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X

**THE STRENGTHENING OF EMIS
IN NWFP:**

**A FINAL REPORT FOR
THE PED PROGRAM**

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The Strengthening of EMIS in NWFP: A Final Report for the PED Program

by

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I. INTRODUCTION

o Definition of EMIS

An Education Management Information System (EMIS) is a data collection, storage, retrieval, processing, and dissemination system specifically designed for use by decision makers and administrators to plan and administer education systems more efficiently and effectively. The objective of an EMIS is to support effective monitoring of the attainment of stated education goals and objectives and to facilitate the efficient direction of resources to achieve them. Examples of basic education data generated by an EMIS include participation rates, promotion, repetition, and dropout rates, student-teacher ratios, the condition of school buildings as well as the breakdown of these data by gender, locality, and socio-economic status. Without these data, it is difficult to manage, plan, analyze, or make decisions to improve education systems.

o The Evolution of EMIS in NWFP prior to the PED Program

Prior to the establishment of the USAID funded PED Program in NWFP and Balochistan in mid-1990, there were *two* distinct, parallel Education Management Information Systems operating in NWFP. There was a manual EMIS at the Statistical Office of the Directorate of Education (Schools). The statistical officer collected and tabulated data from all schools manually and there was another "computerized" EMIS located at Project MUST (the Management Unit for Study and Training). Neither EMIS was very efficient or effective. The major disadvantage of the manual system at the Directorate of Education (Schools) was hand tabulation. Data were aggregated at the subdivisional and district levels which often resulted in misreporting of data. Frequently, there were large errors in the tabulated data, resulting in suspect numbers which made them almost useless for educational planning purposes.

The "computerized" EMIS at MUST included two technologically outdated IBM 5280 electronic data processing machines (precursors to the modern personal computer with only 64K memory). Project

MUST had the disadvantage of being a semi-autonomous organization with no official authority to collect data from schools; they could only *request* schools to provide them with data but not *require* them to do so. Therefore, there had always been large discrepancies between the data produced by Project MUST and the data produced by the Directorate of Education (Schools).

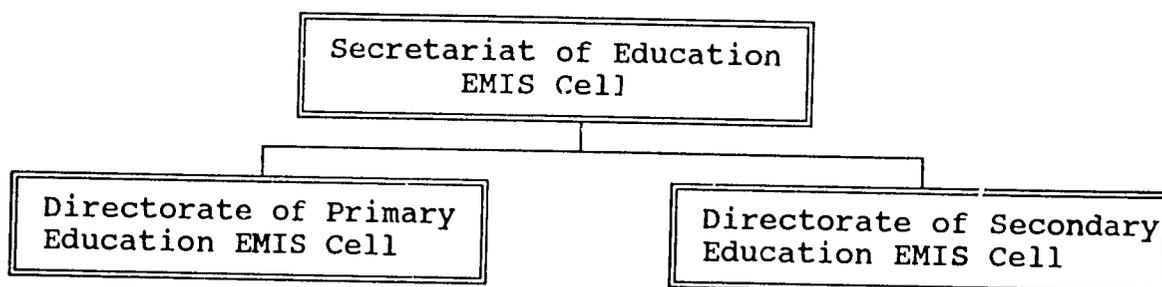
In January 1990, I was invited by USAID to analyze the flow of school census data in NWFP as part of the development of the USAID funded Primary Education Development (PED) Program. At that time, I concluded that valid data were properly maintained at the school level but unreliably transferred to the provincial level due to problems primarily attributable to (1) manual aggregation of the data at the subdivisional and district levels of the Directorate of Education (Schools); as well as (2) the fact that not all schools were represented in the annual school census due to misreporting from one year to the next.

In an effort to improve the quality of school census data, those involved in the development of the PED Program agreed that school level data needed to be collected and input into a computerized district-based Education Management Information System which was fully integrated into the Education Department. This would eliminate any unreliability associated with (1) manual aggregation of data as in the case of the Directorate of Education (Schools); or (2) any imbalance between data reporting authority and accountability as in the case of Project MUST. In this way, valid and reliable school census data would be available from one source as a tool for strengthening the institutional capacity of NWFP educational administrators and decision makers in formulating and implementing policies which would improve access, equity, and quality of primary education in NWFP.

o The Strengthening of EMIS under the PED Program

The PC-1 approved by ECNEC for the establishment of the Primary Education Development (PED) Program financed by a grant from USAID provided for a *single* province-wide EMIS in NWFP.

Diagram 1. Relationship of EMIS Cells in NWFP at Provincial Level.



The bifurcation of the Directorate of Education (Schools) in January, 1991, into the Directorate of Primary Education and the Directorate of Secondary Education, resulted in the need to develop an EMIS which had three components, as illustrated in Diagram 1.

According to the approved PC-1 entitled '*ESTABLISHMENT OF EDUCATIONAL MANAGEMENT INFORMATION SYSTEM IN NORTH WEST FRONTIER PROVINCE*,' dated December, 1990, one component of the current EMIS became operational at the Directorate of Primary Education and the other was proposed for operation at the Directorate of Secondary Education. In addition, the approved PC-1 envisioned that the EMIS-related positions at MUST would be absorbed into an EMIS Cell at the Secretariat. This was decided because MUST was a project (as opposed to a program) with a specific purpose and a limited duration. That is, once its goals were accomplished, it was supposed to cease to function. Nevertheless, MUST had sanctioned posts which could be transferred to the Secretariat. This strategy was supposed to create a *single* EMIS with three cell at the provincial level.

According to the PC-1 mentioned above and as visually illustrated in Diagram 1, the EMIS for NWFP is divided into three cells. Both the Directorate of Primary Education and the Directorate of Secondary Education are supposed to collect and process data from the schools which are under their jurisdiction and provide that data to the EMIS Cell at the Secretariat of Education for decision making purposes to improve education in NWFP. This new, single EMIS replaced the two competing EMISs which had existed prior to the bifurcation of the Directorate of Education (Schools).

The PED Program invited me to start working on the development of a computerized district-based EMIS for NWFP in September, 1990. Obstacles which no one had foreseen at that time made the successful achievement of this undertaking unexpectedly difficult. Nevertheless, we did succeed in fulfilling our principle objectives: (1) putting the technical components of the system in place; and (2) making the EMIS operational at both the provincial and district levels.

However, as is the case in many other countries in which EMIS is just beginning to take shape, the most serious limitation to the future sustainability of EMIS in NWFP is a general lack of understanding among educational administrators and decision makers of how data generated from a computerized district-based EMIS may contribute to the improvement of primary education in NWFP. Until now, attention has focused primarily on how to develop the EMIS structure. That is, how to collect valid and reliable data through the school census (and financial and personnel information systems), how to set up computers at the provincial and district levels, how to train people in the use of computers, etc. Attention must now focus on how EMIS data may be utilized by

educational administrators, planners, researchers, and decision makers to improve educational quality and efficiency in the schools and in the classrooms where the real process of education occurs. The next step in the development of EMIS in NWFP must be concerned primarily with the link between *having* better data about the education system and *using* these data more effectively to inform educational practice at the school and classroom level.

One of the biggest contributions of the development of EMIS in NWFP is that it has revealed certain traits about the education system which had heretofore remained undetected. It has revealed an organizational structure which may be characterized as a "loosely coupled system" -- a system with little or no communication among units (both horizontal and vertical), poor supervision at all levels, slow or absent coordination between units, failure to implement rules, and frequent and unpunished violations of rules.

The development of EMIS in NWFP has also demonstrated that there are several factors which are beyond the control of the Directorate of Primary Education and which are also having a significant influence on the development of primary education. Specifically, development of the financial management information system has revealed that the Finance Department has total financial control over the development of primary education. Since the Finance Department controls when funds are dispersed for both the developmental and recurrent budgets, it also has authority over which decisions to improve the primary education system are implemented. For example, the Finance Department has the habit of dispersing funds for such items as jute tats only at the very end of the fiscal year. Since these funds are supposed to be dispersed throughout the year, this practice makes it virtually impossible for district or subdivision education officers to spend the money targeted for primary education in any responsible way.

The EMIS has also revealed an imbalance between authority and accountability at the district level. For example, although DEOs are held accountable for the transfer of teachers and the selection of sites for new schools according to certain objective criteria, investigations related to the development of EMIS have revealed that Members of the Provincial Assembly (MPAs) have total unofficial authority over the transfer of personnel and the selection of new school sites. If a DEO refuses to rescind a transfer order of a teacher who has political connections with an MPA or approve the selection of school sites given to him or her by an MPA, the DEO can expect to be transferred to a "far flung" school. Factors such as these will need to be acknowledged and taken into account if the PED Program goals of increasing access, equity and quality of primary education are to be achieved.

II. PHASES OF STRENGTHENING OF EMIS IN NWFP

My participation in trying to strengthen EMIS in NWFP can be divided into four phases which correspond to each primary education school census carried out since the creation of the PED Program.

PHASE 1: PRIMARY EDUCATION SCHOOL CENSUS 1990-91

o Arrival in Islamabad

I originally arrived in Pakistan to begin work on the development of EMIS in NWFP on Monday, September 24, 1990, for an initial nine-month period. On that same day, Ernesto Cuadra, Jorge Valdes and I met Wade Robinson and Bill Darnell to discuss our position that the primary focus of EMIS should be on the development of the school census database which would contain school level data. On the following day, all five of us, along with David Sprague and Sarah Tirmazi, met with Warren Mellor at USAID where he outlined his efforts to develop NEMIS. His first step had been to summon representatives from the four provinces and federal areas to develop a national proforma. Unfortunately, no one from the Directorate of Primary Education NWFP had been included in these meetings. Warren Mellor provided me with a copy of his questionnaire which I brought back to NWFP and used to include data elements for the provincial NWFP primary school census questionnaire.

o Arrival in Peshawar

On September 26, 1990, Ernesto Cuadra and I arrived in Peshawar. The Directorate of Primary Education NWFP consisted of only two full-time personnel at that time: (1) the acting Director of Primary Education, Mr. Shah Jahan Khan; and (2) the acting Deputy Director of Research, Development & Evaluation (RD&E) at the EMIS Cell, Mr. Mohammad Rafique Khattak who was on loan to us from Project MUST -- neither had been officially named to their posts nor had they access to any of the funds (\$16 million) provided by USAID for the development of primary education through the PED Program for the 1990-91 fiscal year. In addition, the PC-1 for the establishment of the provincial level EMIS Cell at the Directorate of Primary Education had not yet been approved. The workplan which I had developed prior to my arrival was no longer valid since it was based on the assumption that funds from the Directorate of Primary Education NWFP would be available. With these factors in mind, I readjusted my workplan.

o Development of Revised EMIS Workplan

I used the development of a revised workplan as a platform for discussing the role which Mr. Khattak and I would be expected to play in the development of EMIS as well as what could be realistically accomplished by only two people within a nine month period. Expectations were tempered and alternative courses of action considered for developing the multi-faceted components of a comprehensive EMIS. More specifically, our major objective for the nine month period was the development of the school census database which was to include data on students, teachers, facilities and materials. However, an EMIS must encompass much more than a school census and various participants in the debate concerning how EMIS should be developed aired their concerns for the development of additional databases for monitoring financial expenditures, personnel, and planning & development schemes. All of these activities are normally included in a comprehensive EMIS, but given the limitations on funding, manpower, and time, alternative solutions would have to be considered.

The following are issues which had remained unresolved at this time:

- * Equitable distribution of EMIS resources across both male and female streams.
- * Unfilled posts at the EMIS cell in the Directorate of Primary Education.
- * Collection of examination and budget data.
- * Establishment of EMIS cells in the Secretariat and Directorate of Secondary Education.
- * Establishment of a Computer Lab at the Directorate of Primary Education.
- * Identification of sources of data and a plan for collecting data from schools operating under other authorities (e.g., private schools).
- * Financial resources to support EMIS activities.

o Development of the 1990-91 Primary School Census Proforma

Mr. Rafique Khattak's and my first major task in strengthening EMIS was the development of the 1990-91 primary education school census proforma. Although Ernesto Cuadra had recommended that we adapt as many of the elements of the national proforma as possible, he had also worked on the development of the Balochistan proforma and was trying to make them as similar as possible for the two

provinces. We took advantage of the interviews which Mr. Khattak and I had conducted during our study of information flow in the spring throughout NWFP to determine what information was available for collection at the school level. We also worked closely with Fida Hussain who was in charge of monitoring the planning & development schemes for primary education. Ernesto, Rafique & I continued developing the proforma until Ernesto's departure on October 2, 1990.

Following Ernesto's departure, Khattak and I held meetings with the Chief Planning Officer of the Secretariat of Education in order to discuss the inclusion of any data elements which he thought he needed. Based on these meetings, we made several changes to the proforma. When all parties concerned were satisfied that the questionnaire contained all the data elements they required, we had the questionnaire translated into Urdu and brought it to the field for a pilot test in two districts in NWFP: Peshawar and Kohat.

o Pilot Testing the 1990-91 Primary Education School Census Proforma

Before its final approval, the proforma was pilot tested in the districts of Kohat and Peshawar. Six Learning Coordinators (three male and three female) working with the head teachers and headmasters of six schools (3 male, 3 female) in Kohat and Peshawar were asked to fill out the proforma at the school site. Out of the three schools, one was an urban secondary school and the remaining two were rural primary and middle schools located not too far from the vicinity of the district capital for ease of accessibility.

Khattak and I visited the Kohat District Education Office (Male) on November 3, 1990, and the Peshawar District Education Office (Male) on November 4, 1990 to discuss our strategy for pilot testing the proforma with the Learning Coordinators. The schools were chosen at random. The Learning Coordinators had three days to go to the schools and fill out the proformas, working in conjunction with head teachers and headmasters.

The Learning Coordinators were asked to meet us again on November 6, 1990, in Kohat, and on November 8, 1990, in Peshawar. They exchanged their views with us on the proforma including (1) the quality of the questions on the proforma (e.g., whether the questions could be answered based on the data available in the school registers); and (2) the level of difficulty encountered by the Learning Coordinators and the head teachers and headmasters in filling out the proformas.

One of the major problems which cropped up during the pilot testing of the proforma was the status of the Learning Coordinators who were working under the World Bank PEP II Project. To our

surprise, the Learning Coordinators under PEP II were not answerable to either the SDEOs or DEOs. Furthermore, they were not accountable to anyone at the Directorate of Primary Education. They were only responsible to the PEP II Project Director who was working out of Peshawar and who, in turn, was not accountable to anyone at the Directorate of Primary Education. That is, Learning Coordinators whose job was to provide support to head teachers of primary schools were not accountable to anyone in the primary education sector. This unexpected organizational problem ultimately resulted in our having to abandon the idea of using Learning Coordinators to collect data from for the 1990-91 primary education school census.

In terms of the actual results of the pilot test, the headmasters of secondary schools had refused to cooperate. This was due to the fact that, although they have primary classes, headmasters were also not accountable to the Directorate of Primary Education.

In terms of those schools which did cooperate with the pilot test, Learning Coordinators said that the age-grade matrix was very tedious and difficult to fill out. The ages of the students had to be calculated from the admission-withdrawal register, but it was a tedious task and took a long time. In addition, they said that the actual ages of the students were unknown and only a "guesstimate" made by the head teacher at the time of admission. That is, there were no birth certificates from which the head teacher could determine students' ages. In addition, in order for the head teacher to fill out the age-grade matrix, he or she had to look in the admission-withdrawal register for the date of birth which had been entered, and then arithmetically calculate the student's current age. According to the Learning Coordinators, it could take one day (a half hour to search for 10 students) to find out the age of one class in a small school. Also the Learning Coordinators felt that because this was the most tedious part of the questionnaire, one could expect problems. They suggested that some teachers would not use the admission-withdrawal register, but that they would only guess the distribution of students' ages by class.

o Database Structure Development & Counterpart Training

Two major objectives for strengthening EMIS were (1) the development of a school census database structure; and (2) the training of the acting Deputy Director of RD&E in all aspects of database management. To accomplish these objectives, I took the final version of the primary school census questionnaire and used it to create the database structure while at the same time developing training materials for the acting Deputy Director of EMIS. As I created tables and forms, I recorded what I was doing and translated this into instructions which Khattak followed to create his own version of the database structure. In this way, he

learned about various aspects of database design and development and was able to simultaneously test these newly developed training materials for the future training of EMIS staff at both the provincial and district levels.

o Printing of 1990-91 Primary Education School Census Questionnaire

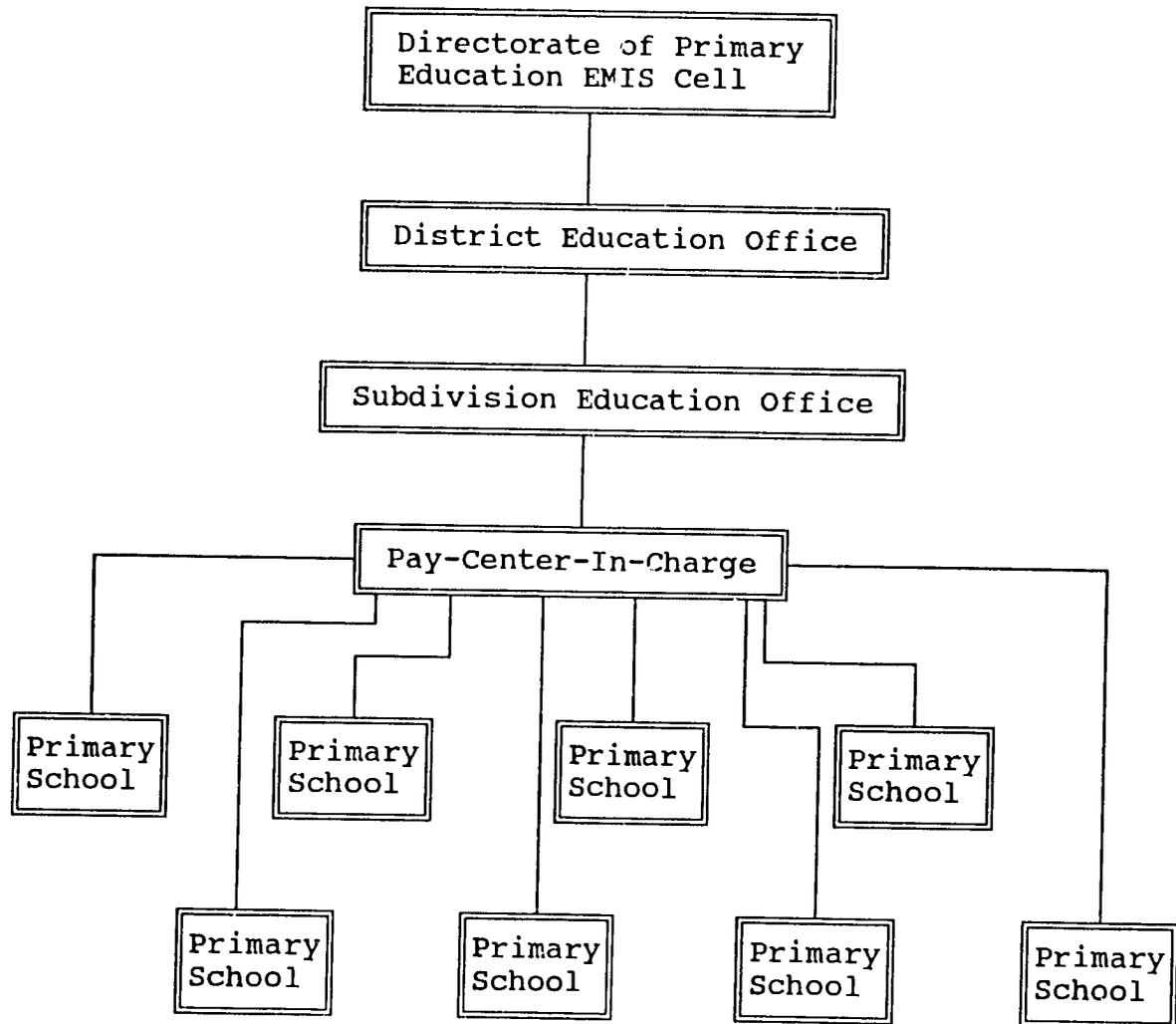
During the entire Pre-Gulf War phase of EMIS strengthening, the Directorate of Primary Education NWFP had not been able to access any of the funds which had been made available to it by USAID through the PED Program. This caused a great deal of frustration in trying to accomplish our EMIS activities. For instance, lack of access to funds was a major obstacle to printing the primary school census questionnaire. However, thanks to Khattak's ingenuity, he was able to secure the printing of the primary school census questionnaire and find a way to have it printed in less than two weeks without any funds. By the first week of December, we had all the questionnaires we needed printed which put us in a position to distribute them throughout the province ahead of schedule.

o Strategy for 1990-91 Data Collection

Based on the development and pilot testing of the 1990-91 proforma, we were able to finalize our strategy for data collection. Khattak and I visited all six divisional headquarters in NWFP in December, 1990, and distributed enough questionnaires for over 17,000 schools. We requested the presence of all district and subdivision education officers in each division for a one-day training effort in how to distribute, fill out, and collect the questionnaires from all government schools offering primary education. We negotiated with them the amount of time they required for the retrieval of the questionnaires. With leadership support from the acting Director of Primary Education, Mr. Shah Jahan Khan, we felt confident that we would be able to collect the questionnaires within a reasonable time frame.

The DEOs and SDEOs were instructed to distribute and retrieve the questionnaires through the data collection infrastructure which had already existed under the former Directorate of Education (Schools). Diagram 2 shows the different administrative levels through which the questionnaires were distributed to the primary school head teachers. The questionnaires were distributed to all DEOs who were responsible for distributing them to all the SDEOs who, in turn, were responsible for distributing them to the Pay-Centers-In-Charge (PCICs).

Diagram 2. Data Collection Infrastructure in NWFP.



The DEOs and the SDEOs were instructed to explain the procedures for filling out the 1990-91 primary education school census questionnaires to the Pay-Centers-In-Charge (PCICs) who would then explain them to the head teachers when they came to pick up their pay. The questionnaires also contained explanations for filling out the more difficult matrices (such as the age-grade matrix).

Once the head teachers had filled out the questionnaires and returned them back to the Pay-Centers-In-Charge (PCICs), the SDEOs were instructed to check the accuracy of the data entered into the questionnaires and return them to the DEOs. The DEOs were also instructed to ensure that the SDEOs had properly checked the questionnaires by double checking the accuracy of the

questionnaires themselves before forwarding them to the EMIS Cell at the Directorate of Primary Education NWFP. The signature of the DEO or the SDEO was included on the first page of the questionnaire as a way of certifying the accuracy of the data contained in the questionnaires.

Once all the questionnaires were returned to the EMIS Cell of the Directorate of Primary Education, we were going to have them entered into a computerized EMIS database. Data entry operators were going to be hired, computers were going to be rented, and a data entry program developed to enter the 1990-91 school census data.

o The Gulf War

Prior to the Gulf War, the Directorate of Primary Education hadn't really come into its own and the number of government people working on EMIS was limited to one person: Mr. Mohammad Rafique Khattak. Khattak and I had put together a general plan on how we were going to collect school census data from all the schools and enter it into a computer database. Although we had discussed the fact that we needed to develop a financial system and a personnel system, it was very clear that the 1990-91 primary education school census was to be the first cornerstone of the new EMIS. The results of the pilot test of the 1990-91 questionnaire suggested to us that this complex questionnaire which had been developed through end-user negotiation could in fact be used to collect school census data. That is, the data existed at the school level and, according to the Learning Coordinators in the pilot test, the head teachers were capable of filling out the questionnaire. However, it was also true that, due to the ambiguous relationship between the Directorate of Primary Education and the Learning Coordinators under the World Bank PEP II Project, we could not use the Learning Coordinators to collect the data and would have to rely on the Pay-Centers-In-Charge as described above.

On January 12, 1991, we were informed that the U.S. Ambassador to Pakistan had ordered the departure of all Americans from Pakistan who were working on any projects or programs funded by USAID. Within less than three days we found ourselves in Washington, DC, working out of office space provided by the Academy for Educational Development.

During the Gulf War period, the following three general areas of activity for EMIS were pursued in Washington:

- * Development of computer applications for the school census;
- * Development of training materials specific to the use of computers for educational planning and decision making; and

- * Development of data presentation formats to facilitate data utilization for decision making.

In Pakistan, Khattak continued working on getting the questionnaires for the 1990-91 primary education school census back from the field. However, once he got the questionnaires, there was nothing that he could do about entering the data into a database since the computers which had been purchased by USAID had not yet arrived from the States and, without any technical or financial support, Khattak was not experienced enough to find an alternative means for entering the data.

o Post-Gulf War

By the time the Gulf War was over, the situation at the Directorate of Primary Education had changed drastically. The PC-1 for the establishment of the provincial EMIS has finally been approved. At the same time, the posts for Deputy Director of Research, Development & Evaluation (RD&E) and Assistant Director of the EMIS Cell had been filled by Mr. Mohammad Fayyaz and Mr. Qazi Jalil respectively. Now there were three counterparts for me to work with at the provincial EMIS Cell: Fayyaz, Khattak, and Qazi.

The new Deputy Director, Mr. Mohammad Fayyaz, had 9 years of experience with programming in cobalt on mainframes. He had also done programming on an IBM 5280 (a precursor to the modern computer which had a total of 64K memory) which had been used for data processing at MUST. He had been one of the principal architects of MUST. My first impression of him was very positive. He demonstrated that he had the kind of logic required to do the type of work which was involved in EMIS and gave me the impression that he wasn't afraid to learn new things.

Mr. Qazi Jalil was the new Assistant Director of the EMIS Cell. He came from the World Bank PEP II Project. He was a bit older than Fayyaz and didn't seem to possess same kind of aptitude for computers or much of a working knowledge of computers, although he knew a little. I thought it was possible to provide him with the knowledge he needed. He seemed willing learn to how to use computers.

By June, 1991, the EMIS cell was located in its own building with 6 computers which had been purchased by the Director of Primary Education (DPE). Below is the configuration of distribution of those computers.

LOCATION	COMPUTER (SOURCE)
EMIS Cell, RD&E Section	
Deputy Director's Office (Fayyaz & Khattak)	2 386 NEC (DPE)
* Assistant Director's Office (Jalil)	1 386 NEC (DPE)

* Computer Lab

3 286 NEC (DPE)

o 1990-91 School Census Data Entry Strategy

Since no one had been trained in the use of computers and the computers ordered by USAID would not arrive before the end of summer, 1991, we decided that data entry of the 17,000 primary school census questionnaires collected for the 1990-91 school year should be contracted out. A tender was floated for this purpose and AEPAM (the Academy for Education Planning and Management in Islamabad) won the bid. AEPAM had proposed to have around the clock data input with 3 work groups on 9 machines. This meant that the data could be input within 6 to 8 weeks. That is, by September -- just before the beginning of the 1991-92 school census activity. The 1990-91 questionnaires were packed and shipped to AEPAM in Islamabad where work began on data entry.

o Problems Encountered with Data Entry at AEPAM

Based on observations of data entry at AEPAM, we came to the conclusion that AEPAM would not be able to fulfill its promise to have the 1990-91 data entered by September, 1991. Indeed, we calculated that they would not finish data entry before we received the next batch of questionnaires from the 1991-92 primary education school census. There were three observations which supported this viewpoint:

1. PROGRAMMING: It took data entry operators 10 minutes to enter one questionnaire.
2. MOTIVATION: Data entry operators were not working "around the clock" as promised. Being fulltime government servants, they also had no incentive to enter questionnaires quickly.
3. SUPERVISION: AEPAM could not ensure adequate supervision to enhance the level of data entry. In fact, data entry operators took many breaks during the one shift per day that they were working (i.e., regular government hours).

Based on these observations, it did not seem possible to us that AEPAM could finish data entry within the timeframe they had originally proposed. Since we had wanted to have the data ready by mid-September at the very latest and it appeared that AEPAM would not be able to finish data entry for at least four more months, we recommended that the Directorate of Primary Education terminate the contract for data entry with AEPAM and that the EMIS Cell of the Directorate take over the task of data entry by hiring the required data entry operators privately on a short term basis to input the questionnaires at a rate of 4 rupees per questionnaire. Under the supervision of the Fayyaz, Khattak, and Qazi, and with the help of

the newly arrived computers provided by USAID which had just been installed at the EMIS Cell, we estimated that we could accomplish the data entry job before the next batch of questionnaires for the 1991-92 school census arrived from the field.

It was an important decision to re-enter the 1990-91 primary school census data since we felt that we would never really be able to have much confidence in the AEPAM data. Every time we tried to clean a part of it, we would find massive disparities between the rows of data which had been entered into the database and what was actually recorded on the questionnaires. Rather than always worrying about the extent to which we could trust the data, we decided to input it again. The job of re-entry was finished by mid-November -- just in time for the entry of the 1991-92 primary school census questionnaires.

o Cleaning the 1990-1991 Primary School Census Data

We finished entering the 1990-91 primary school census data in November, 1991. We began cleaning these data but it turned out to be a slow and grinding process. Analysis of the 1990-91 data set suggested that the data had serious flaws in terms of both reliability and validity. For example, a comparison of four questions which requested head teachers of primary schools to fill out student data by age, mother tongue, distance from school, and enrollment (number of repeaters and promoted in the same class) showed a difference of 26% between the number of students tallied by age and enrollment (see Table 1 below). It appeared that the data had not been checked for reliability or validity either when the data were collected from the schools by the SDEOs or DEOs.

Table 1. Distribution of primary school students in the North West Frontier Province (NWFP) of Pakistan according to 4 different questions on the 1990 school census.

QUESTION	TOTAL	DIFFERENCE
Students by Age:	1,323,081	0.00%
Students by Mother Tongue:	1,085,420	17.96%
Students by Distance:	1,167,035	11.79%
Students by Enrollment:	975,251	26.29%

We hypothesized that two major factors were adversely affecting the reliability and validity of data:

- (1) the lack of any mechanism for ensuring that DEOs and SDEOs instructed Pay-Centers-In-Charge and head teachers of primary schools in how to fill out the questionnaires; and
- (2) the lack of any systematic procedures or incentives for ensuring that DEOs and SDEOs checked the reliability and validity of the data before forwarding them to the provincial level for processing.

Our analysis of the 1990-91 school census database suggested that the data were not as clean as we presumed they would be. There were many irregularities in the data. For example, we discovered that there were 214 male students listed as age 3 in class 5! This was one of many unreasonable responses which we had discovered throughout the database and on the questionnaires to our great dismay. Although we conducted limit checks in December, 1991 (i.e., making sure that the data fell within the given the ranges of the categories), we had not expected to find such problems within the distribution of the data. Based on the unforeseen magnitude of the unreasonable responses we had found, we had to undertake an intensive cleaning effort using logical checks before the data could be distributed to policy makers.

o The Need to Improve the Data Collection and Processing Procedures

There were three ways we needed to improve the reliability and validity of the data which were being collected and processed at the EMIS Cell in NWFP. The first was to develop a way of ensuring that instructions for filling out the questionnaires got beyond the SDEOs to the Pay-Centers-In-Charge and the head teachers. The second involved developing systematic procedures and incentives at the field level for checking the reliability and validity of all the data collected from the schools. The third involved developing systematic procedures at the central level for rechecking the reliability and validity of the data provided by the districts for input into the school census database.

In order to improve data reliability and validity, it was essential that the data collection and processing components of the EMIS be systematically operationalized from the field level to the central level. Specific job responsibilities and specific deadlines for collecting and processing EMIS data needed to be institutionalized.

o Development of Systematic Procedures and Incentives at the Field Level for Checking the Reliability and Validity of the Data Collected from Schools for the EMIS

As mentioned previously, the final questionnaire used for the 1990-91 school census was initially developed from interviews conducted in 1990 with educational administrators and head teachers

from across the province and based on the types of data maintained in registers at the school level. However, based on the analysis of the 1990-91 data, it appeared that measurement error was playing a large part as exemplified by the variation observed in the four questions concerning the number of students by age, mother tongue, distance and enrollment. Therefore, there were three problems which needed to be addressed:

- (1) Did the DEOs and SDEOs train the head teachers in how to fill out the questionnaire as they had been instructed?
- (2) Did the head teachers understand how to fill out the questionnaires?
- (3) Were the data in the school registers actually valid?

Those personnel who were involved in the data collection process needed to be made aware of the importance of filling out the questionnaires appropriately. They needed to be made aware of the importance attached to the accuracy of the data provided in the questionnaires for decision making. Our observation was that the DEOs and the SDEOs had not carried out the tasks demanded of them. That is, when the school census questionnaires were distributed to them, they were asked to explain to the Pay-Centers-In-Charge (PCICs) the proper method for filling out the questionnaires. In turn, the PCICs were then responsible for explaining it to the head teachers. However, this chain of events probably did not occur.

Since the results of the 1990-91 school census were seriously flawed, we decided that a stratified random sample of the schools needed to be undertaken by consultants external to the education system. That is, a team of researchers needed to be hired from outside the Directorate of Primary Education to collect the same data from a stratified sample of schools which reflected the situation in the schools on the same date on which the school census data had been collected. Data from the 1990-91 school census would have to be compared to data from the random sample for validity and reliability.

PHASE 2: PRIMARY EDUCATION SCHOOL CENSUS 1991-92

The main thrust of the second year of strengthening EMIS was specifically in the area of training. Training in all aspects of EMIS took place among provincial level counterparts as well as among pilot district staff. We had hoped that once the three pilot districts (Charsadda, D.I.Khan, and Mansehra) had been provided with training, we would be able to move forward quickly to train Deputy District Education Officers (DDEOs) and EMIS clerks from the remaining districts. However, this was not to be the case since the second tranche of computers provided by USAID were not available for installation in all the districts until Phase 3. We expanded to only one additional district during Phase 2: Bannu. Therefore, by the end of Phase 2, we had established district EMIS cells in four male and four female district education offices.

The first tranche of computers purchased by USAID for the PED Program in NWFP arrived from the States and were installed in the Computer Lab of the EMIS Cell in September, 1991. This was a critical achievement which allowed the Directorate of Primary Education to develop a fully functioning EMIS Cell at the provincial level. The following is the distribution of USAID computer hardware which took place during Phase 2 in 1991-92.

<i>LOCATION</i>	<i>COMPUTER (SOURCE)</i>
Research, Development & Evaluation (RD&E) Section	
* Deputy Director's Office	1 LAPTOP (USAID)
* Computer Lab	1 386 EPSON (USAID)
* Computer Lab	6 286 EPSON (USAID)
Pilot Districts	
* Charsadda (Female)	1 286 EPSON (USAID)
* Charsadda (Male)	1 286 EPSON (USAID)
* D.I.Khan (Female)	1 286 EPSON (USAID)
* D.I.Khan (Male)	1 286 EPSON (USAID)
* Mansehra (Female)	1 286 EPSON (USAID)
* Mansehra (Male)	1 286 EPSON (USAID)
* Bannu (Male)	1 286 EPSON (USAID)
* Bannu (Female)	1 286 EPSON (USAID)
Directorate of Primary Education Main Building	
* PED Program Office Assistant	1 286 EPSON (USAID)
Secretariat of Education	
* NEMIS Technical Advisor	1 386 EPSON (USAID)

Below is a summary of the activities undertaken during Phase 2 strengthen the EMIS in NWFP.

o Provincial Level Counterpart Training

Fayyaz, Khàttak, and Qazi were trained in the following areas:

- * General computer literacy.
- * Relational database design, development and use.
- * Principles and elements of decentralized EMIS design and development.
- * How to deal with threats to the quality of data.

Daily individualized hands-on training of provincial level counterparts started in June, 1991. Fayyaz, Khattak, and Qazi were given specific tasks to perform. Through the performance of those tasks, the above knowledge and skills were transferred. Fayyaz was given the responsibility for developing of a personnel information system. Khattak was given the responsibility for developing a private schools information system. Qazi Jalil was given the responsibility for developing a financial information system.

In addition, both Fayyaz and Khattak received further hands-on training in the use of computer software by supervising data entry at AEPAM for the 1990-91 primary school census questionnaires. When data were being entered from the 1990-91 NWFP primary school census questionnaire at AEPAM, Fayyaz and Khattak alternated spending a week at AEPAM to oversee the quality of data entry. Fayyaz and Khattak learned to check the quality of data entry by exporting the school codes from the questionnaires being entered by the AEPAM data entry operators out of R:BASE and into Lotus. Then, they generated random numbers to select a 10% random sample of all questionnaires entered into the database, and compared the data on the questionnaires with the rows of data which had been entered into the database. Finally, they wrote reports in Word Perfect summarizing the results of their work (i.e, the results of their quality check). In this way, they were able to gain a lot of practical experience and knowledge by interfacing with three different kinds of software (e.g., database management, spreadsheet modeling, and word processing) which served them in their future work in EMIS.

The 1991-92 "update" questionnaire was also developed by Fayyaz, Khattak, and Qazi. (Note that the original 1990-91 questionnaire was used again as the "baseline" questionnaire for all new schools in 1991-92.) Basically, Fayyaz, Khattak, and Qazi reviewed the different sections of the 1990-91 baseline questionnaire and determined which sections would need to be updated for the schools already included in the 1990-91 database (e.g., number of students by class).

o Pilot District Training

For a period of three weeks in November, the three pilot

districts (Charsadda, D.I.Khan, and Mansehra) sent their DDEOs and EMIS Clerks to the EMIS Cell at the Directorate of Primary Education to receive computer training. They were introduced to the computer (hardware & software), EMIS concepts, the need for ensuring the integrity of the 1991-92 primary school census data, and the data entry procedure for the 1991-92 primary school census questionnaires.

Armed with this knowledge, the trainees returned to their districts. Computers and peripheral equipment were immediately installed in six District Education Offices with the assistance of EGS. Two EMIS field operators hired from the private sector (who had also assisted in the training) went to each pilot district to make sure that the data entry procedure was operational.

Overall, we were very satisfied with the results of the pilot district training. The biggest problem we faced was that the DDEOs and clerks had other responsibilities which drew them away from their data entry tasks. In order to overcome this obstacle, we asked Shah Jahan Khan, the Director of Primary Education, to mandate that those clerks working in EMIS should be freed from any other responsibilities. We also asked him to prevent those people who had been trained from being transferred for at least two years.

Once the 1991-92 school census was operational in the pilot districts, the EMIS Field Operators continued providing the pilot districts with bi-weekly support. The DDEOs also had the option of calling the provincial EMIS Cell if any problems occurred. In those cases, they were provided with immediate support from the EMIS Field Operators. Likewise, our EGS representative provided the pilot districts with immediate technical support when the pilot districts reported any hardware problems.

o Development of the Financial Management Information System

Due to unanticipated workloads in other areas (e.g, the 1990-91 and 1991-92 primary school censuses), FMIS development was starting to take a back seat to other activities. As of mid-November, 1991, Qazi Jalil had developed a computerized version of the manual FMIS system in R:BASE 3.1 as outline by the consultant Dennis Martin who had worked on the development of FMIS in Quetta. The FMIS prototype was ready for testing by the end of November, 1991. At that time, the offices of P&D and Accounts were shown how to use the database program for data entry and output. Once that activity was accomplished, we were in a position to declare that we had successfully translated the current manual accounting system as outlined by Dennis Martin into a computerized system.

However, questions had been raised whether the system outlined by Dennis Martin was comprehensive enough to meet the needs of the end users and further questions had been raised concerning the

manual accounting practices themselves for keeping track of all expenditures from all funding sources for primary education. Therefore, we decided that a computer programmer with knowledge of financial systems would need to be hired to do the following:

- (1) Write a report documenting the system;
- (2) Make recommendations on how the system could be changed within governmental parameters; and finally
- (3) Implement those recommendations at the provincial and district levels.

We anticipated that such a person could accomplish the first two tasks within 2-4 weeks. The implementation period was dependent on the consultant's recommendations, but we estimated that implementation could take 1-2 months at the provincial level. We decided that this task would be a good test of Mr. Shahid Mir's consulting group's ability to perform work in EMIS according to a conversation we held with him in October. If this worked successfully, then we could consider using Integrated Systems Research for many other tasks related to EMIS and thus, make an alliance between the public and private sector.

o Data cleaning procedures for the 1991-1992 school census

Based on the problems we had encountered with the 1990-91 school census database, we revised and finalized the data cleaning procedures for the 1991-92 database. Personnel were instructed to carry out specific steps to verify the accuracy of the data including sequential, limit, and logical checking and validation. All questionnaires were checked for accuracy prior to data entry. All data entered in the database were checked with both limit and logical checks for every variable. In addition, we developed a strategy for randomly checking the accuracy of data entry.

As in the case of the 1990-91 school census, we experienced many problems with the 1990-91 school census because we had not discovered the anomalies in the 1990-91 database until we had already distributed the questionnaires through the same mechanism as the previous year. In addition, in February, 1992 there were still questionnaires from the subdivisions of D.I.Khan, Tank and Kulachi which we had not received. It appeared that DEOs and SDEOs were not taking seriously the submission of questionnaires within the agreed target dates. Signatures on the front of questionnaires attesting to the accuracy of data inside questionnaires were only a formality. Questionnaires and the information contained therein were not checked by the senders (DEOs and SDEOs). Codes that were on the computer-generated list of schools from the 1990-91 school census were not written on the returned 1991-92 questionnaires. In some proformas, different schools had duplicate school code. Some codes were not 12 digits long. No one person at the field level was given the responsibility for ensuring the accuracy or

reliability of the filled in questionnaires. Many update questionnaires were received but were not on the computer list. Questionnaires were incomplete. There were 41 questions, but sometimes only 20 or 30 were filled in. When we cross-checked enrollment, one answer showed 10 students, another showed 7 for the same class in different parts of the questionnaire (e.g., age, language, distance, enrollment).

We modified the questionnaire checking procedure for the 1991-92 school census questionnaire in order to ensure the accuracy of the data collected from the field. Specifically, we hired and trained a person from the private sector to check the questionnaires. He employed systematic procedures for checking the accuracy of the data on the questionnaires. For example, he had to make sure that all the descriptive variables (e.g., school gender) had entries and that if any were missing, he had to give the code 9 or 99 (depending on the length of the coded response). In this way, we would be able to distinguish between missing values from the questionnaires and data entry errors. In addition, he also checked to make sure that corresponding tables had the same number of rows. That is, if there were data in the table for male students by age, then the data in the tables for male students by distance from school, mother tongue, and enrollment (repeaters and promoted) had to correspond exactly. The same rule was applied to teacher and classroom data. Based on the implementation of this procedure, we were able to increase the reliability of the data coming from the field. Any questionnaires which had missing answers were sent back to the field.

In addition to the questionnaire checking procedure, we also began to employ more strict data entry procedures. That is, we developed cleaning procedures and hired a system analyst to be in charge of the data entry operation. He had the task of checking the accuracy of the data being entered on a daily basis. We developed several routine applications which he ran on a daily basis. Specifically, he backed up the data from the data entry machines daily. He took the data and put it into one database. He deleted duplicate entries and null values and then tallied the data to determine the response range. Certain variables have a particular response range. For example, district numbers were between 1 and 18. If there was a response of 19, then the system analyst investigated the error and corrected it.

The system analyst also tallied all continuous variables to determine whether the responses seemed reasonable. Very high responses were checked against the original questionnaires to verify that they were accurate. For example, if he tallied the number of students in class 2 and found that there was an entry of 3,000 students, he checked the original questionnaire to verify that this entry was not a data entry mistake.

The system analyst also ran a "Group-by-Select" command in

R:BASE which is a very powerful way of looking at the data in a matrix. For example, this command shows the distribution of students in the age-grade matrix and allowed the system analyst to pinpoint strange occurrences, such as 3 year old students in class 5. Finally, the system analyst randomly checked 10% of the questionnaires entered by each data entry operator to gauge the level of quality of data entry. This last procedure instilled in the data entry operators the need to enter accurate data. In the end, the system analyst was able to report that there were no errors detected during random checking.

o Review of the Status of EMIS in NWFP: Tom Cassidy's Visit to NWFP in October, 1991

Tom Cassidy's visit to NWFP was very important in terms of assessing where we were and where we wanted to go with EMIS in NWFP. Based on the fact that he had drafted our initial workplan in 1990 and that he already had several years of experience in developing EMIS in other countries (most recently in Egypt), he was in a good position to give us realistic advice on the direction we should pursue. One of the most important things that my counterparts and I learned from his visit was that we did not have the capacity to undertake all the activities we would have liked and that we did not have all the available resources required (e.g., highly trained manpower, unlimited financial resources and time) at our disposal to develop a comprehensive EMIS in a short period of time. We came to the sobering realization that development, implementation, and institutionalization of all the desired system components (e.g., annual school census, financial system, personnel system, etc.) within a 15 to 20 month period was unrealistic given our constraints.

At the end of his visit, Tom Cassidy said that if we wanted to create a sustainable EMIS, we would need to focus on developing a self-sustaining capacity within the EMIS Cell to (1) conduct the annual school census; (2) use, maintain, and update the financial system; and (3) manage and expand future EMIS developmental activities.

In addition, Tom Cassidy pointed out that we needed to compromise on our notions of what specific components should entail. In this regard, he made the following recommendations:

- * Building a sustainable capacity to conduct a sound, even if limited, school census was more important and expanding existing proformas and collecting data at additional points in time.
- * An early demonstration of effective data presentation was more important than insisting on broad-based end-user involvement in output design and a strategy of iterative development.

- * It was more sensible to provide district-based EMIS staff with a set of very well defined "problem-solution templates" (i.e., sets of standardized query routines, fixed report structures, and menu-driven front ends) than to expect that they could master all the skills required to conceive and develop these on their own. "Problem-solution templates" could be designed and developed efficiently centrally. EMIS field staff could then be trained to use this in a fairly short period of highly focused training.

- o Development of EMIS Objectives to Accomplish by 1994

Based on Tom Cassidy's visit, my counterparts and I discussed which EMIS objectives we thought we could realistically attempt to accomplish by June, 1994.

EMIS OBJECTIVES

- * Institutionalize orderly procedures and processes for all aspects of EMIS at the EMIS Cell in order to foster a structured working environment.
- * Develop a limited but sustainable and fully functional EMIS at both the provincial and district levels by concentrating limited institutional resources in the following areas:
 - the capacity to conduct a sound (i.e., valid and reliable) annual school census;
 - build an internal capacity to manage future EMIS developments.
- * Develop and disseminate both routine and ad hoc output reports based on the primary education school census database for education decision makers and administrators.
- * Establish fully functioning EMIS cells in all primary education District Education Offices (both male and female).
- * Institutionalize a very strong field support capacity for the primary education district EMIS cells.
- * Develop step-by-step self-guiding training materials which focus on the immediate database development and management needs of primary education district level EMIS staff. These training materials would be used as part of the on-going in-service computer training program at the RD&E EMIS Cell and then as reference documents in the district EMIS Cells for district level EMIS staff to maintain their operations.
- * Provide initial and on-going in-service computer training to all primary education district level EMIS staff in database

development and management techniques.

- * Sanction and fill all required posts for the institutionalization of a professional, well-organized and comprehensive EMIS at both the provincial and district levels.
- * Establish EMIS cells in the following offices:
 - Secretariat of Education
 - Directorate of Secondary Education
 - All male and female District Education Offices
- * Develop "front-ends" for use in all EMIS cells for the following categories:
 - o School census
 - o Financial Management Information System (FMIS)
 - o Personnel Management Information System (PMIS)
- * Institutionalize the provision of highly structured, on-going training for district level staff in the following categories:
 - o School census
 - o Financial Management Information System (FMIS)
 - o Personnel Management Information System (PMIS)
- * Assist the NEMIS Technical Advisor for NWFP in the establishment of provincial level EMIS cells in the Secretariat of Education and the Directorate of Secondary Education. (We provided a 386 computer and peripheral equipment -- including a laser printer -- to the NEMIS Project Advisor when he arrived to work at the Secretariat.)

PHASE 3: PRIMARY EDUCATION SCHOOL CENSUS 1992-93

Since 1990, I had been involved in trying to collect primary education data in NWFP as the Technical Advisor for the PED Program who was responsible for developing an Education Management Information System (EMIS) for all of NWFP. When I first arrived in January, 1990, I had travelled across the entire province to determine what information was available at the school level and how that information flowed from the school to the Secretariat of Education. In the two and a half years that had passed since then until this point, the PED Program had faced three major obstacles at the Directorate of Primary Education in trying to collect timely and reliable data on primary education for decision making purposes.

o Problems Faced

1. Inability to collect primary education data from all schools

We were unable to collect data on primary education from all schools in NWFP which had primary sections. These schools included provincial government middle, high, and higher secondary schools. They also included private schools.

2. Inability to collect reliable data

The data we collected from primary schools were unreliable because the questions were too complex for head teachers of primary education institutions to comprehend. Although the data were available at the school level, the head teachers of primary schools were unable to transfer those data from the format of the school registers to the format of the data collection instrument (that is, the school census questionnaire). This was due primarily to the level of education of primary school head teachers and a lack of training of head teachers in how to fill out the questionnaires properly.

3. Inability to collect data in a timely fashion

It had been our experience at the EMIS Cell of the Directorate of Primary Education NWFP that it could take as long as several months for the school census questionnaires to come back to the main directorate from the schools. This was true for two reasons. First, the schools in the hilly areas closed down as early as November because of snow and did not open again for months. In particular, schools in far flung areas were inaccessible during the winter months. Second, administrators at the district and subdivisional level were unaware of the importance of collecting valid and reliable data quickly for decision making purposes at the

provincial level.

In order to provide education decision makers and administrators at the provincial level in NWFP with more accurate data on primary education in a more timely fashion, we proposed the following steps for collecting school census data during the 1992-1993 school year:

o Proposed Solutions

1. Distribute a one-page questionnaire to collect primary education data in September

A one-page questionnaire requesting very basic data on primary education was proposed to be sent out to all government schools for collection during the month of September, 1992. In the case of the Directorate of Primary Education, these data were to be collected through the Learning Coordinators who would visit the schools and help the head teachers fill out the questionnaires properly.

In the case of the Directorate of Secondary Education, the questionnaires were distributed and collected by the District Education Officers to the heads of those institutions which were under the direct control of the Directorate of Secondary Education.

Since the questionnaire was only one page long, it could easily be filled out in a day and returned to the EMIS Cell of the Directorate of Primary Education by the 1st of October. Data processing (that is, entering the data into a computer database and then creating reports based on that data) could be accomplished within three months. That meant that basic data on primary education in NWFP were available to education decision makers and administrators as soon as the 1st of December, 1992. Since the questions were simple, the data had a much higher level of reliability than ever before.

2. Provide training in data collection to DEOs, SDEOs, and Learning Coordinators so that more reliable data can be collected for the more complex NEMIS questionnaire

The one-page questionnaire provided not only timely and reliable data for making informed decisions quickly for NWFP decision makers and administrators, it was also useful for collecting very detailed data on all aspects of education in NWFP using the NEMIS questionnaire. In this way, NWFP could provide the federal government with the information they request on the official data collection date (31st October).

However, the NEMIS questionnaire was very complex -- more

complex than the questionnaires we had used in the PED Program to collect data during the first two years -- and it ended up requiring several months to collect and process due to the problems cited above which we had faced in collecting and processing data from complex questionnaires.

Therefore, it was necessary to provide administrators at all levels of the bureaucracy with the training necessary to collect and process reliable data. We recommended that NEMIS provide training sessions to all DEOs, SDEOs and Learning Coordinators in the proper methods for filling out the NEMIS questionnaire. In addition, we proposed that procedures be developed through which Learning Coordinators would be responsible for collecting the data and SDEOs and then DEOs would be responsible for checking the accuracy of the data. This was important because very soon computers would be provided for all district education offices in the province and they would become responsible for collecting and processing all data collected from their schools and reported to the provincial government.

3. Computerize all District Education Offices for Primary Education and all Divisional Education Offices for Secondary Education

One of the major objectives of the PED Program was to computerize all relevant offices for the collection and processing of educational data. That is, to develop a functioning Education Management Information System (EMIS) which would provide data to education decision makers and administrators so that they could make informed decisions about how to improve education in NWFP.

In the case of primary education, this meant providing computers to the male and female District Education Offices. In the case of secondary education, this meant computerizing the Divisional Education Offices and establishing an EMIS Cell at the Directorate of Secondary Education with computers.

Finally, in order to coordinate the entire effort, an EMIS Cell at the Education Secretariat had to be established to provide answers to specific queries by the Secretary of Education. The entering of data would fall into the hands of the District and Divisional EMIS Cells which would provide data to the provincial EMIS Cells of each Directorate. Finally, these data would be given by the two Directorate EMIS Cells to the Secretariat EMIS Cell for the purpose of providing information directly to the Secretary of Education on all aspects and levels of education in the province.

USAID was going to provide NWFP with computers in the Spring of 1993. By properly coordinating our efforts, it was possible to provide the necessary training to district offices so that they could enter data from the NEMIS questionnaire. This data could

then have been sent to the federal government.

o **Outstanding Issues**

There were a few outstanding issues which I had hoped to resolve during Phase 3.

1. **Collect data from private schools**

A mechanism needed to be developed through which we could collect education data from private schools. There was an unknown number of private schools in NWFP which provided education to primary age students. If we didn't collect data from private schools, we would never know exactly how many students were being given a primary education. As a result, the participation rate of the primary age cohort would remain incorrectly low.

2. **Adapt the NEMIS questionnaire to NWFP**

It was necessary to analyze the NEMIS questionnaire in detail to determine whether it was realistically possible to collect the data requested on that questionnaire in NWFP. The rationale for the collection of all items needed to be clearly stated. Whether the data requested actually existed at the school level also needed to be determined. Finally, the responsibility for collecting NEMIS data needed to be clearly delineated.

o **Steps Needed to Collect and Process the 1992-93 Primary Education School Census**

The following is an outline of the procedures which were followed for collecting and processing the 1992-1993 School Census questionnaire.

1. **Secure Leadership Support**

A. **Secretary of Education**

A meeting was held on 10 August 1992 with the Additional Secretary of Education to finalize the proposed procedure for collecting data on a one-page questionnaire as well as to resolve some outstanding issues, such as the collection of data from private schools and whether to use the NEMIS questionnaire (or a variation of that questionnaire) to collect detailed data which reflects the status of education as of 31 October.

B. **Director of Secondary Education**

A meeting was held on 08 August 1992 with the Director of Secondary Education who pledged his support to help us collect

primary education data from the schools under his jurisdiction. He offered to send a letter to the heads of all schools asking them to cooperate in the data collection effort. We offered our services to help them collect and process their data as well as to help them to computerize their offices.

C. Director of Primary Education

The Director of Primary Education agreed to have data collected using the one page format and to allow us to collect data during the month of September.

2. Consensus on Format of the Data Collection Instrument

At the meeting with the Additional Secretary of Education on 10 August 1992, the final format for collection of the one-page data collection instrument was finalized. The NEMIS data collection instrument was also discussed.

3. Translate and photocopy the One-Page Questionnaire

The data collection instrument was translated into Urdu and then photocopied by 13 August 1992 for distribution to all districts starting next week.

4. Train all LC's in Data Collection Procedure

On 15 August 1992, Fayyaz, Khattak and Qazi started visiting all DEO offices throughout the province to provide training, distribute questionnaires and collect data from Learning Coordinators concerning the number and names of schools under each LC's jurisdiction. Learning Coordinators were asked to provide a list of all the schools under their jurisdiction which was brought back to the EMIS Cell for processing. This information was compared to the number of schools in the 1991-1992 database.

Learning Coordinators were then given two copies of the 1992-1993 school census questionnaire for each school under their jurisdiction. They filled out both copies and keep one for themselves. If there was another school census (e.g., NEMIS), then they were to use the information on the questionnaire when filling out the NEMIS questionnaire to ensure consistency in reported data.

Learning Coordinators were given one month to collect data from their schools. They were told to collect data which reflects 07 September 1992. They were instructed to sit with the head teachers of the schools to fill out the questionnaires in the appropriate format.

PHASE 4: PRIMARY EDUCATION SCHOOL CENSUS 1993-94

The 1993-94 primary school census is 90% complete as of December 12, 1993. By the beginning of January, a hard copy of the database will be on the Chief Planning Officer's desk in time for him to use that information to meet the needs of the annual planning cycle. This is the second year in a row that PED has been able to provide valid and reliable data in a timely fashion to decision makers.

Stand alone district-based EMIS Cells are fully operational in the following locations:

- * 30 District Education Offices (male and female) in 15 districts under the Directorate of Primary Education.
- * 6 Divisional Education Offices under the Directorate of Secondary Education.
- * 1 attached to the Chief Planning Office of the Secretariat of Education.
- * 1 attached to the Statistical Office of the Directorate of Secondary Education.

A Local Area Network (LAN) is currently being installed in the EMIS Cell of the Research Development & Evaluation (RD&E) Wing of the Directorate of Primary Education. This LAN will serve various research, analytic, and evaluation tasks.

All district EMIS Cell staff have been trained to enter, maintain, and output data in a computer database for:

- * school census management
- * financial management
- * personnel management

Personnel have been offered hands-on training in all aspects of database management for these areas. In addition, they have received training in spreadsheet modelling and word processing.

All provincial EMIS Cell staff from the Directorate of Primary Education, Secondary Education, and the Secretariat have been offered hands-on training in all aspects of data management, analysis and presentation for policy making.

The following activities will also be carried out during Phase 4 of the strengthening of EMIS in NWFP.

ACTIVITY 1: DEVELOP DISTRICT AND DIVISIONAL EDUCATION OFFICE EMIS CELLS THROUGH THE INTRODUCTION OF SCHOOL CENSUS MANAGEMENT (EMIS).

Six weeks of "hands-on" training are being offered over a three month period in all district and divisional EMIS Cells. The first two weeks of training began in April, 1993, and the last two weeks will be achieved by June, 1994. During the first two week period, district EMIS clerks received training in computer hardware and software, school census questionnaire checking procedures, and they learned how to enter the school census questionnaires into a computerized data entry form. During the second two week period, clerks are receiving training in data cleaning, how to create the school census database structure and data entry forms. They are expected to replicate the school census database structure and to develop their own database structure based on the Monthly Staff Statement. During the third two week period, they will learn how to output data to a file and the printer. They will learn how to create reports in R:BASE by replicating standardized report formats and then creating their own report formats for the database structure based on the Monthly Staff statement. In addition, clerks will receive training in Lotus 123 and Word Perfect.

ACTIVITY 2: INTRODUCTION OF FINANCIAL MANAGEMENT INFORMATION SYSTEM (FMIS).

This activity is being accomplished at both the provincial and district levels. At the provincial level, financial data is currently being managed at both the Management & Administration (M&A) Section and the Planning & Development (P&D) Section of the Directorate of Primary Education. Computer programs have been developed by financial management consultants specifically to meet the data requirements of these sections.

Directly related to the FMIS is a system to track donor resources. All resources spent on primary education by all donors can now be monitored and related to expenditures.

The financial data used by the provincial level A&M Section has been adapted to the districts. In addition, the data requirements of each district and their related subdivision offices have also be studied and modifications made to the computer programs to meet the data needs of the districts. The two FMIS field operators have been fully trained by a financial management information system consultant and they are implementing the FMIS in all the districts. They spend a total period of one month in each district. They began in the four pilot districts starting in December, 1992 and are expected to finish all the districts by March, 1994.

ACTIVITY 3: INTRODUCTION OF PERSONNEL MANAGEMENT INFORMATION SYSTEM (PMIS).

The requirements of a personnel management information system have been assessed and a computer program which reflects the needs of provincial level administrators has been developed. The provincial level PMIS is being implemented this week. It will be adapted to the district level in a pattern similar to the development of the FMIS. Implementation will begin within the next few months and terminate by June, 1994.

ACTIVITY 4: INTRODUCTION OF DISTRICT EDUCATION OFFICERS TO THE CONCEPT OF USING DATA TO IMPROVE THE EDUCATION SYSTEM

District Education Officers have participated in workshops on the use of data for making decisions to effect changes in the education system. DEOs have been engaged in discussions on the development and use of education system indicators to measure the attainment of specified targets, such as increasing participation and promotion, and decreasing repetition and dropouts.

ACTIVITY 5: IMPROVING THE QUALITY OF DATA COLLECTED FROM SCHOOLS.

One of the biggest problems that the strengthening of EMIS has faced since Phase 1 has been to ensure the validity and reliability of school census data collected from schools offering primary education. We have had a lot of variation in the quality of data we have received from different subdivisions and are just beginning to understand the reasons why this has occurred. This has serious implications for the use of data in decision making. In order to overcome this problem, we focused on measuring the quality of data available at the school level. An in-depth report on this activity is forthcoming.

ACTIVITY 6: DEVELOP TEACHER TRAINING MONITORING SYSTEM AT THE CURRICULUM BUREAU.

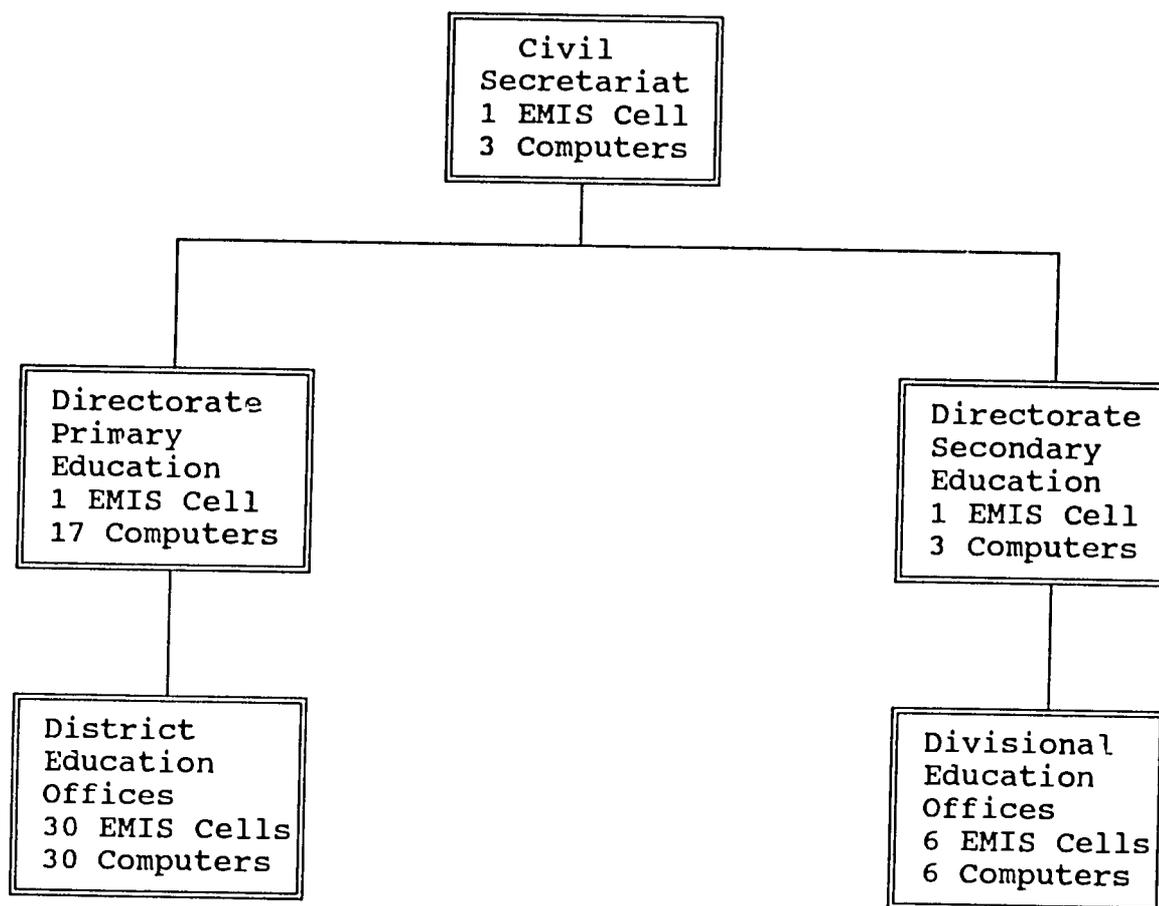
An information system which tracks the training of primary teachers (both pre-service and in-service) has been established at the Curriculum Bureau in Abbottabad in order to keep track of the teacher supply coming into the Directorate of Primary Education. The data needs of the Curriculum Bureau were assessed and an information system developed accordingly.

III. CONCLUSION

o Current Status of EMIS in NWFP

The organizational chart in Diagram 3 below illustrates the current configuration of EMIS Cells where computers have been installed in NWFP. This configuration promotes data-based decision making at the level of the secretariat, directorate, division, and district. Data relevant to each level of the hierarchy is available to the appropriate officers to make decisions relevant to their jurisdictions. Data are collected and processed for individual schools by the District EMIS Cells for primary education and the Divisional EMIS Cells for secondary education. Those data are forwarded on computer diskettes to the Directorate of Primary and Secondary Education where the data are compiled for each directorate. Finally, the data for each directorate are forwarded on diskette to the Secretariat of Education where it can be compiled with data collected and compiled from the tertiary education level.

Diagram 3. Organizational Chart of EMIS Cells in NWFP.



A considerable amount of attention and resources have been devoted to the development and implementation of the EMIS in NWFP as a way of providing decision makers, planners, and administrators with more accurate, relevant, and timely data. To accomplish this objective, EMIS technical assistance has focused on how to develop the EMIS. That is, how to collect accurate, reliable, and valid data through the school census, how to train people in the use of computers, how to make the EMIS operational at the field level, etc.

A well-equipped computer lab has also been established at the Research, Development, and Evaluation (RD&E) Section of the Directorate of Primary Education. Twelve computers and peripheral equipment have been installed. The lab is under the direct responsibility of the Deputy Director of RD&E. In addition to the Assistant Director of EMIS and four permanent Data Entry Operators, additional staff have been hired from the private sector to manage the data processing operation. A Systems Analyst and a Programmer manage the daily operation under the supervision of the Deputy Director of RD&E. They have overseen the processing of data for the four school censuses as well as various research undertakings, including the Human Resource Survey, achievement data from the Northwest Educational Assessment Programme, data from the Book Survey, among others. It should be noted that this alliance with the private sector has permitted the government to take advantage of the skills of highly trained technical manpower who would not normally be available in the public sector. In addition to the System Analyst and the Programmer, several short term data entry operators are hired during high data entry periods, such as the annual school census.

School census data have been collected for the past three years and a fourth school census for the 1993-94 school year is virtually complete. At the Directorate of Primary Education, data have been collected and are being entered into computers simultaneously at the provincial and district levels under the direction of the Deputy Director of Research, Development & Evaluation. These data will be output to support data utilization for the Chief Planning Officer at the Secretariat of Education by the beginning of January which corresponds to the planning cycle. At the Directorate of Secondary Education, data are being collected under the direction of the NEMIS Technical Advisor who is also training directorate and divisional staff in data collection and processing. Data from private schools throughout NWFP are also being collected from all the districts.

A Financial Management Information System (FMIS) and Personnel Management Information System (PMIS) have been developed by Pakistani consultants hired from the private sector. Both the FMIS and the PMIS will be fully operational at both the Directorate of Primary Education and District EMIS Cells by June, 1994. In addition, a Teacher Training Monitoring System has also been

developed by Pakistani consultants hired from the private sector and implemented at the Curriculum Bureau which is responsible for teacher training. Data from the Teacher Training Monitoring System will be converged with the FMIS, the PMIS, and the School Census databases to give a full picture of the status of education in NWFP by June, 1994. Finally, a Facilities Inventory System (which will include all primary school buildings, their condition, and a maintenance and repair schedule) will be developed by June, 1994. The FMIS, PMIS, and Facilities Inventory System could easily be adapted for use at the Directorate of Secondary Education.

Training of District Education Officers and District EMIS Clerks from throughout the province in data utilization has been completed. District Education Officers participated in a workshop on the use of EMIS data for making decisions to effect changes in the education system at the district level. Clerks were trained in how to input, process, and output the data necessary for decision making at the district level. The objective of these training sessions was to engage District Education Officers in substantive discussions about educational issues in order to help them frame and operationalize interventions intended to improve equity, access, and quality of primary education by using EMIS-based data which have been collected from all government schools offering primary education in NWFP since the 1990-91 school year. In order to achieve sustainability through data utilization, EMIS training in data utilization responded to the need for District Education Officers to access EMIS data on the current condition of primary education in their districts in NWFP. This same type of training should be provided to education officers at the level of the Secretariat and the Directorate of Secondary Education as well as Members of the Provincial Assembly (MPAs).

o Future Development and Needs of EMIS in NWFP

In the future, technical assistance must focus on how EMIS information can be used to improve educational quality and efficiency in the schools and in the classrooms where the real process of education occurs. This focus on data utilization must be concerned primarily with the link between having better data about the education system and using these data effectively to inform educational practice. To accomplish this objective, a full-time foreign technical assistant should be placed for a period of 3 years at the level of the Secretariat as the counterpart of the Chief Planning Officer. This technical advisor should be responsible for coordinating the retrieval of data from the Directorates of Primary and Secondary Education. Although this technical advisor will need to ensure that the data collection and processing systems currently in place continue to function smoothly, his/her main responsibility should be to analyze the data for all levels of education for the entire province and train decision makers in the use of these data for to improve the

education system. The decision makers to be trained should include officers in the Education Department, Finance Department, and Planning & Development Department, as well as the Minister of Education and Members of the Provincial Assembly who play a critical role in deciding the distribution of education-related resources.

Since the Directorate of Education (Schools) was bifurcated into the Directorate of Primary Education and the Directorate of Secondary Education, virtually all TA from the PED Program has focused its energy on the development of EMIS under primary education. NEMIS TA was supposed to develop EMIS capacity at the secondary and secretariat level but, for many complicated reasons, was unable to fully succeed in its endeavor. Currently, EMIS is fully operational under the Directorate of Primary Education. At the Secretariat and the Directorate of Secondary Education, the hardware, software, and supplies are in place but the personnel have not been trained to perform the necessary functions related to EMIS. However, as mentioned above, the EMIS component of the PED Program has been using the services of several Pakistani consultants from the private sector who are technically competent but for various reasons are not interested in pursuing a career in the government. Under the supervision of the technical advisor, these same personnel should be redeployed to train personnel at the Secretariat and the Directorate of Secondary Education in order to ensure the proper operationalization of EMIS at those level.

The EMIS in NWFP is sustainable at the Directorate of Primary Education because there are competent personnel. However, both the Deputy Director and the Assistant Director will be eligible for promotion soon and it is unclear whether they will remain in their current positions much longer. Since the government has not yet sanctioned all the positions which are required to maintain and expand EMIS development activities and there is no clear indication that they will, the alliance between the public and private sector which has been so successful over the last three years should be expanded. That is, Integrated Systems Research has successfully provided the PED Program with highly qualified technical manpower to develop several databases for the education system. In addition, they have been awarded a contract in the Punjab to develop and implement the EMIS for the province. For NWFP, they should be awarded a contract to run the technical side of EMIS and have a liaison with an officer from the Education Department. In this way, we would ensure the future development of EMIS in NWFP by securing a permanent alliance between the public and private sector.

In terms of technical work, there are still some activities which need to be undertaken in order for the EMIS to be completely comprehensive. The following recommendations are related to the activities which should be undertaken in the near future.

- * Develop query and output facilities in R:BASE in easily understood formats to address identified needs of education decision makers and administrators.
- * Develop and demonstrate a broad range of examples of computer-based EMIS use for senior level decision makers.
- * Develop additional applications to facilitate the collection and integration of other categories of data required for development of a comprehensive EMIS, including but not limited to the following general data categories:
 - achievement data
 - buildings data
 - manpower data