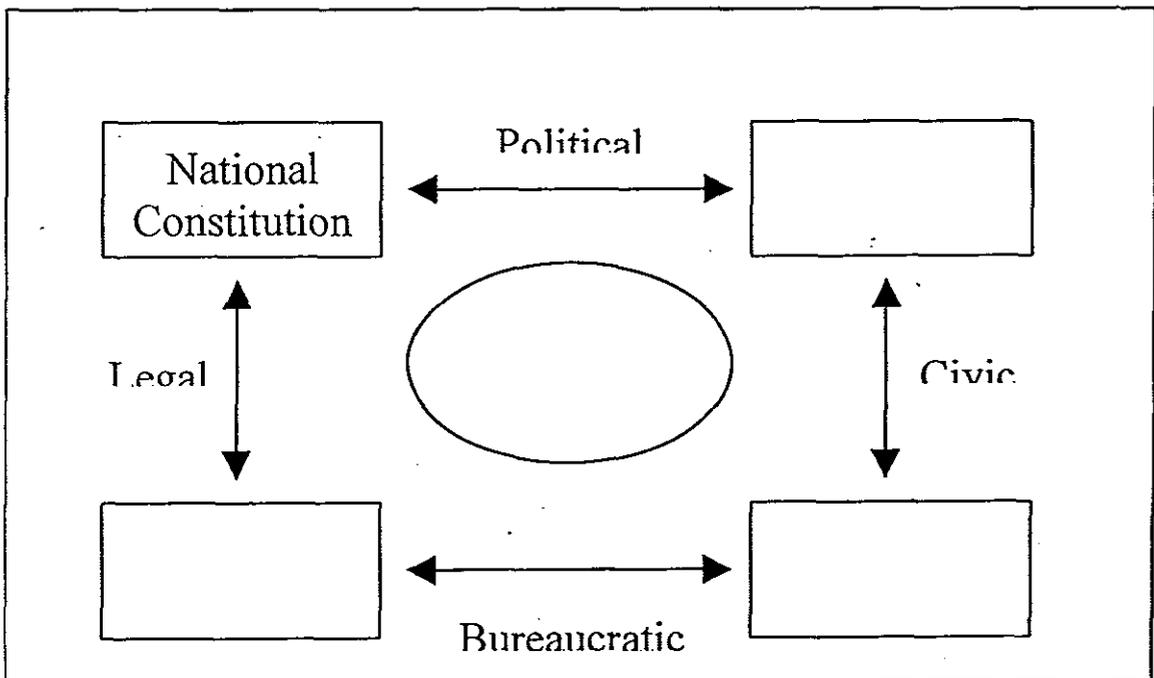
Request the information you need to specify student achievement in the context of time. You will be given information if it is available.

Record the results of your analyses in your log. Is the situation today the same as it was in the past? What kinds of things have improved? Or gotten worse?

Exercise 4: Analyzing Context-Dependent Information

What other kinds of information would you want about teacher quality? And/or student achievement? Decide has been in the education business for a long time. What other information would you want to know in order to better understand the problem area? When we ignore the context, we lose a significant amount of information about what any problem area means. We need to understand the various aspects of system governance in order to place a problem in its local context.

In the development of the Education Management Information System (EMIS) for Decide, Harvard's Tom Welsh has suggested a useful model to frame questions about a particular problem area.



The governance of an education system depends on these polarities: Constitution or Organic Law, Rules, Staff, and Civic capacities. The national constitution establishes the 'foundational' rules for governance. Based on national

principles, the constitution serves as an arbiter of appropriate actions in the governance of the education system. Rules emerge within the institutional framework (or Ministry) to provide specific guidelines for action in the domain of education. In the case of teacher quality, the guidelines would operationalize the notion of a teacher. These institutional rules must be consistent with the constitution in the legal domain (representing the interaction of areas between the constitution and the institutional rules). Staff capacity reflects the organizational talent available to address problems. In the enactment of rules, the staff displays its bureaucratic domain. When dealing with the community, it's the civic domain. Organizational capacity is dependent on an efficient bureaucracy and an effective relationship with the polity. Education, like most cultural activities, depends on civic relationships. Community involvement in education has been found to be very important to an effective program, and many reform efforts are aimed at the creation of civic capacity in order to strengthen ties between the community and local schooling. The community is the constituency of education, and the community represents education in the political domain. Direction and goals, funding, hopes and aspirations are all embedded in the political domain. In newly independent countries, like Decide, the constitution reflects these dimensions and guides the general intentions of the education system.

Problems, such as teacher quality or student achievement, lie in the middle of the contextual 'force field' within which governance takes place. For example, what constitutes a 'teacher' is defined by the rules of the education agency and this is worked through the organization, the community, and the formal legal system. In entrusting our children to an adult for education, we expect the adult to possess certain qualifications and these expectations are inculcated in formal

designations in the system. These official determinations become key aspects of how a country views teacher quality. When there are deficiencies or ambiguities in rules, staffing, or civic polarities, then teacher quality will vary in meaning and probably in action. Problems and concepts are dynamic, and many features depend on the context.

Specify what information you would want to have about
Decide in order to improve your understanding of teacher
quality and student achievement in this context. If the
information is available, it will be provided for your analysis.

One of the hardest things to determine in analyzing a system is what information is needed to better understand the system. Both in this exercise and the earlier time-series exercise, you will find that what's available may influence what you can actually study. If you wish to pursue some area for which no information is available, then you have to create new information capacity. In this exercise, for those areas for which you cannot obtain the information you might want, please note this in your log and provide some guidance as to how you might collect the needed information, should funds become available at some future time. Your own argument will be weakened by inadequate representation of your conceptualizations. Noting the ways around that can be important recommendations for the development of the M&E system over time.

Exercise 5: Analyzing General Comparative Information

With the improvement of information gathering capacity due to the Internet, anyone with access to the 'net' can search for a wide range of topics and find out many things about what people are doing elsewhere or are thinking elsewhere about the same problems. Sometimes these different perspectives can be useful and enriching. It increases the possibilities for thinking about a problem and frequently adds new informational elements for our consideration. Decide is a small country with few resources. The research pool of information is sparse, despite increasing recognition of the importance of research in dealing with complexly organized problems like those found in education. The Internet provides exposure to a larger research pool of information.

We can start by locating the 'search engine' of our Internet interface software. We shall demonstrate that process to you, based on your specific computer capabilities. Once we have located the search procedure, then we can enter the words 'teacher quality' and see what references we get. Teacher quality is a very broad topic and it may lead to some confusion of 'riches.' That is, we may get a million possible 'hits' that are related to teacher quality. We can attempt to go through a few possibilities and see if this is a useful way to go about our search for information. If in your definition of 'teacher quality,' other words have emerged as important in pinning down your particular view of teacher quality, then you can search the set of finds for 'teacher quality' in terms of your additional representations to see if they narrow the field down to a useful subset of references.

Another way to proceed is to identify useful web sites that already organize information for us as part of their function. Some useful ones, for example, are the Association for

Supervision and Curriculum Development (www.ascd.org), the Phi Delta Kappa (www.pdk.org), the Northwest Regional Education Laboratory (www.nwrel.gov), the Mid-continent Regional Education Laboratory (www.mcrel.gov), and the Harvard Institute for International Development (particularly their Development Discussion Papers) (www.hiid.harvard.edu). We can go to these sites and then search them for the problems we wish to study.

Once we have established useful sites, then we can create a web site for ourselves, perhaps called something like the <www.decide.gov> web site and collect the useful sites as linkages to our own. This way we'll keep the links alive and be able to use them when we need to do so without searching for their web designations each time we want to find them. Some web sites last only a couple of years and then change their names or they are updated. We need to keep our linkages up-to-date.

For this exercise, let's first search in general to see what we find with your general search engine for the area of 'teacher quality.' In situations where Internet connection is limited or slow, the search may take a long time so you'll have to be patient.

Note claims and assertions made by the research literature for teacher quality in your general search.

Now pick a particular web site and search that site for 'student achievement.'

Note claims and assertions made by the research literature for student achievement in your web site search.

Note any new ideas, information, or links you wish to retain for later use in your log. The richer your understanding is of these areas, teacher quality and student achievement, the richer your analysis will be of the problems confronted by the Decide education system. Teacher quality is a complex issue. Student achievement appears more straightforward but has many complexities as well. Knowing as much as possible about the problem areas helps us frame better questions and generate better information. We know from modern cognitive research that the ability to handle complexity intellectually grows with experience with complexity. The only way to 'know' about the key issues of education is to grapple with them continuously so that the depth of your understanding grows with each new revelation. Complexity does not yield to sloth or ambivalence. Your search for better understanding in education is never-ending.

Exercise 6: Teacher Quality and Student Achievement (Information)

At this point, Case Study 1 is well-understood, both in terms of its arguments and its time and historical context. Information related to the problem areas of teacher quality and student achievement is also available from Internet searches. The Task Force must now review the problems for the conference.

Recall they were:

1. Is teacher quality (by your definition) related to student achievement (by your definition)?
2. Are the scores particularly low in the rural areas, indicating that the under-educated, under-trained teaching cadre there may be the key reason for low performance, which in turn lowers the national average?
3. Do you believe that teacher quality is the key deficit in the system? What argument would you present?
4. Are there other plausible explanations for the poor performance of primary students in various testing contexts?
5. What major recommendations could be made to improve teacher quality in ways that are known to affect student achievement?

As a first step, let's keep teacher quality and student achievement separate for our initial analyses. Let's look at teacher quality information as a start so that we can completely describe what we know about it before contemplating its relationships and implications. What information would you request from the Education Management Information System (EMIS) or Personnel Files of Decide?

Write a memo for each information request to the EMIS or Personnel Director. If information is available, then it will be provided for your analysis.

In your requests earlier, you may have acquired all the information you need. But this is your last chance to get information, so review your situation carefully.

Take the key variables that you've identified as central to the concept of teacher quality and let's describe that information. Let's say that you have decided to select teacher certification as an indicator of teacher quality at the primary school level. How would you go about describing the state of affairs? In this case, you might want to label the categories of certification and indicate their definitional relationship to teacher quality. A Primary Teacher Certificate from the Decide Teacher Training College might be the key certification for primary school teachers in the country of Decide. Another category might be No Certificate. In the simplest case, you would have those with a certificate and those without. From data provided by EMIS or Personnel, you might conclude that 60% of teachers in Decide are certified (and therefore, designated as quality teachers, by the certification definition). So for every 60 people in the system with a certificate, there are 40 people teaching without a certificate.

The situation is unlikely to be this discrete. We may have gradations of certification, with some considered higher than others. If we order these in terms of our definition of teacher quality, then we shall have multiple categories, running from low quality to high quality. The number of teachers (or frequency) in each category gives us some idea of the profile of teacher quality that presently exists in the Decide system. We call this depiction, a *Frequency Distribution*. The more it peaks to the right (high quality), the more quality teachers there are in

the system. The more it peaks to the left (low quality or no certification), the lower the quality of teachers in the system. Thus, the frequency distribution of teacher certification provides a 'picture' of teacher quality in Decide.

The 'picture' can become more complex if we add more conditionalities to our notion of teacher quality. For example, we might decide that headmaster rating was important as well as formal certification. A non-certified teacher could perform very well in the classroom, without the advantage of pedagogical training, if s/he had a good tutor or mentor who 'trained' the teacher on-the-job, or perhaps the individual was reflective enough to develop teaching skills without any guidance. The headmaster's rating would more directly relate to what happens in the classroom; whereas, certification relates to what could or should happen as a result of skill development outside the classroom. Combining these two dimensions would provide a more comprehensive picture of teacher quality. But when we add dimensions, we also add complexity.

Review material on FREQUENCY DISTRIBUTIONS

The combination of variables to represent a complex concept is not unusual. Teacher quality encompasses many facets of teaching, and teaching is a very complex undertaking. In order to represent fairly and accurately the state-of-affairs in teacher quality in Decide, we'd want to do the best job we could to represent the 'real' meaning of teacher quality.

If you are comfortable with the notion of frequency distribution, then we can combine the two distributions (from certification and headmaster's rating) to get a combination picture of the state of affairs. Let's say there were 5,000 teachers with the highest certification possible. We'd separately examine those 5,000 teachers in terms of their

headmaster's ratings. The category of 'highest certification' would now be broken into additional categories according to classroom performance ratings. If all these teachers received the highest ratings as well, then these two dimensions may not be different or provide different information. More likely, some of the 5,000 would get the highest rating but others would 'distribute' themselves across the board of ratings. We would hope, if the teacher training system were at all efficacious, that most of the highest certified teachers would in fact receive the highest ratings for their classroom performances as well.

When we do this breakdown for each level of certification, we then have a table or matrix of values. At the top we might have the certification categories (highest on the right), and on the side we'd place the rating categories (highest at the top). Each entry in the table would indicate the number of teachers who have that particular category of certification and that particular category of headmaster rating. If the numbers were all equal in all rows and columns, then certification is not related to classroom performance (as defined here). That is, knowing what certificate a teacher has tells you nothing about what rating they are likely to have received for their classroom work or vice versa about certificate attained.

As the numbers increase in the middle and decrease from any corner, a relationship is present. A perfect relationship between these two indicators of teacher quality would have numbers only on the diagonal of the table. Few things are perfectly related. We would expect that teachers with more certification would perform better in ratings. Thus, the numbers would be larger, moving from the bottom left of the table to the top right of the table, and there would be only scattered numbers along the top left and the bottom right of the table.

It would look something like this:

Cert/Ratings	No Cert	In-service Cert	Some Cert	Certification
High Rating		400	2,000	4,000
Good Rating	150	1,600	6,000	800
Moderate Rating	1,850	5,500	1,500	200
Low Rating	3,000	1,500	500	

The higher values are on the diagonal or would be nearby for a positive relationship to exist. This is called a *Bivariate Frequency Distribution*.

Use the data you have collected to specify the notion of teacher quality that exists in Decide as of the time that data were assembled. If you have established several dimensions, then break them down as above into their bivariate frequency distributions. Indicate what the 'picture' shows for the presence of teacher quality in Decide.

Now do the same exercise for student achievement. Use a frequency distribution for one dimension or bivariate frequency distributions for each combination of two dimensions. If your data are strictly categorical, and do not have an order to them (from lowest to highest), then you will have to create a verbal picture rather than the quantitative one illustrated above. That is done in the same manner but your picture has to be described in detail. For each category, you specify its relationship to other categories for the second dimension as above, but the specification is verbal.

With these two 'pictures' of teacher quality and student achievement, you can now describe teacher quality in Decide and student achievement in Decide. Compare the situation from

these analyses with the arguments that have been presented. Is teacher quality lower than you might expect for a poorer country like Decide? Is student achievement lower than you might expect? We shall develop better techniques to describe the situation but you can do quite a bit from this set of descriptive exercises.

Are you beginning to feel you know more about the teacher quality and student achievement problems in Decide? From the early analyses, you should now know the kinds of information available and what's needed for the future in order to have good operational definitions of teacher quality and student achievement. You should also have a good idea of relevant historical and contextual influences on these notions. And you will know something, at least a start, of the research literature that exists in other contexts and other historical places about teacher quality and student achievement. And lastly, you'll have an idea, based on available data, about the extent of teacher quality and student achievement in Decide. At the moment, we might call this Indecisive, but you're on the way!

*Exercise 7: Teacher Quality and Student Achievement
(New Information)*

Let's continue to setup the eventual responses for your Task Force.

Recall the specific requirements are:

1. Is teacher quality (by your definition) related to student achievement (by your definition)?
2. Are the scores particularly low in the rural areas, indicating that the under-educated, under-trained teaching cadre there may be the key reason for low performance, which in turn lowers the national average?
3. Do you believe that teacher quality is the key deficit in the system? What argument would you present?
4. Are there other plausible explanations for the poor performance of primary students in various testing contexts?
5. What major recommendations could be made to improve teacher quality in ways that are known to affect student achievement?

As a second step in this process, let's look at which questions we can answer with the kinds of information we have. We'll put aside Question 1 for now because it requires more analysis. How about Question 2? Do we know, from the data given under your definition, if the teachers come from rural or peri-urban or urban schools? Can we breakdown the data for that variable as well, as we did above, using frequency distributions? Let's say that we just have town versus rural categories. Then, we'd take each level of the certification variable and break it down by town-rural categorization. This

would give us some idea if those with certification are equally distributed in both town and rural locations, and that addresses the question. We might also do the same for headmaster ratings to see if classroom practice, as defined by these ratings, differs from town and rural locations.

Questions 3, 4, and 5 are not directly answered by direct reference to EMIS or Personnel files. The search carried out on the Internet may have suggested some other plausible explanations for system deficits (Question 4), and the process of investigating teacher quality and student achievement may have shaped some sense of the importance of other variables in the consideration of poor student achievement (Question 3). You would be wise to look at local research to see if anyone has investigated these factors in Decide.

Frame a request, in the form of a memo, for additional research information on Decide's system and the impact of various variables on student achievement in Decide. If information is available for your request, you will be provided with information.

Recommendations must await your full analysis of the relationship of teacher quality and student achievement. As a result of your enquiries above, you may also want to include other variables and other kinds of information in your planned analyses.

Write a note to your log on how you might proceed to analyze the full data entailed in this study. Frame a request, in the form of a memo, for any raw data that you may need for inclusion in further quantitative analyses.

*Exercise 8: Teacher Quality and Student Achievement
(Analysis of Relationships)*

We've assembled everything we can now on this problem. More may become available as the process continues. Other researchers may complete studies that weren't available earlier, unfound research may emerge, new hints of how to better search the web or the local resource centers for additional research may arise, or as the understanding of the issues deepens, new ideas about what information to get may develop. These new possibilities may change the shape of our enquiries.

Note any new ideas you have and seek new information accordingly. Document in your log what you did to enhance your study at this point, if anything.

Now we are ready to tackle the central issue (Question 1) and begin to shape our response to Question 5. How do we answer the question of relationship between teacher quality and student achievement? Naturally, our approach depends on the particular information that we have collected, it's technical quality, and it's usefulness as representative of the complete notions of teacher quality and student achievement that we might hold. This is called *Construct Validity*. If we don't have high construct validity, then any further analyses will be compromised by the weaknesses in representativeness.

This doesn't mean that we don't proceed. The world is imperfect and we want to find out all we can, even if not as complete as we might like. So we take the variables we have and begin to organize them into tables that connect a teacher quality category to a student achievement category. This turns out to be a difficult task because education is hierarchical.

Many students 'belong' to one teacher, so any single teacher has multiple effects on many students. The issue becomes further complicated at the secondary school level if different teachers teach students!

If we carried out the above exercise, we'd have one primary school teacher for many students. The same teacher quality value would appear for each member of the class of students. There is little doubt that if we conceptualized education as individualized instruction, we'd note that any one teacher has many different effects on the classroom, depending on many interactional aspects of the teacher and student. For the moment, we can't incorporate these complexities. So how can we deal with groups of students for each teacher?

The first way we might look at this is in terms of the frequency distribution of our student achievement variable. We can categorize the variable in terms of class membership, so that all students from the same class are grouped together. The question we face now is how to characterize this class of performances or to put it more generally, this frequency distribution of the particular class of students.

If you are new to statistical thinking, then proceed to the material provided on elementary statistics. This material is meant to provide some conceptual understanding and is not meant to explore the mathematical principles underlying statistical analysis.

Review material on ELEMENTARY STATISTICS
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We can characterize any frequency distribution in many ways. Two key ones are central tendency and variation or dispersion. Central tendency refers to the mean or average achievement, the balancing point for the distribution of achievement scores,

and variation refers to the extent of dispersion from this balancing point by the entire range of scores. These two notions, then, tell you about the 'center' of the distribution and the spread around that center.

For our case study, we can characterize each teacher's class by the mean and variance of the students in that class. We then have a matrix of teacher quality categories joined separately with categories of means and variances. The achievement scores are likely to have many categories, so we can think of a category of teacher quality as having a distribution of mean scores or a distribution of variance scores for each category. In this case, the teachers in each category of quality are different so there is no artificial dependency in the data. Each teacher has a quality designation and a student achievement mean or variance.

We'll put aside the variance variable of student achievement for the time-being (although too many people never come back to it and fail to recognize the importance of spread of performance in a classroom). The mean is a good representative of the distribution of scores in a classroom, and we can think of it as the 'score' for the classroom achievement. We alter the question slightly to say, 'What is the relationship between teacher quality (as we have operationally defined it) and classroom achievement (as we have operationally defined it).'

Perhaps you can already see that it's difficult to answer important questions in education. The context is complex and so many factors are involved in any consideration of an enquiry. Statistical manipulations assume independence of factors but educational variables are all inherently related due to the complexly organized system of effects and influences in education. We have to be especially careful using quantitative analyses to be aware of their strengths and weaknesses.

Qualitative analyses do not escape the consequences of complexly organized problems. Sometimes their imprecision masks the problems they tackle. We need to exploit many different kinds of methodologies and approaches, as well as get different perspectives on the interpretation of results, in order to tease out what understanding of these domains that we can. Education is about learning, but learning about education is not transparent or easily accomplished.

Once we've assembled our data in two columns of variable data, we can calculate the *Correlation Coefficient*. See the Elementary Statistics material again if you need review. The correlation provides the 'answer' to Question 1, with all the conditions that it has taken to arrive at this stage and all the inadequacies that we may connect to our approach. If the correlation is high, then our recommendations might stress the need to improve teacher quality and the ways that Decide might go about that, given the ancillary information that you have picked up in your studies of teacher quality. If the correlation is low, then you might stress the need to look for new variables and perhaps suggest some that seem appropriate to the Decide context, based on your review of the research literature and your knowledge of the Decide system. Question 5 is shaped by the answers to all the other questions. If rural location appears related to teacher quality, and teacher quality appears important to student achievement, then features of rurality also enter the formulation of recommendations.

Exercise 9: Paper on Teacher Quality and Student Achievement

In this exercise you need to write the five-page report that will serve as your Task Force submission to the conference. You've assembled a great deal of information on your journey to investigate this set of questions, so now you have to condense what you've learned into items for wider presentation. You want to communicate your understanding to those that would read your report.

There are various ways to present your findings and some researchers are very creative in their approaches to communicate. There are research standards that are normally followed that help to guide a write and ensure that sufficient information is presented to fully represent the study and the findings. The following list may help you formulate your paper:

- Title (The title sets the tone for the study and alerts those who might be interested in this topic just what your paper is about).
- Introduction and statement of the problem (Why are you investigating this problem and what exactly were your intents?).
- Review of literature (What information did you bring to the analysis from other sources?).
- Proposed methods (How did you go about your study?).
- Results or findings (What did you learn that you can share?).

- Limitations or delimitations (How would you attenuate your result statements so that others don't misunderstand the value of your findings?).
- Recommendations (How would you apply your findings in the context of Decide?).

In five pages you can't expect to provide a reader with everything that you learned, and you may have to decide on things to include and things to exclude to provide the clearest presentation to the reader. For example, under proposed methods, you would not expound on the notion of correlation. It's a well-known technique and there are many sources where it's strengths and weaknesses are explicitly studied. You want to tell the 'story' of teacher quality and student achievement for the country of Decide as best you can in the short space and time available. Writing requires practice so your skill at communicating will be related to the number of times you try. So give it a try!

Exercise 10: Presentation on Teacher Quality and Student Achievement

Your paper summarizes the Task Force findings and presents the facts that your Task Force has decided are important to communicate the results. This will serve as the basis for your presentation. You've already done the work of identifying the important information that you wish to communicate.

You will receive or have received separate training on MSTM PowerPoint software. When you come back to this exercise, you'll use those skills and that program to develop your presentation.

As a rule of thumb (general principle that holds in most cases), each slide that you prepare entails approximately two minutes of conversation to explain your point of presenting the slide. So for a 20-minute presentation, you'd want approximately 10 slides. It might be more if there's little dialogue associated with some (for example, background information) or it might be fewer if there's extensive discussion associated with some particular aspects of the findings. But 10 give you a rough idea of a beginning.

Since you have a five-page paper and you want 10 slides from the paper, you might consider two slides for every page in the paper as a starting point. In the presentation, however, you'll probably want to emphasize the latter information, the findings and the recommendations. Of course, this emphasis may also appear in the brief paper so the two slides for each page algorithm might still hold for the initial development of the presentation.

In PowerPoint, there is a provision to attach text to each slide, called Notes. In this section, your Task Force members can now relate what should be said about the slide in the

presentation. These notes would not appear in the presentation but they help you organize your thoughts and check that items are covered in the presentation.

The slides are either 'printed' on to overhead transparencies or are retained in a computer for projection directly from the computer during the presentation. If the latter approach is possible, then many more possibilities arise in creating effects for your presentation.

Each Task Force will present their studies. Although each Task Force is from the 'same' country, it will be interesting to observe the differences in perspective that arise from the 'same' study.

We can look separately at the notion of 'truth' in research at a later stage. For the moment, we're interesting in building the deepest understanding of the problem area that is possible with few forays into the complexities of philosophical concerns. Have you learned more about teacher quality and student achievement as a result of your Task Force probes? The amount you learned will be related to the amount that you worked on this problem. Sounds like education?!

Information for Case Study 1

Argumentation

Stakeholders

Frequency Distributions

Elementary Statistics

Other Information Available

Sample Assumptions List

Sample Stakeholder Designations for List

Sample Verifiability Designations for List

Teacher Quality Information

 Studies of Teacher Quality in Decide

 Student/Teacher Ratios

 Classroom Observations

 Teacher Use of Continuous Assessment

 Years of Experience

 Gender

 Certification

 In-service Training Attendance

 Teacher Attendance at School

 Headmaster Ratings

 Inspection Reports

 Grades Attained in Teacher Training

 Years of Education

 Age

Student Achievement Information

 Number of Students

 Test Information

 International Test Information

 Pre-Post Test Information from Project

 National Examination Results for Primary School

 Number of School Days

 Student Absenteeism

 Student Drop-Out

 Per Cent of Graduates

 Classroom Mastery of Instructional Objectives

 National Assessment Information for Grade 6

Contextual Census Information

Enrollment Data
Drop-Out Data
Absenteeism
Number of Inspections Per Year Per School
Size of Schools
Student/Teacher Ratios
Curriculum Requirements
Examination Coverage
Examination Results
Facilities Quality (School and Furniture)
Instructional Materials Availability
Nutrition Data
Headmaster Preparation (Years of Experience,
Qualification, Supervisor Ratings)
Male-Female Attendance
Attendance Per Population Census
Resource Distribution Per District and Per School
Advisory Teacher Availability
Percentage Passing Primary School Examinations
Percentage Accepted to Junior Secondary School
Average Distance Walk to School
Role of Teacher Assistants
Operation of the Parent-Teachers Associations
School Governance Information
School Manager Qualifications (Years of Experience,
Training, Education Level)
Financial Support Secured from Community
Total School Budget from Government
Teacher Salaries
Administrative Salaries
Retirement Data
Teacher Departure Data
Number of Teacher Training Graduates Per Year
Number of Degree Graduates Per Year

Number of Advanced Degree Graduates Per Year
Foreign versus Local University Trained
Number of Volunteer Teachers in the System
Teacher Housing Availability
Bursaries for Primary School Attendance