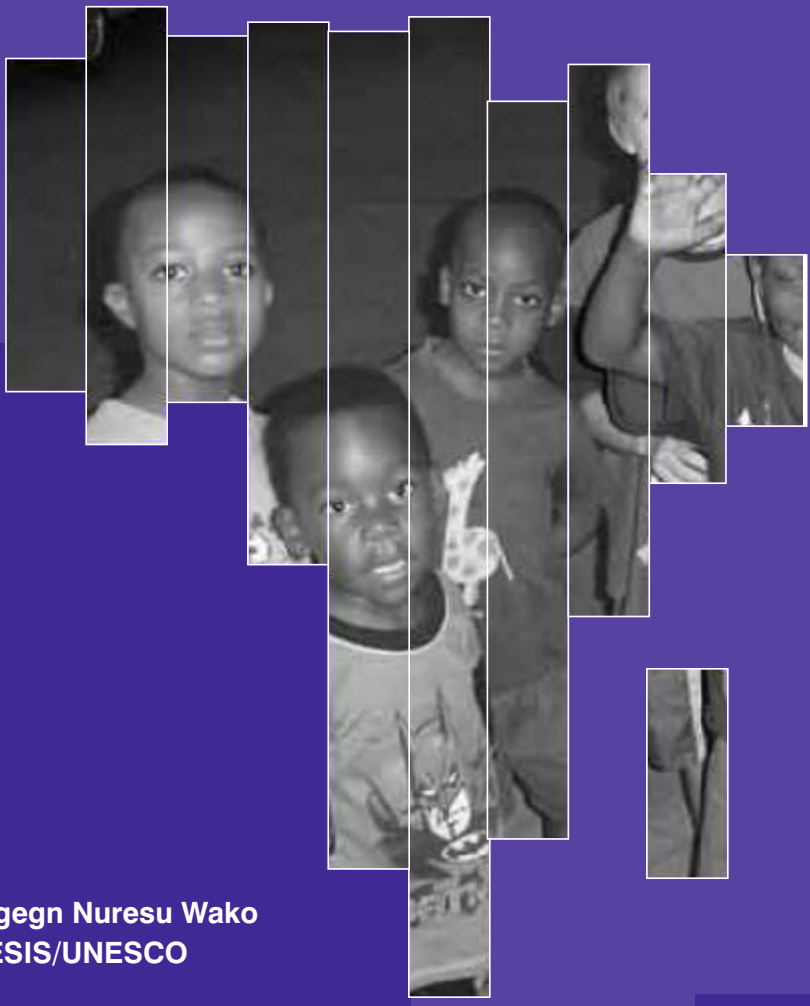
Education Management Information Systems (EMIS)

An overview



By
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NESIS/UNESCO

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Harare, Zimbabwe

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Preamble

The Vision of Education Management Information System (EMIS)

The long-range vision of EMIS is to establish a demand-responsive and self-sustainable education management information system (EMIS) that is:

- based on integration of decentralized and distributed sub-systems
- guided by partnership of stakeholders at both federal and state levels
- supported by technically competent bodies

I shall explain this vision, illustrated by a concrete example.

EMIS

Increasing numbers of countries have adopted the concept of Education Management Information System and the title of EMIS. However, many have already failed. Simply adopting a new name, obtaining funds for computers, making study visits and having project cars will not create a new system.

EMIS is a concept imported from the business world. It is an acronym for a System for processing Information for Management of Education. It is not purely statistics-based, nor does it replace the use of statistics. EMIS requires all sorts of data, including statistics, which need to be credible, verifiable, authoritative, and professionally certified by an authority whose independent, professional integrity is accepted by all. Before you can apply it to management or other purposes, you have to get the statistics right. Processing garbage will not convert it to information. It is still garbage. Successful uses of EMIS have seriously addressed both the statistics and their use for management.

It is **demand-responsive**, which means that it serve the needs of the consumers or the users of information. The role of statistics should be viewed along the whole chain of information management, starting from the consumers' demand for information to the delivery of information products

and services. On their own, data collection and processing tasks have no meaning. Unless the whole system is functionally integrated, EMIS has no *raison d'être* and will quickly become irrelevant.

To serve one's clients, one should conduct periodic surveys of the information needs of consumers and the capacity needs of producers, and produce the according user-friendly and interpretable information products and services. One should also promote the use of information for decision-making and public discourse.

To avoid the graveyard, the system should be **self-sustainable**. The most important part of capacity-building is not the training of individuals per se, although it is important at the beginning. In countries that have used EMIS successfully, EMIS (at national level) provides capacity-building and support services to the decentralized and distributed statistical functions at levels corresponding to state and local governments. It has special functions, such as standard setting, application software development, quality control, and coordinating annual statistics production as well as providing technical assistance and training services to empower the State's capacity to take on the responsibilities and to participate in nationally-coordinated EMIS development.

In countries undergoing decentralization and coping with diversity and tensions, the failure to address the issue of co-ordination and integration would risk chaotic disintegration. One must integrate the decentralized and distributed sub-systems.

- *Decentralized* refers to the vertical, multi-tiered or layered subsystems at federal and state levels
- *Distributed* refers to horizontal structures of education sub-sectors, the primary and the secondary schools and the post-secondary education

Only through integration can these loose parts become an effective system. Moreover, quality control procedures should be placed at all levels.

Thus, using common data collection instruments, data processing software, and quality-control procedures, participants should be able to effectively perform statistical functions for their own policy, planning, and management needs at all levels of government. Data-collection, data-entry, and verification all start close to the source. An electronic copy of the verified data sets is transmitted via diskettes or the Internet to the next level and so on. Each level analyses the data in terms of the requirements of their own

users. This method minimizes the duplication of tasks and inconsistency, and enhances reliability, quality, cost-effectiveness and consumer satisfaction in this partnership between and among the participating governments and technical teams at all levels.

EMIS is meant to serve various stakeholders. In some countries systems are governed by not an authoritarian hierarchy, but by a **National Advisory Council**, representing the partnership of stakeholders, between consumers and producers of information. It is a forum for negotiation and policy-level commitment, for mobilizing human and institutional resources, and for issuing executive directives across the whole system. Supported and coordinated through this partnership, all members benefit from sharing responsibilities, resources, and costs.

In contrast, those systems governed solely by the Ministry of Education experienced difficulties in times of political or civil strife. For example, in one country, although EMIS 'survived' the civil war, it received very little support from the Ministry during this time that also saw enrolment at schools drop radically. In addition, the education budget was re-allocated to the war effort. As a result, data-collection was difficult, and the government was unwilling to finance the publication of poor results.

Lastly, to develop and maintain such a vast system, various kinds of knowledge and skills are required in different areas, such as systems development, quality assurance, training, technical support, and national reports. There are resource persons and types of institutional capacity within different departments, organizations, and agencies. To fulfill its EMIS directives, the National Advisory Council must select – from participating organizations – those people with the best levels of expertise and talent to serve on task-specific teams. The first task of these teams is to organize and conduct diagnosis of the information needs of consumers, the quality and relevance of statistical products and services, and the capacity of producers. They must then organize a national workshop to propose a strategic development plan, with the findings and recommendations submitted back to the Advisory Council, who can then set the priorities, mobilize resources and issue directives for implementation. This process will ensure a diagnosis-informed, resource-supported, and policy-anchored action plan. Even in the case of executing a strategic plan, this mode of technical co-operation provides flexibility to reconfigure technical teams and production factors in response to the new challenge.

Those who rely solely on donor-funded experts and resources ignore potential indigenous partnerships. As a result, their development will be neither diagnosis-based, nor indigenous resource-supported, nor policy-anchored. In contrast to those governments who relied on indigenous partnerships, their systems are thus more likely to collapse once the donor-funded project comes to an end than those who relied on indigeonous partnership.

Critical factors for success

The basic elements of the vision that is EMIS were drawn from the experiences of African countries. Let us conclude with the three most important critical factors for success.

Above all else, **political commitment** is the most important. Following the diagnosis, one member said, any underlying problems tend to be neither technical nor concerned with a lack of resources. If a system is in a developmentally poor condition, it is because of indifference on the part of the country's leaders. Although signing agreements with donors is a sign of commitment to the people (especially to the lowly-paid civil servant who will have to work hard to achieve the objectives), such commitment has to be clearly expressed, through, for example, political campaigning and national reform. Simply signing an agreement and assigning a counterpart to a consultant-driven project does not constitute political commitment. The leadership must inspire a sense of mission if the acute developmental issues facing their countries are to be solved. Increasing the professionalism of statisticians is essential. The leadership must support budding professionals and facilitate the development and application of their knowledge and skills as well as their work with other professionals. The managers of institutions must be likewise inspired, if to justify the deviation from routine and the diverting of staff and resources toward the joint effort.

Giving political priority also means issuing directives to mobilize and authorize financial, material, human, and institutional commitment to the implementation of the adopted strategy and management of the operations.

The second critical factor – good governance – pertains to the origin and the manner in which direction and authority are exercised to steer the enterprise. In any joint venture, decision-making must involve all the major stakeholders, for each respective authority structure has a vested interest in the outcome, and it is they who must also authorize participation and diversion of staff resources to the common cause. These authorities are the holders of

the required expertise, facilities, and mandates. It is only through their consent and their participation in the decision-making that the policy advisory council is empowered to exercise oversight function and issue guidelines and standards.

In some countries, the situation is that one authority is unable to command or direct another. Without such agreements, technical staff will not be able to work on a common task in co-operation with their counterparts from other organizations. As participation based on vested interest is a better guarantee of success than coerced co-operation, different priorities and potential conflicts must be ironed-out at policy-making level. Once the policy advisory council has agreed on a course, each partner must issue directives and authority through their own respective hierarchies.

The third critical factor for success is having strong management in place. Here, strong management means the effective co-ordination of staff and resources for task performance. As the tasks involved in developing efficient EMIS or NESIS require a variety of knowledge and skills, management needs to be advised and assisted by a working group of experts and institutions. In turn, management needs to ensure professionalism, accountability, quality, efficiency, competence, and consultative decision-making.

By sharing responsibilities, expertise, costs, facilities, and resources, everyone can achieve more than if they were acting alone. Sharing, however, does not necessarily mean transfer of resources from one to another. Here, it means that each partner devotes some of its resources toward the execution of tasks in one's own area of responsibility.

There are, of course, many other factors that can and do affect the success or failures of EMIS and NESIS. The lessons learnt and recommendations resulting from the experiences of African countries are documented in the module entitled 'From Diagnosis to Action Plan'.

K. C. Tung
WGES-NESIS coordinator

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A. Introduction

The acronym EMIS stands for '*Education Management Information System*'. It is a system designed to systematically organize information related to the management of educational development. EMIS's centre is at the Ministry of Education (MoE), where it is responsible for the collection, processing, analyzing, publication, distribution, and rendering of information services for users of educational information. In the words of K. C. Tung, 'EMIS refers to a **S**ystem for **P**rocessing **I**nformation for the **M**anagement of education resources and services'.

Within the MoE, EMIS is responsible for the promotion and use of information for policy planning and implementation, decision-making, and the monitoring and evaluation of an education system. As we live in the age of information, the success in organizing information systems for the development of education lies in the use of information for development. Not using accurate and timely educational information for monitoring development activities results in retarded development.

EMIS also substantially aids efforts made to assess the performance of an education system. It also closely monitors the equitable distribution of resources, and plays an active role in providing information to top management about the deployment of teachers, student performance assessment, internal efficiency of the education system, resource allocation, and the distribution of didactic materials to schools. It must also give technical support to the research unit at the MoE.

Statistics are an important part of the EMIS system. Thus, statistics relating to formal, non-formal, and early childhood, primary, secondary, and higher education, teacher-training institutions, and technical and vocational institutions are vital to EMIS. In turn, the collection, processing, analyzing, and reporting of statistics in these areas is the responsibility of EMIS at the MoE. In the event that each department and section of the MoE collects and compiles its own statistics, EMIS must obtain a copy of the final product from each department or section.

EMIS is also responsible for continuously developing, through training and work, the capacity of its own EMIS staff as well as other staff in the MoE in order to generate a sustainable and self-sufficient centre for the provision, development, and maintenance of an educational information system.

Moreover, central EMIS is expected to provide special assistance to EMIS personnel at provinces, districts, and schools. Being the major source of educational information, schools need more input regarding training, the improvement of the records management system, and awareness of the use of such information for planning and decision-making purposes.

Experience has shown that the best approach to achieving this is having in place an organized programme for the training of trainers. Using this approach, central EMIS will train the provincial staff trainers, who will in turn train their own staff as well as those at district level. At district level, staff is to create close contact with schools and provide constant feedback and training. They must also relay information, guidelines, and reports between central EMIS and schools, and in both directions. For example, they must ensure that schools have received the necessary instruments of data collection, have filled them in correctly and sent them back to the district office.

Data processing is done at provincial level in a decentralized system. It is too expensive to decentralize the data-processing system down to district level. Countries that can afford to decentralize to district level have a greater chance of increasing the accuracy of data and getting timely reports as they can easily contact schools for feedback information and follow-up. Eventually, countries will have to decentralize the data processing (entry and cleaning) to school level, with reports being sent to upper tiers electronically. However, this may not be realized in the near future due to the digital divide and poor economic capacity that affects many countries in sub-Saharan Africa.

Finally, central EMIS has a coordinator role, connecting major stakeholders in partnership and experience-sharing programs, while at the same time introducing new innovations to all stakeholders. Hence, EMIS must carry out the following:

- Survey administration of schools – instrument design, testing, re-design, distribution, and collection
- Organizing, processing, compiling, and cleaning of data
- Analysis, interpretation, and use of educational information

- Publication, distribution, and dissemination of the outputs to users of educational information
- The overall management and planning of EMIS activities, and the promotion of decision making support systems
- Monitoring and evaluating of all nationwide EMIS activities
- Training of all levels of EMIS personnel

For over a decade, the NESIS[1] program was engaged in capacity-building in sub-Saharan Africa under the theme of leadership, ownership, and partnership. As a result awareness has increased among users and producers of educational information. In this approach, participating countries were to identify and prioritize the use of information, identify problems, and then seek solutions for them through partnerships with professionals from educational departments, sections, provinces, districts, schools, and donors. This proved successful, with awareness on the use of information for decision making increasing in many countries in this region.

Central EMIS also needs to adopt this approach, and take on board similar partners to develop and promote its system within their own countries. Partnerships with professionals inside and outside one's country, sharing experiences, and assisting each other in developing professional technical skills within EMIS, especially in the area of systems development and programming is needed.

Partnership also refers to the vertical and horizontal relationship and collaboration of professionals within the MoE. Vertical partnerships describe the relationship and collaboration of professionals between the centre and provinces, districts and schools. Horizontal partnerships refer to the collaboration and communication within the central Ministry departments, divisions, sections, and lower tiers.

The diagram in Figure 1 shows the relationship and the flow of information that should exist between the producers and users of information and top decision-making bodies and schools. Through the conceptual framework we intend to convey to the reader, the following points, at the very least:

a. Central EMIS is located within the MoE (the inner circle) and gives out information services to all users around it.

[1] *NESIS = National Education Statistics Information Systems.*

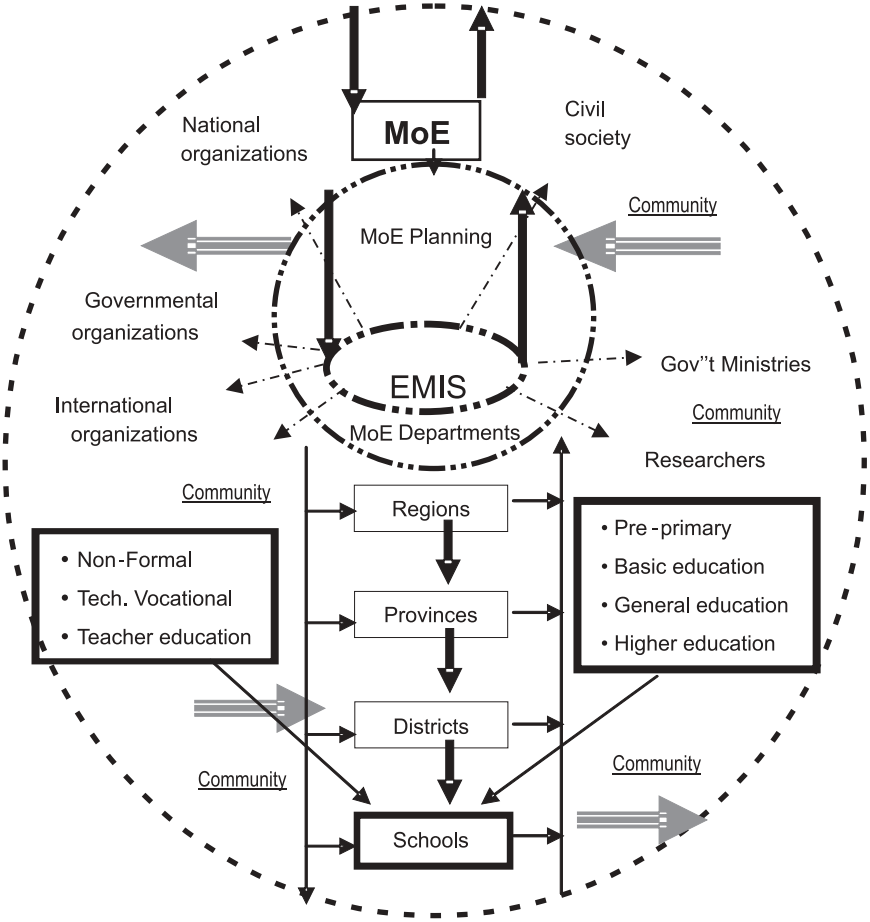

Figure 1: EMIS: Producer – Users conceptual relation

b. Directives, guidelines, and demands for information and other administrative information are sent to schools via the administrative channel.

c. Through this same channel, reports, demands for support, and other necessary information flow from school up to the top decision-making bodies.

d. The top arrows show the information that comes from higher body, higher than the MoE (perhaps the Council of Ministers, for example) and the responses.

e. The three bold rectangles at lower end of the figure indicate major sources of information that need greater attention.

f. At each point of the administrative channel – region, province, district, school, they not only receive and pass information accordingly but information is also processed, analyzed and used. This is vital to increasing the awareness and appreciation of information and will lead to the capture of quality information.

g. In all directions there are arrows pointing inwards and outwards. These signify information exchange and feedback information at all levels. Accordingly, users at different stages have to have access to information, and feedback has to be collected, processed, and incorporated for future enhancement.

Exercise 1

Traditionally, central EMIS is structured under the MoE's planning department. Recent argument has it that central EMIS, be structured as a department that serves all other departments. The rationale for this is that EMIS serves all departments. Discuss the advantages and disadvantages in both cases, taking into account the situation in your country. Share your ideas with others and brainstorm.

B. Objectives of the Manual

The objective of this training manual is to lay down the scope, structure, and responsibilities of a management team in a central EMIS office in MoE in any country in sub-Saharan Africa. It is specifically intended for new managers with new responsibilities in the area of EMIS management and new managers coming from entirely different backgrounds. We hope countries that are embarking on building an EMIS centre within their MoE and those with the intention of strengthening their EMIS centre will find it useful.

C. Who should use the Manual

The manual should be used as a working document by professionals in central ministry. In a decentralized system, this manual can be of use to provincial and district office professionals. It can also be used as a reference guide for staff working in the field of data collection, processing, analysis, and dissemination at regional and sub-regional offices of the MoE. Higher managers and decision-makers are encouraged to read the manual to acquaint themselves with the work involved and learn more about what it takes to build an EMIS centre in a MoE.

D. Goals and Objectives

Our goals are:

- To promote educational development through informed decision-making practices by increasing demand for information use
- To collect, organize, and report accurate, relevant, and timely data for planning and decision-making purposes
- To promote the use of information for educational development

Our specific objectives are:

- To create an organized unit within the MoE that can collect, process, analyze, publish, store, disseminate, and provide efficient services of educational information for users
- To promote the use of education information, both internally and externally, by increasing its quality
- To create a network of users and producers and increase the role of information in the development of education
- To cultivate the ability of EMIS workers in the areas of survey administration, data processing (hardware, software, networking), analysis and use of educational information, and managing, monitoring, and evaluating the EMIS activities
- To take active part in similar activities to those outlined above in other sectors of the MoE
- To strengthen the overall management of EMIS unit of the MoE

E. Management

Management is an effort made to coordinate the exertion of human and material input in order to achieve the set objectives. It is an art of coordinating the knowledge and skills of people involved in EMIS activities in order to accomplish planned objectives and visions. To do this, we consider all our activities, the procedures involved, the professionals carrying them out, and the relationships within and with other stakeholders.

The total quality management approach:

This is a philosophy that ensures the quality of data collection instruments, data processing methodology, analysis and dissemination (including good skills to communicate to users), feedback, and the utilization of feedback information for future enhancement of acquiring relevant information for decision-making. Quality management and leadership at the central EMIS unit, including planning, monitoring and evaluation, and follow-up strategies, needs attention for total quality management to be addressed. As David Butler puts it:

> '*Total quality management is a philosophy that integrates a focus on the user, a focus on the work process, and a focus on continuous learning.*'

TQM refers to all the work we do in organizing and systematizing the procedure we follow, the equipment we use, the people involved in building EMIS, and the relationship between EMIS as a centre of information and its users. Conscious communication between EMIS staff and the users is essential to achieving total quality of outputs and services for the development of education.

User-focused approach:

The user of information is central to EMIS functions and management. There are two types of users: internal and external. Internal users are planners, decision-makers, decision support systems, and the different departments and divisions of the MoE. External users are other government and non-government institutions, national and international organizations, donor

agencies, and civil society. All are central, and of equal importance, to our work towards achieving quality output.

Given the latter, it is important that everything we do is closely related to users' needs and expectations. Having a quality product increases the number of its users. This leads to an increased use of information, which in turn leads to an increased level of informed decision-making. This secret of success is not known by a number of EMIS workers, and this attitude of giving the end-user a low profile must change. It is important to note that EMIS is both a producer and user of educational information, although it does more of the former than the latter.

Team approach:

In order to effectively use the knowledge available, a situation must be created where all EMIS staff can work and learn together. Here they can jointly plan, implement, and asses the impact of their work in meeting the goals and objectives of EMIS. Common sense dictates that 'people support what they help create'.[2] The attitudes 'I am a programmer, I write my codes, the rest is less of my concern', OR 'I am a statistician, I do my data analysis, the user can come and collect what is needed', OR 'I am encoder, I enter data, other assignments are beyond my capacity' notion are narrow and self-defeating and should be avoided. The team can also learn from each other and enhance the performance level of the EMIS unit.

Learning environment:

It is important to create a working environment that is favorable for continuous and harmonious learning. By the nature of its organizational set-up, EMIS is a learning environment. We have the necessary machines and manpower available. What we do need to work on and achieve, is the willingness of both learners and decision-makers to encourage self-instruction as well as team learning, and, when necessary, provide a budget to cover the cost of such an initiative. Members of a team should learn from each other through organized formal training programs or, more informally, by consulting each other on a regular basis during and after office hours.

Once this is achieved, workers will feel better about themselves and pay better attention to quality output and outcome. They put more effort into achieving goals and objectives. Moreover, this working and learning together

[2] *Stephen G. Haines in 'Reinventing Strategic Planning'.*

results in an overall development of both the EMIS unit and the MoE as a whole.

The need for assessment:

Assessment, which explores users' needs, is essential. It is important that EMIS management can see and understand what users need, and, once they get what they need, what users do with that information and how it impacts on the overall development of the user's organization. Planners, decision-makers, decision support systems, and experts in the MoE, among others, are core users of educational information.

Assessment can be done formally by taking a sample of users and interviewing them, assessing their feelings about educational information and their interest in using educational information for decision-making. (This can be done periodically.) However, we must also focus on the type of assessment obtained indirectly, i.e. by reading through reports of different kinds, discussions in a meeting, discussion with friends and professionals, media reports, reading faces, reactions, and gestures, etc. In other words, we should keep our eyes and ears open to useful comments and ideas that we can incorporate for future enhancement of our products. The better the products we develop, the more we attract users, which in turn leads to the better use of information for decision-making.

The challenge for EMIS management is to attract dedicated professionals and workers who have the vision to improve the current situation of low demand for information and launch themselves into a continuous learning environment, and who are willing to do away with 'control and command' management system. This management style works to the advantage of the team members within the EMIS unit, the MoE, and will greatly contribute to the overall development of countrywide EMIS systems.

The central EMIS unit is responsible for creating an objective-oriented, user-focused team spirit in provincial and district offices and schools, with emphasis on school-level information systems organization and use. Being the major source of educational information, the school needs the most attention, and more awareness creation and technical assistance should be given to staff at this level. In this regard, the focus should be on:

- Improving and bringing up to date the school's records management system

- Creating awareness among school managers, teachers, and record officers
- Promoting information use for planning and decision-making in schools

Exercise 2

We have said the user is central to our work. What do you think the advantages are of putting the user upfront? Discuss. Directly related to the above notion is the quality of our output. How do you understand quality in terms of products of EMIS? Discuss. Use the procedures as a guide (survey administration, data processing, data analysis, publication, dissemination, feedback).

F. Information

The nub of the acronym EMIS is the word 'information'. Information is additional knowledge the users desire about the functions under their responsibilities. It is this additional knowledge that users utilize to enhance planning, programming, monitoring, evaluation, reviewing, research for overall management, and decision-making in educational development.

> *Suppose that planners in country X have asked the top decision-making body (perhaps policy-makers) to expand the construction of primary schools in rural areas in the hope of attracting more girls to schools and thus bringing about gender equity. The top decision-makers have asked the planners to justify their argument and come up with the locations of a number of primary schools that could be constructed.*

The planners need information about the number of existing primary schools in urban and rural areas (perhaps by district as well), the distribution of enrolment in each school by sex, the average distance travelled by pupils, the number of children per class, the number of pupils per teacher, and so on. Without such basic information, planners find it difficult to justify their argument for the construction of new schools and win the decision-makers over to their side. *Note: the above scenario is one of many that we encounter.*

Information is only of value when there is a use for it. In other words, the value of information depends on the demand for it. The higher the demand, the more the value it has. It is this high demand that we are trying to cultivate through our capacity-building program.

A planner who is engaged in allocating scarce resources, say books, to schools in a certain district will place more value on information relating to the number of schools in that district. Moreover, information about the number of existing books in each school in the same district will enable the planner to carry out such an assignment more effectively. The latter piece of information therefore has more value than the former.

Hence, information can also be in the form of increased awareness about the work we are doing and feeds back into the desire to do it better. Herein, we talk a little about the management of such knowledge in the field of education. Information is also the additional knowledge users such as policy formulators, decision-makers, planners, researchers, etc. not only need to learn about the different functions under their responsibility but also, when it comes to decision-making, require to act rationally and correct problems before it is too late. Information is therefore a tool used to further enhance the planning and implementation process.

Exercise 3

The MoE in country X has, for a short period of time, decided to increase the subsidy to pre-primary education in addition to the training of teachers. It is known that pre-primary education is run by several different stakeholders: non-governmental, governmental, private individuals or groups, community, townships, etc. Often, the government subsidy is limited to a certain amount of one-off reimbursement. The task of allocating government subsidies is given to committee of planners and EMIS professionals.

a. *List the types of information needed by the committee to allocate government subsidies efficiently.*

b. *Pre-primary institutions are mostly non-governmental. As a result, the coverage of information already available is limited. What approach or action should you take in this situation to get more information? Discuss.*

G. Scope of Work and Working Procedures

In the MoEs of many African countries there has traditionally been a statistics section. It was responsible for collecting and reporting statistics on schools, teachers, and pupils, which was limited in terms of the information requirement for policy planning and implementation. Hence, EMIS was born, based on the idea that the MoEs' information requirements needed to be considered from a wider perspective, one that involved acquiring both quantitative and qualitative information for educational policy planning and implementation.

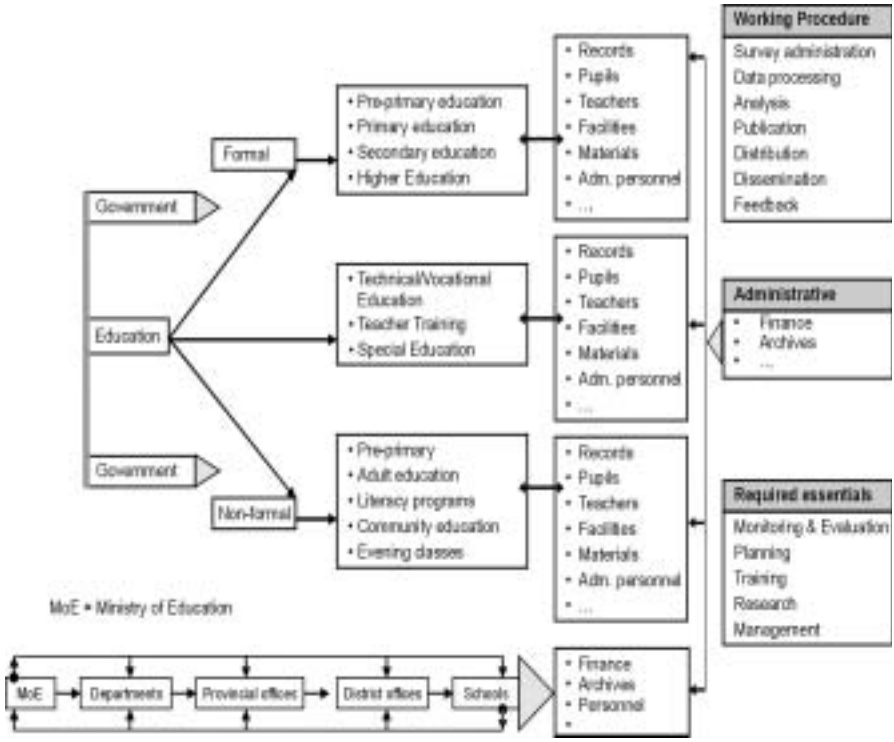

Figure 2: Scope at work

Thus the role of EMIS is to coordinate, in an organized and systemic way, the information necessary for educational planning, policy formulation, decision-making, and resource allocation. This includes information on both formal and non-formal education, higher institutions, technical and vocational education, special education, and educational research institutes. It is equally important to collect information on personnel and finance at different administrative offices: Central Ministry, provinces, district offices and schools. Note: these are often left out or given little attention.

While the working procedure outlined in Figure 3 may not be detailed enough for use, it does, however, lay out the important steps to be taken when organizing EMIS functions systematically. Each EMIS activity follows certain established steps. The procedure begins with an appraisal of the MoE's needs. This is where you can asses what you can collect, and from where, and what you cannot collect.

It is here that you can investigate what the MoE needs in order to plan, make sound decisions, and conduct research work. To do this, a decision has to be taken on what data to collect, or not, whilst balancing the needs and the manpower available and the material and financial resources available.

Figure 3 EMIS: Work procedure

Then follows data processing, analysis, publication, and dissemination. This is an established working procedure, with each step tied to the next, so much so that the incompletion of a single step implicates the incompletion of the next and thus the incompletion of the whole. For example, some users, especially decision-makers, emphasize analysis without paying due attention or giving necessary support to data collection and processing. We can only have good data analysis and interpretation when we have a good data collection and data cleaning system in place. Therefore, to achieve our vision, each of the steps in the procedure has to be attended to, planned, monitored, and evaluated.

Exercise 4

The scope of work carried out by EMIS is wider than most of us expect. Using Figures 2 and 3 (above), identify areas that you have not covered so far. Look into areas for which you have no established data collection instrument. Give special focus to statistics relating to early childhood and non-formal education, personnel, and finance.

H. The System

Stephen G. Haines defines a system as '*a set of elements or components that work together in relationship for the overall good and objective (or vision) of the whole*'. He uses three important phrases in his definition: working together; in relationship; and vision of the whole. Working together is a collective effort that is additional to individual and professional efforts to achieve desired outcome. Good relationships between EMIS staff, as well as a quality relationship of EMIS staff with users, are a basic requirement for the system to function properly and move in the right direction.

The system is made up of components, each of which contributes to its proper functioning. These components are survey administration (which includes data collection), data processing, data analysis, and data use. It is possible to have a good survey administration with bad data processing, or good data processing system but poor analysis. Even worse, the system may have good survey administration, good data processing, and good analysis in place but poor use and utilization of feedback information. It is not the workings of one part that will leads to a desired result. It requires good output from the whole. It is only when the system as a whole functions properly that, assuming that we all want a good functioning system, we get what we want, i.e. an efficient result and an efficient accomplishment of our vision.

Figure 4 summarizes the concept of systems thinking in a short and precise way. The practice in a systems thinking approach is to start by looking at the future, the outcome or vision. The products or outputs we envisage are considered first, rather than looking at today's plans and programs, and walking through the process and considering the output last of all.

Having considered the future, today's status is assessed, taking into account the environment and feedback information, and then throughput – the alignment of delivery and attunement of people. This is not a one-man show; it needs to be correctly understood and supported by those all who take up initiative.

Systems thinking:
"A new orientation to life"
"From complexity to simplicity"

Source: Adopted from Systems thinking and learning, by Stephen G. Haines with permission

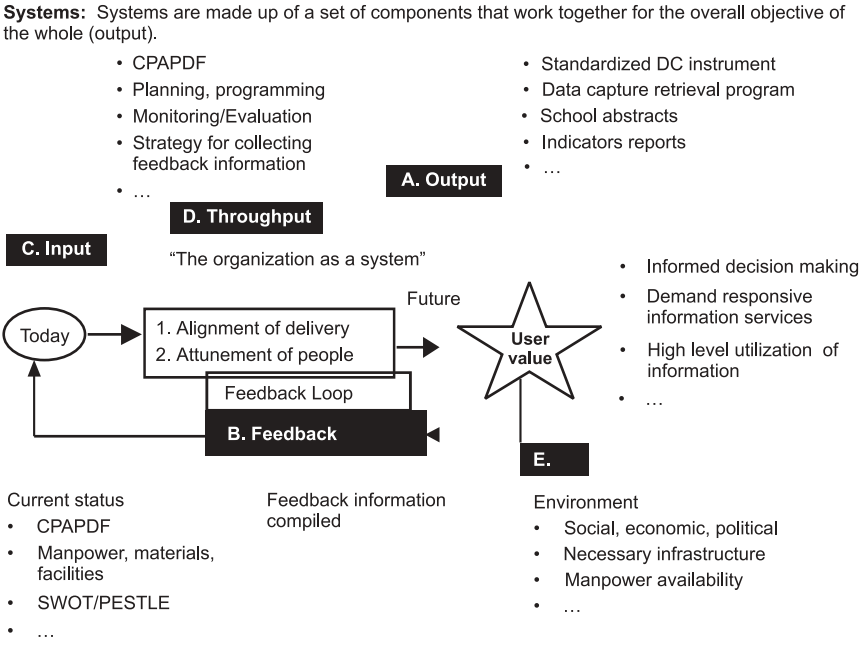

Figure 4

'Good vision' is the vision of EMIS as a unit within the MoE in relation to the objectives and goals of the Ministry as a whole. In other words, EMIS's vision needs to be anchored to the policy pursued by the MoE.

Next we assess the current status of the EMIS system: the strengths, weaknesses, opportunities, and threats in relation to political, economic, sociological, technical, legal, and ecological factors. Each component is investigated separately. Data collection, processing, analysis, publication, distribution, dissemination, feedback, information are all assessed. Moreover, its overall management, periodic evaluation, research, documentation, and training are all investigated to identify problems.

Once the assessment phase is completed and documented, we can plan for each of the above components, to include in-built mechanisms for monitoring and evaluation, and strategies for the collection of feedback

PESTLE	Strength	Weakness	Opportunity	Threat
Political				
Economic				
Sociological				
Technical				
Legal				
Ecological				

Figure 5: SWOT – PESTLE Analysis

information. Some of the advantages of the total quality management system discussed above are summarized below.

The advantages of this approach include:

a. Better communication between EMIS workers and users.

b. The development both of a culture of working together and a capacity to manage changing environments.

c. A better understanding of how EMIS parts work together to arrive at the desired outcome.

d. Knowing how to serve users better and putting this knowledge into practice.

In terms of EMIS management, we understand this effective communication to mean working together both within our unit as a whole and with the general user. For EMIS, this involves a system of data collection, processing, analysis, publication, and dissemination; the incorporation of educational information feedback, research, monitoring and evaluation; and the management of educational information and other development programmes as part of the systems thinking approach. It is a coordinated system that pulls together human and material resources to achieve the desired result (as stated in the goals and objectives of the system).

Exercise 5

The systems thinking approach allows you to identify the goals at the outset. In a short paragraph, state the goals (dreams) of the EMIS unit in your MoE. Assess the current situation of the EMIS unit in your country using the SWOT/PESTLE tool. What can you say about this approach? Discuss.

I. The Components of a System's Life Cycle

This section goes through the steps required to get the data from the field, process it, and take the results back to users. The procedure followed is cyclical. It is chained together in a specific order that must be adhered to if an efficient result is to be achieved. Any break in the procedure will affect the final result. Moreover, it is the EMIS manager who should be responsible for every component in the cycle performing well. For example, if school records are not maintained, then the feasibility of the data collection system is hampered, no matter how well formulated the data collection instruments.

1. Data Collection:

If the system of records management at school level is poor then you cannot expect to get the results you require from the data collection system. The school remains the core source of most of the required data items, which are not often recorded in the desired manner. It is the responsibility of the EMIS manager to see to it that the records at school level are properly maintained.

Most often, data is collected by means of questionnaires. These are prepared in a centralized system at the EMIS centre or through decentralized regional offices. Irrespective of the method followed, questionnaires are used to collect school data annually. To do this properly, knowledge of the needs of planners, decision-makers, researchers, and other users is required. As far as is possible, the data collected should satisfy their needs. Ultimately, their need is our need, and our need is their need. It is a symbiotic business.

One way of assessing users' needs is to take notes during meetings and casual discussions with them. Others include having them comment on the instrument of data collection, listening to their presentations, and reading policy and planning papers.

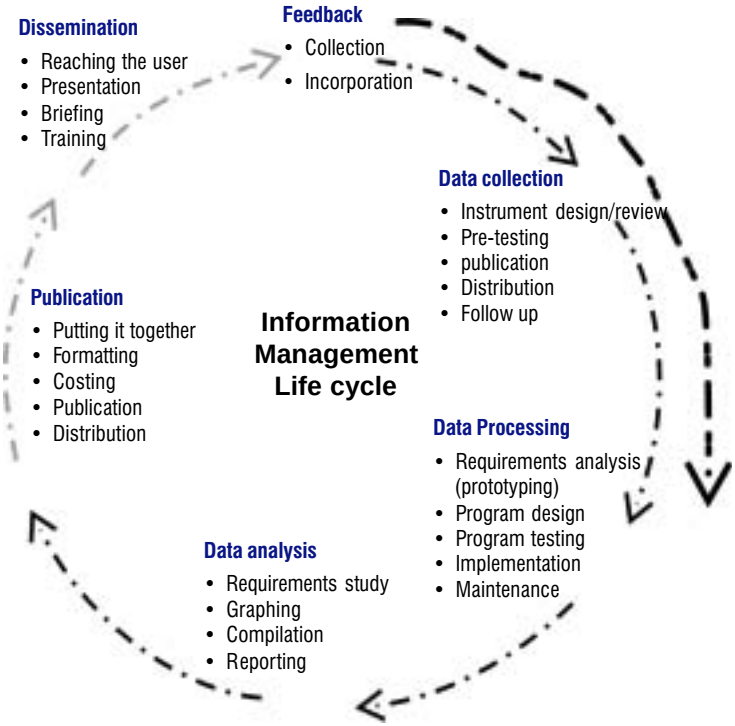

Figure 6: EMIS – Information Management Life Cycle

Schools:

The school is the main source of data for EMIS functions. The way records are kept at school level matters hugely when it comes to data collection. School heads, teachers, or record officers complete the questionnaire by filling in the necessary data according to the questionnaire. Most often schools have data in a list form, unaggregated, which is easy for the school head or record officer to complete but difficult when it comes to extracting specific information as it is not aggregated. To prevent this, EMIS management must devise ways and means of recording and presenting data items that make completing the annual/ regular questionnaire less complicated. One way this can be done is by encouraging and assisting schools with the regular (annual) preparation of a school abstract that contains all the data needed. This reference document will prove to be of advantage to both the school management and upper-level decision-makers and in preparing reports for higher bodies.

Instrument design:

Most MoEs in sub-Saharan Africa collect core regular data using questionnaires, perhaps because this method is simple and relatively cheap. The design of such an instrument, however, must be done extremely carefully. The questions, the layout, and the syntax should be well formulated. Furthermore, we also need to pay close attention to whether the receiver will understand the questions as they are intended. Therefore, an experienced person should be assigned to formulate and design the questionnaire.

Pre-testing:

Once the instrument (the questionnaire, for example) has been designed it must be pre-tested. This can be done by selecting a limited number of schools and asking them to complete the instrument. By so doing we can:

1. Find out how the receiver/s understand/s the questions. This will allow any necessary modifications to be made.
2. Better estimate the time it will take to be completed.
3. Learn more about how records are kept at school level.
4. Establish how easy it is to complete the questionnaire.

It is important to note that the pre-testing of the instrument should include a wide variety of the projected users, particularly the departments in the MoE, with special emphasis on the planning department.

Instrument redesign:

Once the pre-test is complete, any changes need to be carefully incorporated. This is often done through discussion to 'approve' the changes required. It is through such discussion that professionals learn from each other's experiences. Most important is for everyone to realize and understand why the changes were necessary. Then there is less chance that the same mistakes will be repeated.

Publication:

Once the pre-testing is complete and the changes incorporated, the instrument/s will have to be published. However, before a camera-ready copy of the instrument can be taken to the publishers, an estimate of the number copies per region and district (with an allowance for contingency) must be

made, and the production costs be established. In practice, the latter has to be approved by higher management and there is usually an established procedure to follow.

Distribution:

After publication, the instrument(s) is (are) ready for distribution. Before this can happen, a distribution program will have to be established. The estimate of the number of copies required can be used to schedule the distribution. Such estimates are easily made by referring to the distribution of schools by region and district and adding on some extra copies.

Follow-up:

The distribution of instruments is usually done in stages. The EMIS centre distributes it to provinces, who in turn distribute it to districts, and they to schools. It can take some time for all schools to receive their copy of the instrument. Schools will also need enough time to complete the instruments. Once complete the instrument is sent back, as soon as possible, via the same route – to district, to provinces and then, possibly, to a higher administrative level. To ensure that all this has taken place requires a well-scheduled follow-up. Important information for the survey administrators at MoE, provincial, and district level includes establishing the number of districts not received the completed instrument by the deadline given; how many districts received the required number of copies; and how many schools/ districts managed to send the instrument back to the relevant authority.

2. Data Processing:

If you haven't collected any data you will have nothing to process. However, once you have collected the school data, you need to plan how to organize its many different types so that it is usable for planning purposes. When data is not well organized, it cannot be properly utilized. Data processing is therefore one of the bigger activities in the cycle. Some of the most important aspects of this activity are highlighted below.

Monitoring instruments:

The key question is how many questionnaires have been filled in and returned? Our aim is 100% return. In practice this does not always happen. Some come early, some as scheduled, some come back late, some may not come back

at all. We need to know how many have come in (completed), and how many are lagging behind.

The distribution of non-returned instruments by both provinces and districts needs to be identified. From these findings we can draw up a schedule to contact those schools concerned. The main aim here is to establish the reasons for the failure to report back as knowing the problem is half way to solving it. It will enable us to identify those schools that can be given second chance as well as those that are not expected to report back. The latter include those schools that have closed, combined, or merged. There are also those schools that fail to report but are operational. Such schools fall into the category of those who give rise to missing data. Admittedly, some schools find responding difficult due to the distances involved or the lack of reliable communication.

By routinely applying such a monitoring technique, we are paving the way for the statisticians and analysts waiting to estimate missing data.

The case of missing data:

No matter how hard we try, there will always be some schools that do not return their questionnaire, or do not fully complete it. Identifying such schools is a very time-consuming process. Those schools known to be operational that have failed to report have to be included in the estimation of missing data, otherwise our results will not reflect the reality on the ground. Missing data is part of the overall picture. Several methods can be used to estimate missing data. Two are mentioned below.

1. Browse through the school database and identify any schools that have failed to complete/return their questionnaire in the last five years. The data extracted will enable you to project the results for the current year.

2. Often there is not enough manpower to make projections for schools, especially when there are many involved. Sometimes the historical data does not exist. In such cases, the previous year's data can be used to predict the current year. However, we have to make sure the school exists, i.e. is not closed, combined, or changed location, etc.

One good practice is to have in place a computer program specifically meant for monitoring and reporting the status of schools. It can be built in to the major data capturing program or be kept separate, with the option of being linked to the main program at a later date. The purpose of this program is to

generate information on how many schools have reported and how many did not, thus facilitating the follow-up of those schools that failed to report.

Data entry program design:

More often than not, data entry work is done using front-end, user-friendly data entry templates. These should be prepared, most preferably, by computer programmers working for EMIS unit of the MoE. Countries should work hard towards developing their own programs for data capturing and retrieval purposes. In-house developed programs have several advantages:

1. They are easier to enhance, change and develop in order to further accommodate new requirements.
2. They are easier to maintain and debug.
3. In-house developed programs are less costly.
4. In-house programs are more sustainable.
5. EMIS professionals can be trained to upgrade and maintain the system.
6. There is more opportunity to further enhance in-house programs.

Externally-driven data capturing and retrieval systems are more expensive and leave countries dependant on external expertise, which is usually much more expensive and thus often unaffordable. As a result, external systems are far less sustainable; when external assistance goes, the expertise goes with it, leaving countries more or less bereft. Therefore, countries should work within their own capacity in order to be self-sufficient.

In the absence of the internal capacity to train people in the area of in-house program development, the template design can be contracted out to private firms who undertake computer programming and maintenance. However, parallel to the development of the program, EMIS staff must be trained to maintain and efficiently use it. This ensures both the system's sustainability and program maintenance. Without necessary training, the sustainability of an externally-developed program is impeded.

With an in-house set-up, EMIS management and EMIS programmers can choose the type of software used, i.e. the operation program for data entry and cleaning. It is important for programmers to work closely with survey administrators in order to make the work of data entry easy and manageable.

Moreover, the programmers need to produce two important reference manuals. One is the users' manual, which is used by the data entry clerk and tells the encoder how to enter data into the computer. These instructions include what keys or key combinations should be used to move from one screen to the other and perform other operations. The second manual is intended for programmers. It documents, among other things, the program used and the logic applied in developing the computer codes. It is particularly useful for young programmers, who can use it to learn the logic on which the program is based and write and maintain similar programs; modify and correct errors; and adopt the program to specific objectives.

Data entry:

Data entry can be carried out by trained encoders or data-entry clerks. Following a short period of orientation training using the manual prepared for this purpose, secretaries who are computer literate can also do the work in the absence of trained encoders. The main task is to enter the data into the computer using the pre-prepared data entry template. This work is usually supervised by an operations manager, who will usually liaise with the programmer[3] responsible for maintenance of the program. The objective of data entry is to computerize written information from questionnaires and make it more manageable.

Data cleaning:

Data cleaning refers to routinely checking for entry errors to ensure that what is entered in the computer matches what appears on the questionnaire. This is the most laborious job, and is often undermined because of the difficulties involved in administering it. There are several ways of getting around such problems. These include:

1. Including input masks, validation rules, default values, etc. when preparing the data entry template. Unfortunately, this method alone cannot guarantee error-free output and must be supplemented by:
2. An organized and well-scheduled proof-reading method in which two or three different groups do the proof-reading. As this checking mechanism is very tiresome, it should be arranged in shifts so that encoders can take turns.

[3] *Corrects errors, makes necessary adjustments, and assists the encoders as needed.*

3. Preliminary analysis, a method that is often overlooked. This involves carrying out a simple analysis such as calculation of pupils per teacher, per school, percentage of girls, percentage of female teachers, teachers per class, etc. When this is done at school level it gives an overview of those outliers that may make us suspicious of our findings, which we can then go back and check.

4. Maintaining a good and complete schools list by district and region is a good aid for data cleaning as it identifies which schools have reported or not. It is also useful to select a list from a flat database of schools without a teacher, schools with no classrooms, schools with no repeaters, etc. to find out which schools have reported correctly. Database queries are good aids in this regard.

5. Looking back at trend data and comparing the results of the current year with those of the previous year/s and scrutinizing the outcome.

Data compilation:

Here, data compilation means obtaining a flat table from a relational database and aggregating it by level and geographic units: provinces, districts, and school summaries. Although you may not agree that this deserves to be a step in data processing, I feel it should be included. It makes the data set ready for the analyst, who may not have an all-embracing knowledge of database manipulation.

3. Data Analysis:

Until you have processed your data, you will have little or nothing to analyze. Data analysis involves looking more closely at the data, and in various ways, in order to extract information useful for planning and decision-making: ascertaining trends, comparing provinces, districts, urban and rural schools, boys and girls, etc. Nobody does data analysis just for the sake of it. The analysis is done to provide information to planners, decision-makers, researchers, policy-makers, and other users so that they can establish whether their actions are appropriate or whether the actions need to be modified. In other words, the results of the analysis can point decision-makers in the right direction. Consequently, we attend to policy and plan documents, and research findings to find out what concerns people have in their minds about educating citizens. We then try to support their efforts with analysis and providing information services.

Data analysis should be done with users in mind. There are several types of users: general users, decision-makers, planners, researchers, information service providers, students, and teachers. Each one will have different requirements. Some want only to know the current status as relates to enrolment, teachers, growth rates, the level of available facilities, etc. Other users base decisions on the findings of the analysis or use the information for planning and research purposes. Policy-makers need information to find out how the policy they are promoting is working. As a result, the type of analysis we make is often tuned to the needs of different categories of users, especially policy-makers. It will also guide us in the type of report we subsequently compile.

It is then imperative to make the basic indicators of education systems' performance available to users. These are:

- Trend statistics and indicators, which are used to supplement analytical reports
- Research results, which are used to augment other reports
- Reports on regional, urban and rural, and gender disparity analysis, which are incorporated into major reports
- Planning, projection, and simulation models to make different scenarios available for planners

4. Reporting:

The above suggests that the type of report we need to compile may differ depending on the type of user we are obliged to serve. Some users are satisfied with yearly abstract or quick book references of numbers and some indicators while other users need detailed analysis. Others users need a detailed analysis that shows both the achievements and shortcomings. Therefore, we need to know exactly who each of our users are and what they are likely to use.

It is always advisable to prepare a short report of the outcome for top decision-makers, who may not have the time to read a long report. Therefore, the production of the following summary outputs are envisaged from an EMIS unit of the MoE:

1. *Annual statistical abstract:* This is a summary of statistical tables and some indicators and is intended for the general public, i.e. users within

and outside the MoE who need the statistics for reference purposes only. This category also includes casual researchers, monitoring and evaluation experts, national and international organizations who use statistics to include in their background report, students and teachers in educational institutions, and research and trust organizations. By producing a statistical abstract we take many steps forward in our aim of providing information services to general users.

2. *Quick reference:* This is a short summary of the annual statistical abstract. As the name indicates, it is meant for quick reference and is targeted at upper decision-makers and those users who do not require detailed statistics. Some countries have already started to appreciate the use of quick reference reports.

3. *Indicators report:* This contains the analysis of the school system's performance, which NESIS is encouraging countries to regularly produce. It is prepared by a team of experts in the MoE, including planning and EMIS experts. The objective is to identify the progress made, the problems encountered, and the future direction of the system's implementation. Yearly-based particular findings must be included in this report. It is an important document in that it guides planners, and decision and policy-makers in taking correct actions when planning and making decisions. As such, it should reflect the needs of planners, and decision- and policy-makers. It can be updated on yearly basis by highlighting significant changes made over time.

5. Publication:

If you haven't published it, you haven't achieved anything. Without publishing your findings, the effort you have put into collecting, processing and analyzing the data is lost. You may well have printed some reports when asked by higher decision-makers, planners, researchers, and other users. You might have even copied the database for a friend or an office requesting information. Although these are good attempts at providing assistance, more techniques and methods have to be developed if all users are to be reached. After all, this is EMIS's core objective. One way of doing this is to publish our products and distribute them to users. In so doing, we not only publicize our product but also increase the user's chance of receiving the products they require. Moreover, this encourages the use of information. Collecting and processing the data, but not publishing the result is like placing a lit candle in a closed can – it has no particular purpose except to light the small space in which it is located.

There are some countries that still refer to individual school files when compiling reports. This process cannot be done quickly. It is easy to imagine how difficult this would be for small firms, never mind a huge organization like the MoE. Moreover, in a world of modern technology in which abstracts and reports are well laid out, placed on web sites, and made easy to use, browsing through endless data relating to school records is used in most developed countries. However, in sub-Saharan Africa this stage is a long way off, principally because of the current digital divide. As a result, we have to use both web publication (when possible) and printed media to reach the users.

Accountability:

We are all accountable for the work we do and for the tasks for which we are responsible. If we have not published our work, then we cannot consider it to be complete. Furthermore, even if we have published it, we are still not at the end of the yearly cycle of our work. The responsibility of dissemination, of reaching the user, of making the outcome known to users, and to use the results ourselves remains to be done. (This is discussed under section 6.)

If your findings haven't been distributed, you have not fully reached the user and you have limited the use of your information. This, in turn, impedes the promotion and use of information.

6. Dissemination:

In practice, dissemination takes a number of forms:

- ❖ Regular distribution of school abstracts, quick references, indicators' reports to users
- ❖ Distribution of pamphlets and posters to users
- ❖ Reports and briefing provided to planners and decision-makers at different levels of administration – provinces, districts, and schools

Dissemination

- Distribution
- Broadcasting
- Diffusion
- Propagation
- Spreading
- Giving out

Dissemination can be both internal and external. Internally, information will have to be disseminated to planners, decision-makers, decision support systems, experts, and educational administrators at all levels within the MoE as well as provinces, districts, and schools. This is important because:

1. It can bring about progress towards creating an informed decision-making environment.

2. Internal users will be aware of the importance and role of information in educational development. Moreover, awareness among users leads to better policy planning, implementation, and review.

External users are planners, researchers, students, teachers, government and non-government organizations, national and international organizations, civil society, private individuals outside the MoE, and the community as a whole. They are important in that the more they use information, the more they become aware of its role, and the better the planning and decision-making work in their respective organizations, sections and units becomes. This also has a feedback effect on the internal system and supports the progress made towards informed decision-making as well as the overall educational, economic and social development of a country.

7. Application Feedback:

The assumption is that once produced and distrubuted, the products will be used or applied. Then feedback can be collected. Feedback is a learning process. Through feedback we will learn of our achievements and where problems need correcting. Feedback also allows us to realize that others know and appreciate what we are doing, that there may be better ways of doing things, and that there may be more innovative ideas that could support our effort to produce timely and accurate information for an overall educational development. In turn, others will also know what we are doing, and perhaps how easy or difficult it is or has been.

When we apply the feedback – knowledge and skills – for the betterment of our job, we are contributing to the development of the system we happen to be building, which in this case is EMIS. At the same time, we are enriching our ability and knowledge to tackle more problems.

Hence we include mechanisms for collection of feedback in our yearly plan of a system's life cycle, and for all that we are doing. This includes:

1. Having a record book to monitor information from those visiting your office to keep account of what information they require and for what purpose they use the information.
2. Developing the habit of reading through policy and research papers and reports to get an idea of what interests these bodies.

3. Using the opportunities you have to attend meetings and individual discussions to try to read the minds of the professionals and assess the kind of information they require and that you might be able to work.

Exercise 6

The current challenge we have as EMIS professionals is to prepare an information base for a mid-decade review of the Education for All (EFA) programme. Consider the six Dakar goals (See Appendix II) and identify the information needs that can incorporate all of them. Suggest how the information should be collected, processed, analyzed, and reported.

J. Manpower Requirements/Structure

The manpower requirement for EMIS depends mainly on the amount of work involved in completing a specific task. An EMIS unit in a smaller country will have less of manpower and expertise compared to a large country. Nonetheless, as the sample structure (Figure 7) shows, there are important qualifications that are required. Note that the sample structure is that of a hypothetical country. No single structure will fit all countries.

1. As with every unit of the MoE, EMIS needs a leader. To achieve and effect the vision set forward – informed decision-making – the leader must be professional and innovative, bringing together all the components of EMIS, and personnel in attitude and spirit and make them aware of the management of change. Such leadership, together with management, should be able to attune all EMIS staff to the planning and policy needs of the Ministry.

2. Under the management of EMIS we also need computer professionals – both hardware and software professionals, including computer programmers and skilled application package users.

3. Also required are statisticians for data analysis and the compilation of reports. These individuals are also responsible for information dissemination – communicating the results to users in an organized and effective way. They should have analytical 'power'[4] as well as ability to use related software packages.

4. The last block in Figure 7 shows the information support system. This section of EMIS staff liaises with users and provides them with an information service. They collect and share feedback with other EMIS staff and users. Not only is this section responsible for collecting, compiling, and presenting feedback information, but it is also responsible for collecting, distributing, and binding annual questionnaires, abstracts, and reports and properly documenting them.

[4] *The word power is used here as the ability to do something/equipped with skills/.*

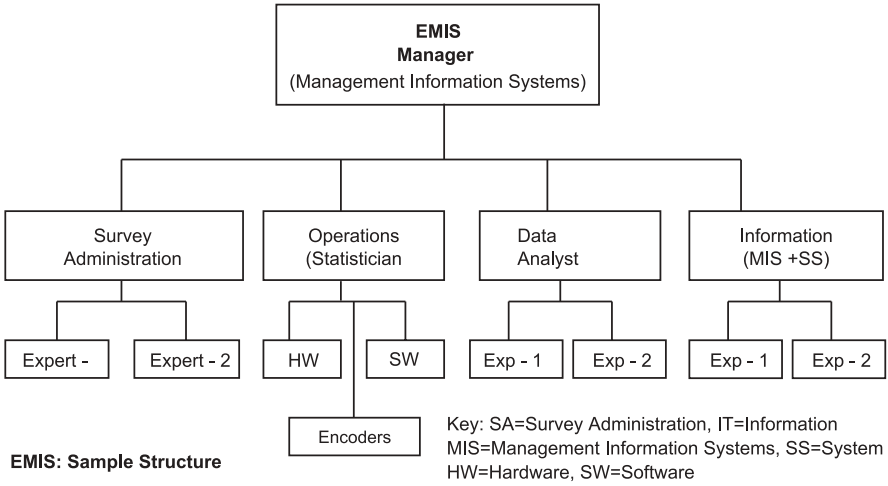

Figure 7: EMIS – Sample structure

5. Data entry clerks are needed. Their job is to enter data into the computer following pre-prepared templates. These encoders can also proofread and perform data cleaning.

This sample structure is meant to illustrate general needs in terms of manpower required. As the amount of manpower required depends on the quantity of work to be done, this structure will differ from country to country. In some countries, a small EMIS unit will be able to carry out EMIS functions. For example, a statistician can do both survey administration and data analysis functions. Hence, this structure is included here as a guide.

Exercise 7

Using the sample structure above, formulate the manpower requirement for your EMIS unit. Compare the results with what you already have and state what additional manpower you require. Comment on the information you need to efficiently perform this task.

K. Training

Training is one of the essential components of EMIS. Because the field of technology is changing fast and manpower turnover is high, training must be viewed as a continuous activity, and one that management needs to pay greater attention to. It is also an all round activity because the system is powered by each components working with the other in a changing environment to make the vision happen. Without efficient short- and long-term plans, it will be difficult to cope with the changing environment and realize the visions and dreams of the EMIS centre and the MoE.

The general content of EMIS training could be summarized as follows:

- Survey administration, including methods of data collection, instrument design (including content outline and layout), pre-testing the instrument, publication, distribution, and follow-up
- Systems development and programming, including end-user computing and the development of application software for data capturing and retrieval
- Policy-related data analysis and presentation
- Compiling reports
- Publication, distribution, and dissemination
- Networking and communication
- Maintenance of both hardware and software
- Documentation
- EMIS management and innovative leadership
- Planning and programming
- Monitoring and evaluation

Some of the above need long-term training and professional specialization if sustainable in-house capacity is to be developed. Others can be tackled through short-term courses, workshops, and seminars. EMIS management

should see where the gaps are and assign staff for 'on the job' training and other means of reinforcing capacity from within.

A better approach is to have a classified structure for training and a developed system for the training of trainers. There should be at least three levels of training on offer: Basic, Intermediate, and Advanced. Not every member of staff will need advanced training. At the same time, basic training alone will not in itself be enough for staff to handle EMIS functions effectively.

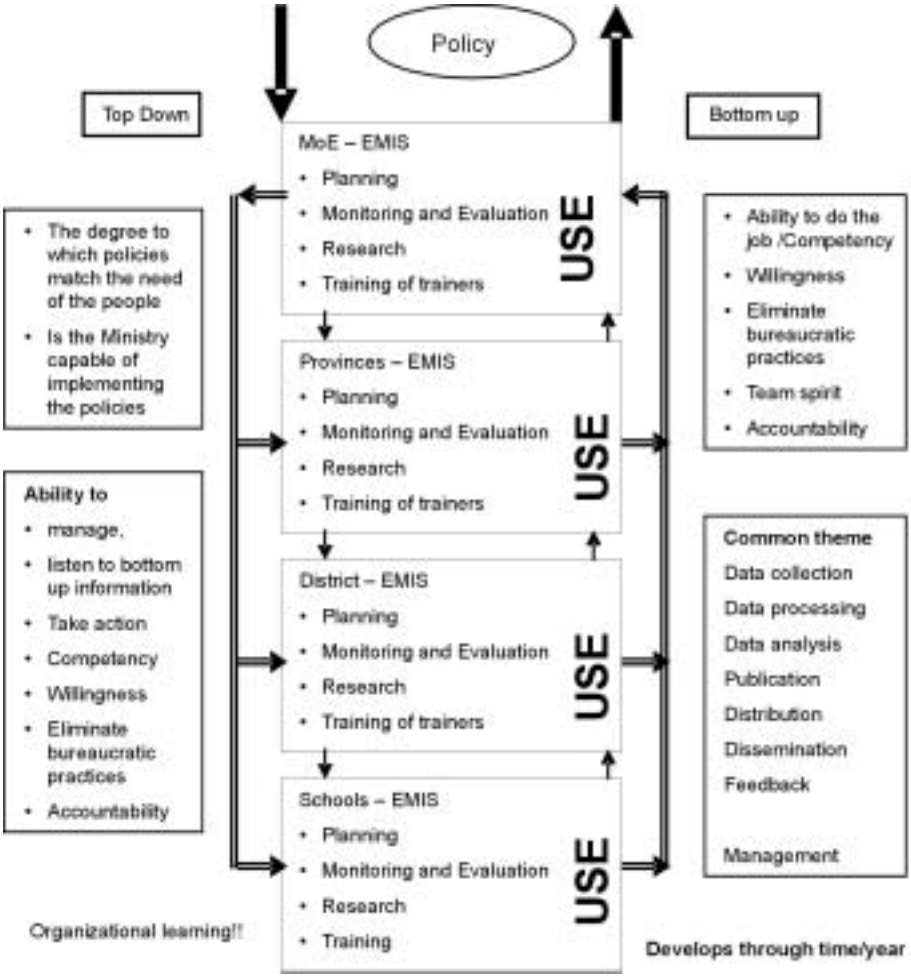

Figure 8

Assessment for training therefore needs to be made both for EMIS and MoE staff prior to planning and preparing scheduled training. Advanced-level training is required to increase effectiveness, innovation, and self-sustainability in EMIS.

Basic training:

Basic skills are needed by all employees, not only those at EMIS but the MoE as a whole. As the use of computers is new to many of our countries, all staff must have a basic knowledge of operating systems, word processing, spreadsheet programs, database operation skills, and use of internet facilities. Moreover, self-learning (individual learning) should be encouraged to help staff cope with the changing environment.

Intermediate training:

This is organized for those who have basic skills but lack the pertinent additional skills required to fully achieve results and so meet the goals. It may be arranged as the need arises. It is a big advantage for EMIS, for example, to upgrade the knowledge of data entry clerks so that they learn more about maintenance support by training them in the basics of operating systems and troubleshooting. Focused training, for example on the use of the SPSS statistical package, can be given to statisticians, researchers, and other experts engaged in data analysis and research.

Advanced training:

Advanced training is necessary for staff to be self-sufficient in major EMIS areas: management, data analysis, programming, networking, and data processing. Moreover, the role of EMIS in rendering technical capacity support in research and development must be encouraged to attend to the development of the system and the long-term management of changes.

It is also important to note that a training programme is provided for EMIS staff at all levels of administration. Central EMIS is responsible for coordinating the training programs at the lower levels, i.e. provincial, district, and school.

Training of trainers:

In large MoEs, central EMIS cannot alone coordinate the provincial, district, and school-level training programmes. Where this is the case, the best approach (strategy) is for central EMIS to train trainers at provincial level who

can then train trainers at district level. It is easier for district professionals to train schools in data collection, processing, and reporting as they have direct contact with schools. As far as is possible, this naturally includes training on the technical skills needed in software, hardware, networking, and the maintenance of both hardware and software programs wherever applicable. It is important that the training be given 'on the job' and on a continuous basis. With more emphasis given to the use of information in planning and decision-making at different levels of administrative units. It is equally important that information is both shared and effectively communicated between departments within the MoE, as well as at decentralized level within provincial and district offices.

The core target groups in this continuous training program should be the schools, specifically the school headmaster, teachers, and record officers (paying particular attention to those who deal with the completion of the annual school questionnaire). The more we invest in training at school level the better the information we will receive. Moreover, the more schools use information for planning and decision-making the better the quality of data obtained from schools will be.

The core content of school-level training must include records management, school-level planning, monitoring and evaluation, and the use of information for planning and decision-making at school level and community

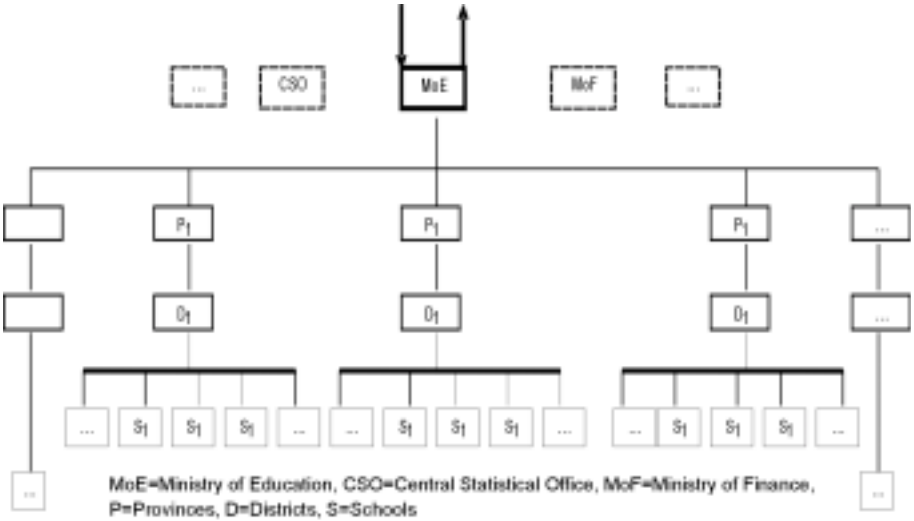

Figure 9: EMIS – Training of trainers

level. Most importantly, is that an overall awareness of what and why we need to collect information in general be established. It is equally important to encourage the use of the information collected at all levels, especially the school. This can be done through giving feedback information to schools such as summary comparison of schools, districts, urban and rural schools, boys and girls, etc.

The basic 'awareness-type' training and methodology in planning, monitoring and evaluation, research, and training of trainers should also be introduced to lower-level administrative units in schools and institutions.

Central EMIS management can benefit by encouraging and practicing self-learning and group learning by using those professionals in the office who are more knowledgeable. Cultivating a culture of developing personal interest and willingness to exert efforts to learn and teach others in the office will benefit all.

Self-learning:

Self-learning is one way of increasing skills in EMIS as the facilities and know-how are available within EMIS. The best way of learning is to consult, practice, and practice again to develop one's own skills and produce better results. EMIS should encourage the method of self-learning by creating good team spirit and fostering mutual support at all levels.

Group learning:

Everyone in EMIS is surrounded by a group of professionals within or just outside EMIS. Of these individuals, there will be someone who knows more than someone else. Encouraging and promoting group learning with colleagues in and outside the office will bring in skills that enable produce better output.

Finally, it is the ability to use the opportunities provided by the MoE itself (top down effort). These include long-term training, workshops, seminars, and meetings, as well as the efforts made by central EMIS to train its own staff (bottom up). As Dunham Rowley puts it, this is building social capital within one's own working environment. Ultimately, achieving better outcomes all depends on the willingness, understanding, and competency of management and feedback services in correctly analyzing problems and identify training gaps, and coming up with strategic planning and strategic management approaches to capacity-building.

What is needed is strategic planning and management that can identify gaps quickly, create situations for continuous learning in a changing environment, and apply new skills to enhance further organizational learning and skills development.

Exercise 8

In view of the manpower available, identify the training needs of the EMIS unit in your MoE. Separate long-term training from short-term training and specify who needs what type of training and for how long. How about training professionals at intermediate level?

L. Planning

Planning is important for every activity we undertake. EMIS is no exception, for it is true not only of the data collection life cycle, but of every functional step such as planning,[5] monitoring, evaluation, training, and research, as well as the other activities that take place to assist us in achieving our goals. Without proper planning we cannot engage ourselves efficiently in plan implementation, or meet deadlines, or achieve the high performance level desired in all EMIS activities. Knowing what has to be planned is equally important as scheduling the activities themselves. To achieve the desired goals EMIS must:

a. Develop an EMIS strategic plan for the year.

b. Ensure successful implementation.

c. Achieve high performance that is sustainable over time.

It is important to look closely at these three simplified objectives, and devise a strategy for achieving each of them. Our suggestion is to use the systems thinking approach and establish goals and objectives right at the very beginning.

We start with the future state.

1. What is our vision? Where do we want to reach? This is to be stated clearly in our plan document. Specifically, we identify what we want to achieve by engaging in strategic planning. Essentially, this means stating our dreams clearly and referring to them from time to time. The plan document is used as a guide for plan and plan implementation.

2. The next step is to analyze feedback information, taking into account the environmental conditions – the context in which we develop our strategic plan – and the economic, social, and political environment in which we operate.

3. This is followed by analysis of the current state. What do we have today? This could be investigated in terms of the availability of manpower, either

[5] *Plan to plan concept.*

in terms of quantity and quality, or in terms of the available facilities (hardware, software, including networking facilities). It also involves an assessment of the current state in relation to important functions. A tour through survey administration, data processing, data analysis, publication, dissemination, and feedback status to identify gaps and get feedback to the next strategic plan period. Is the budget to enable us carry out effective plan and plan implementation available?

4. We then prepare a detailed plan implementation program. This contains a list of activities, responsible person/s or group, a time frame/deadline, expected output, and cost estimate for all activities.

A strategy for monitoring plan implementation is designed here. It will collect feedback information to enable us to measure the progress of the plan implementation.

In our planning and programming, all activities are well detailed and listed and are, from time to time, for monitoring purposes, used as a reference during implementation. This will be an important document for reference during evaluation. A well-structured plan is not only easy to read and understand, but also assists in monitoring and evaluating the program.

It is important to realize that, like every adult, we learn by doing and that we should expect change or improvement in every yearly cycle. In planning, it is useful to note the following points:

- The work process
- Planning to plan
- Effective implementation
- Checking the implementation is done correctly
- Taking measures to use and incorporate knowledge acquired through the process
- Planning the strategy to collect feedback information

Exercise 9

Planning is important for all activities we do. What do you think you can achieve by undertaking planning and programming for EMIS activities? List and discuss the advantages for each procedural steps discussed in this manual.

M. Monitoring and Evaluation

Monitoring is an important component part of our work. It is part and parcel of EMIS activities when establishing what has been planned and implemented, and what remains to be done. Monitoring is our tool to investigate into, see, and learn not only what has been done but also what problems were encountered on the way. More specifically, monitoring allows us to see how these problems were tackled and paves the way for future enhancement of the implementation program.

Bamberger defines monitoring as follows:

> *Monitoring is a continuous internal management activity whose purpose is to ensure that the program achieves its defined objectives within a prescribed time frame and budget. Monitoring involves the provision of regular feedback on the progress of program implementation, and the problems faced during implementation. Monitoring consists of operational and administrative activities that track resources acquisition and allocation, production or the delivery of services, and cost records'.* [Valadez and Bamberger]

Monitoring allows us to review our original objectives, so that we can check that we are on the right track. It enables us to establish whether we can produce to deadline the output as outlined in our planning and programming document and within the given budget. Thus monitoring demands a regular and systematic gathering and analysis of information on the implementation of EMIS activities. Information on the management and administrative style used and the resources allocated are equally important.

It is important to note that monitoring is the collection of information in a systematic way, carried out in the hope of learning:

- What has been done, and in what way?
- What problems have been encountered during implementation and how we have tackled them?

- What lessons or 'best practice' can be learned for future implementation, with the goal of improving the functions of EMIS in today's changing environment?

In our plan, the core elements (procedures) of EMIS's function are laid out in detail, showing the time frame for the expected completion date of the activities. Three months later, for example, we will check what is happening in comparison to the original plan and schedule in relation to data collection, processing, analysis, publication, distribution, dissemination, and feedback, including the management and administration of different activities. In other words, we check that:

- The instruments of data collection are designed/reviewed, with changes incorporated from last feedback information
- The pre-testing of the instrument is done
- The instrument is published and the allocation to provinces, districts and schools is done
- Distribution to school is done and a follow-up mechanism is in place to monitor the returns (filled questionnaires that are returned to the processing centre).

It is important to delegate this important function to districts, and free them from all other routines. By so doing, the monitoring of survey instruments can be effectively done and reported to the district, who in turn reports to the province. This feedback of results to districts is absolutely essential. In turn, the districts are responsible for providing feedback to schools, something that often depends on the financial capability of the district offices.

In a decentralized system, data processing is done at province level. The provincial office is responsible for processing and distributing the results to central office as well as to the district offices. Provincial offices are also responsible for hosting series of training for district offices and their own training schedules provided by central EMIS. These activities are to be tracked and monitored.

Data processing is another important function of EMIS, and many aspects of this work require specialized professional qualifications. Through it, we check whether the requirements analysis has been done[6], the data capture

[6] *It could be that requirements analysis was done earlier and, hopefully, documented. The monitoring function looks into those documents and checks on the modifications, or other additions based on the feedback.*

computer programs or modules are prepared, and whether they are up and running. Checks are also made on the software in place – both back end and front end – and that a standby maintenance schedule is in place. Finally, we check how comfortable the users are and how user-friendly the program is. The data entry clerks are recruited and trained and provided with the necessary user manuals.

Data analysis is performed on specific occasions. Analytical output is required for output publications such as annual abstracts, quick references, and indicators reports. A significant proportion of analysis time goes on responding to users' needs – rendering information services. This includes briefing to superior bodies, analytical feedback for planners and decision-makers for both internal and external users, workshop training preparations, response to research needs, and so on. Here, the role of monitoring is to see to that these analytical reports are produced and that they strongly relate to the policy and overall development of the education section within the country. In other words, what is produced has to correspond to what is required. Through monitoring we also check that the use of qualitative indicators is in place to support the quantitative outputs. In practice, this depends on the adequacy of the budget and willingness on the part of decision-makers and planners.

EMIS produces major publications for general use, one of which is the annual statistical abstract. In some countries, EMIS has also made an effort to produce quick statistical references. Many countries produce indicators reports. We encourage the regular publication of all these documents. Here, the role of monitoring is to see that these products are published, in hard copy and on websites (whenever possible). Abstracts, quick references, indicators reports, and other ad-hoc reports and research results can be published on the web for those users who are not victims of the digital divide.

Dissemination is the word we employ to mean '*reach out to users as much as possible*'. It entails the spread of educational information for all active users and potential users. This is done through training, briefings, distribution of publications and products, and formal and non-formal discussions.

Feedback is the reinforcement to the system, i.e. it is the information collected as a result of the information put to use. Such feedback information can be collected through a clients' service within EMIS unit of the MoE. Many different types of users – government and non-government institutions, civil societies, students, teachers, planners, researchers, donors, private

organizations and individuals – come to the MoE asking for information. Hence, recording, documenting, and using such information is a good reinforcement for future publication.

Finally, there is the monitoring of the management style and administration within EMIS. This includes the type and content of training and its relation to the need of the users, communication, collaboration, the self-learning environment, and the assistance of staff within and outside EMIS. Also investigated is the network of communication between provinces, districts, and schools, including the role played by central EMIS in strengthening the lower tiers. Here, the following issues will be addressed:

- What was planned?
- What was actually done?
- Was there a gap?
- Was the deadline met? If not why not?
- What problems were encountered?
- How were the problems tackled?

By seeking answers to these questions we are preparing to plan for monitoring activities. We prepare the monitoring reports, like all other reports, with the user in mind. In other words, we consider who the monitoring report is for thinking about who will use the outcome is a good guide to input when the report is being prepared.

Exercise 10

Planning for monitoring activities is one of the basic tasks we undertake. List essential steps that you need to take for monitoring activities when you do your annual planning. Discuss the type of information you need to collect taking into account all the procedures we discussed in this manual.

Evaluation

'Evaluation is an internal or external management activity to assess the appropriateness of a program's design and implementation methods in achieving both specified objectives and more general

development objectives; and to assess a program's results, both intended and unintended and to assess the factors affecting the level and distribution of benefits produced.' [Valadez and Bamberger]

Evaluation is basic for every activity/task we undertake. EMIS activities are no exception. Evaluation can be done internally in the form of self-evaluation, or externally or by professionals from the user community. In this manual we emphasize self-evaluation, with the objective of improving implementation and management style. This involves looking back to what we have done and realizing the strengths or weaknesses, learning what to modify, and extracting 'good practices' for further implementation to ensure better performance. New ideas and innovations are assessed and followed, and studied and put to practice in our ever-changing environment.

What to evaluate? We look at all the activities, starting from data collection to feedback gathering (as indicated in the appendix), and establish what we have completed. We also test our implementation procedures to see if we arrived at the desired output and effectively implemented the plan to the best of our satisfaction. Special attention is given to the problems encountered and the method used to tackle them.

For whom is the evaluation done? Evaluation can be done for ourselves – to learn from out mistakes and improve implantation procedures – or for the superior body, who may demand such an evaluation report. It may also be done for external users such as donors. Within EMIS, such evaluation is carried out to ensure development, and to assess the progress made by EMIS, although the results may be beyond EMIS, from a superior body to the user community. The main thing is to have a written report ready.

When should evaluation be done? Evaluation can be done prior to the beginning of the school year, at the middle of the year, or at the end of the school year. The first review is the source of information for feedback from the past, and this information is discussed and incorporated into future implementation plans. The best example of this is the data collection instrument and the feedback obtained from the information services dissemination function of EMIS, which may run parallel to the preparation of the instrument(s). The mid-year review is important for compiling feedback that could be included in the analysis and publication of the outputs (reports of different kinds). The end of the year marks a compilation of the first two reviews and analysis, of which the synthesized summary can be incorporated in future implementation procedures.

How do we evaluate? Evaluation is part of the annual plan. It has an instrument – data collection – and a time frame or deadline for review. We look into EMIS activities one by one, from data collection to feedback review, including the management and administration style, the progress made, and the successes and failures. We also consider, the contents of the data collection instrument from the points of view of needs and coverage of the MoE, how user-friendly the data processing program is, and the level of quality analytical reports produced, etc. Moreover, the feedback information, outputs and products, publication, reports, workshop proceedings and review reports and other useful notes and plan documents all have to be reviewed in a similar fashion.

The core purpose of evaluation can be summarized as follows:

- To improve the overall performance of EMIS functions
- To explore choices that are available to us
- To learn valuable lessons and better manage the work for which we are accountable.

Evaluation can also be done externally, perhaps by other Ministries, Government agencies, or the donor community. This provides us with an outsider's view of EMIS functions in relation to other activities within and outside the MoE. This may be carried out, often indirectly, every three, five, or ten years. However, it is unlikely that an external evaluation is carried out without it being in relation to other research activities or other project evaluation programmes. The following general outline of the evaluation work process may be of assistance when planning an evaluation.

- Clearly state why the evaluation is required and who is to use its outcome
- Recall the overall goals and objectives of EMIS
- Identify EMIS activities fully and the methods used for:
  - Data collection
  - Programs used for data capturing and processing
  - Analysis
  - Publication production and the mechanism of distribution
  - Strategies used to collect feedback information
  - Systems in place to render information services to users

- Determine whether programme activities are sufficient to achieve the set objectives
- Design a data collection and capturing methodology, including analysis and storage
- Collect data checking at every stage, to ensure that the methodology used is leading to the desired output
- Process and apply data analysis
- Organize reports in such a way that they can be used for decision-making
- Prepare summary reports and main reports for different users
- Ensure all users of the evaluation result(s) receive copies of the report
- Develop a plan to act on the results of the evaluation

Exercise 11

The EMIS management cycle is different every year. Thus, there is a need to evaluate the performance of previous year and document the report. What is the purpose of such evaluation? How does this help future enhancements? Discuss.

N. Decentralization

In the context of EMIS management, decentralization is defined as the *share of authority, responsibility, accountability of data collection, processing, analysis, publication, distribution, reporting and dissemination of information to lower levels of administrative units*.

Sometimes other authors use the word 'transfer' when discussing about decentralization in place of 'share'. This eliminates the chances of working together, assisting one another, and learning from each other, and so on, all of which are vital elements in a properly-functioning EMIS. It allows us to share the workload between the centre, provinces, districts, and schools, or lower down (where appropriate), to work together and solve problems together for common end.

Although some provinces and districts are relatively well off, not all of them have sufficient equipment or qualified manpower capable of doing the required job nor the capacity to develop data capturing and retrieval programs. Thus, mutual assistance is necessary, which requires a competent management team to coordinate the work and render assistance to those who find it difficult to keep up. Hence, the role of the central EMIS is to standardize the data collection instrument and develop a standard data capturing and retrieval computer program that can be shared by provinces and districts and develop a data quality follow-up mechanism. This is useful, not only for ease of use and enhancing data comparability, but also for sharing resources and reducing costs.

Provinces often collect more information than is required by central EMIS, and it is to the advantage of all that they use the same platform for data collection, processing, analysis, and dissemination of information. Imagine a situation where some provinces use different software for data capturing and retrieval purposes! It is difficult, if not impossible, to assist these provinces in any way or share resources. Moreover, it takes much longer to relate reports coming in from these provinces and obtain an aggregate (which will be less accurate) at higher level. A single data capture/retrieval program can be used by all districts and provinces.

It is also important to note that the work of one district or province is not complete without the completion of the work of the others. Where all the districts but one have reported on time means that work is now incomplete at provincial level, and so on. Ultimately, it means the report and the annual plan preparation will be delayed. Moreover, one of the objectives we started out with – to make accurate and timely information available to users – cannot be met.

The decentralization of EMIS to lower levels also means, as was mentioned above, sharing authority, responsibility, accountability of data collection, processing, analysis, publication, distribution, reporting, and the dissemination of information to the different departments within the MoE. It is EMIS's responsibility to assess the demand and supply of information of each department and division of the MoE. This is quite often forgotten, simply because the emergence of EMIS as centre of information and training is relatively new in sub-Saharan Africa. There may not be sufficient manpower, both in terms of quantity and quality, in many African countries. Moreover, the importance of establishing such information centre within the MoE is not always fully understood by some countries. To rectify this, more awareness work should be done.

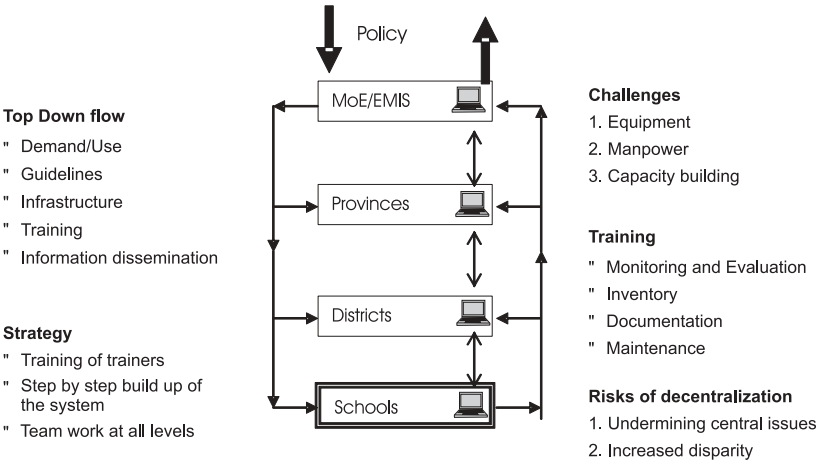

Figure 10

The above figure shows our vision in relation to EMIS decentralization, in which provinces, districts and schools are networked. In such a set-up, data capturing is done at school level and the output is sent electronically to

central EMIS. Provinces and districts retain copies for their own use. However, this is a long-range vision that cannot be achieved in a short time. Moreover, moves towards this can be made by implementing decentralization step by step. For example, the data entry and retrieval system can be initially decentralized to provinces, and later to districts, when considered appropriate. To accomplish this in one fell swoop, providing the necessary manpower, materials and facilities at all levels, would be very expensive.

Advantages of decentralization:

1. The routine workload at central EMIS relating to data collection, data entry, and monitoring of returns will be lower. Its staff can now use the available time for data analysis, training, and other more innovative activities. Summary statistics will be collected from provinces electronically, either on diskettes or by email (where applicable).
2. The work of EMIS will attract more attention and more coverage. Provinces can now collect more data than the centre requires and use it to their own advantage.
3. The quality of data collected should improve. However, more technical support and awareness-training has to be given to provincial staff through regular short- and long-term training, in which details for the working procedures and problems are addressed.
4. It is hoped that provinces will provide better services for provincial-level information users and those at central level reporting by increasing their own level of awareness over time.
5. Central EMIS will have more time to train provinces and coordinate their work. EMIS will also be able to more strongly assess the work of the provinces and assist them in sharing technical expertise and introducing new innovations.

Disadvantages of decentralization:

The main disadvantage of a decentralized EMIS is that provinces may underplay the role of the central standard data collection instrument and data capturing and retrieval programs and try to modify the content or the layout of the instruments. This, as we discussed above, is only to the disadvantage of both the centre and the provinces. It is therefore important to take up this issue and resolve the problem through discussion.

Exercise 12

Decentralization, with regard to EMIS work, is the sharing of responsibilities between different administrative units. What do you think the main advantages of decentralized EMIS systems are? Decentralization also means sharing responsibility between different departments. How does this work in your country? Discuss. In your opinion, or from your experience, what are the disadvantages of decentralization? Discuss.

O. Research Functions

The basic statistics we collect regularly every year do not provide all of the information needed for decision-making and planning purposes. Additional information needs be collected through pilot studies and research undertakings.

Moreover, EMIS analysis of regularly-collected data can bring out further issues that need to be studied closely. Hence, EMIS management should be prepared to undertake research activities that throw more light on different educational issues. Schools must be visited to gain knowledge as to how records are kept at school level, how teaching and learning processes take place, and how teachers and school heads perceive the use of information for planning, etc. Such issues help to strengthen EMIS's acceleration along the road towards achieving its goals.

EMIS, by virtue of the facilities and skills available, has the responsibilities of assisting other experts and analysts in research data processing and of training experts in the software skills required for data analysis and research. Engagement in research is one of the methods used for strengthening EMIS and learning more about not only the work process in EMIS but also of policy-anchored information services.

Exercise 13

As EMIS person, you have access to aggregate data from schools. However, quantitative data alone does not give you all the information you require. You will, at some stage, need to supplement quantitative data with qualitative data. Discuss how so doing can help you perform better in your work.

P. Establishing EMIS

Many countries in sub-Saharan Africa already have some form of data collection system in place. In the last decade, through the NESIS capacity-building programme, awareness of the top decision-makers of the necessity to strengthen the education information system at the MoE has increased. At present, several countries are working towards obtaining, at the very least, the basic indicators of an education system. Many countries are now asking for guidelines on how to go about establishing a strong centre for organizing information for the management of education. In this regard, the following points are useful:

1. *Dreams* – Start by formulating your vision of what you want to achieve. This is a basic starting point. Write it down, in a short and concise form. Ask yourself 'What is EMIS?' and 'Why do we need it?' In other words, you must have a vision statement. It might be necessary at this stage to draw on other countries' experiences.

2. *Scanning the environment* – Study carefully, and with purpose, the environment in which you are working. Consider the MoE and its departments and sections in relation to what they are doing now, and what they want to do in the future, etc. Identify the role EMIS can play and what remains to be dealt with within each department and section. After all, EMIS alone cannot be held responsible for every information needed for MoE. Every department, section, province, district, and schools share this responsibility.

   Assess the capability of each level to collect information and establish what sort of information is to be collected. Acquire a general knowledge of your country's social, political, and economic situations. Some knowledge of the layout of physical infrastructure and facilities is also useful. Assess the level of the digital divide in and around your office.

3. *Feedback information* – Collect and compile feedback information that relates to your vision statement. This is very important but is often forgotten. Users may say something of great importance that relates to your vision and needs to be taken into consideration for further refinement of your plan of action and learning process.

4. *Today* – Carefully assess what you have today in terms of a plan and plan implementation, a strategy for feedback information, training, monitoring mechanisms, overall management, manpower, facilities, etc. Look at the strengths, weaknesses, opportunities, and threats to the current situation in line with data collection, processing, and compiling feedback information. Also consider the level of coverage of activities, and the problems and successes achieved to date. Equally important is to know the budget available to carry out the plan.

5. *Putting it together for action* – By now we have put together our vision statement, compiled feedback information, and assessed the environment and the strengths and weaknesses of the current situation. We have also identified the budget available, including manpower and the materials needed. This leads to actual planning and programming where detailed program activities are prepared. The programs must include such important functions as a monitoring mechanism, and a strategy for compiling feedback information that starts with data collection.

6. Ensure the successful implementation of the plan. Review the plan on yearly basis.

Success factors

In addition to the steps outlined above, the following points are considered as success factors for establishing and strengthening a MoE's EMIS system.

- Include core professionals in EMIS and major users in the whole process. It is true that 'people support what they help create'
- Throughout the whole process, keep the user at the centre of your focus
- Aim at a high and sustainable performance level at all stages of the development process. This can be achieved through self-study, team learning, and effective communication
- Use feedback information effectively and efficiently to ensure continuous learning and enhancement
- Encourage and assist departments that collect data for their own consumption within the MoE to make use of this information in their decision-making processes

- Assist, work closely together, and establish regular contact and communication with departments, provinces, districts, and schools
- Organize a regular training program for all stakeholders, schools in particular, as and when the need arises

Exercise 14

Is establishing a unit within the MoE in your country necessary? Why? Discuss. Has establishing EMIS in your MoE helped to increase the overall performance of your country's educational development? How? Discuss.

Q. Challenges of Building EMIS

EMIS is a relatively new concept that arose from the need to embark into a more coordinated form of management for information on education. All MoEs have a 'statistics' section that is responsible for collection of education statistics. It is this section that is being transformed to EMIS to give a wider look at and more coordinated approach to processing educational information from schools, departments of the MoE, and other educational institutions. EMIS'S goal is to compile more comprehensive and policy-oriented educational information.

With the growing global demand for information and increased volumes of work, the demand for facilities such as computers has increased tremendously. This, in turn, has given rise to institutions requiring more highly-trained professionals in computing and more computer knowledge on top of the existing need for professional training in statistics and data analysis capability. In order to meet these demands, commitment from decision-makers is essential if a budget for procurement and training is to be allocated. However, building EMIS in some countries in sub-Saharan Africa has not been easy. There are still challenges ahead, including:

Awareness: One of the main ideas of having a coordination unit for information within the MoE is to enhance the level of user awareness among planners, decision-makers, researchers, experts, decision support systems, and administrators in the MoE. Although substantive work has been done, there is a long way to go when it comes to the level of awareness on the use of education statistics in decision-making in sub-Saharan Africa. The use of information for this purpose has yet to take root.

Budget allotment: One of the measures or indicators of the level of awareness is the willingness, on the part of decision-makers and planners, to allocate the necessary budget for developing EMIS within the MoE, and the willingness and dedication to immerse oneself in the process of strengthening EMIS on the part of EMIS staff on the other. In this respect, the acquisition of new technology, mailing data collection instruments to schools, and undertaking research and surveys to supplement statistical results are some aspects of budgetary requirements that are worth mentioning.

Self-initiated learning: The initiative to learn on the job, be innovative, and create future vision among EMIS leadership is, at times, lacking. The dedication to sacrificing personal time and persevering in initiating dialogue with decision and policy-makers in the hope of achieving future visions is equally lacking among statisticians and computer professionals working in EMIS.

Personnel shortage: Trained professionals are in short the ministry of education does not attract professionals from outside. Long-term training for professionals in EMIS is not always available. At times, budget for in-house training of EMIS professionals and workers is low.

Overrating the capacity of EMIS: The attempt to create a unit to coordinate information systems for education, coupled with the emergence of fast-growing technology, has led to a need for both short- and long-term training. Before they can produce, professionals in EMIS need to learn. The fact that it takes time to develop such capacity has not been fully realized by decision-makers within the MoE. Furthermore, seldom are enough personnel assigned to central EMIS and information users demand more output than these personnel can reasonably be expected to produce. Unfortunately, a 'computers can do everything' attitude prevails.

The need for continuous training: In the light of fast-changing technology and the very professional nature of the EMIS work, all EMIS staff have to work in an environment of continuous learning, and implement the knowledge gained through time. These needs and efforts are often overlooked by decision-makers.

Exercise 15

Consider the EMIS unit in your country. What challenges does it face? Share your experiences with others. How is this different from what has been observed from other colleagues from other countries?

R. Communication and Information Services

Communication is another essential component of the EMIS management system. Communication here refers to the ability to convey results to users in a simple and understandable way. Thus it involves two parties: the sender and the receiver. The objective in communication is to put across the intention of the producer to the user as understood by the sender and make sure that the receiver has understood it correctly.

To do this, the sender (in this case EMIS) has to have established objectives, a planned and well-organized way for communicating yearly analytical findings from cross-sectional analysis or time series finding to receivers (users of all kinds), and be able to motivate them in the use of and appreciation of the information in decision-making and planning processes. Only this will effect change and bring about positive development within the MoE.

The media of transmission include:

- A written report
- Annual abstracts
- Indicators report
- Electronic transfers
- Briefings
- Individual or group discussions
- Workshop presentations
- Telephone conversations
- Email communication
- etc.

Accurate communication takes place when the receiver attaches the same meaning to the information as intended by the sender. Accordingly, more importance is given to the content of the message passed to the user.

EMIS managers need to communicate:

- The objectives of EMIS to policy and decision-makers and establish the success of the vision of the unit
- Develop a strategic plan to achieve these objectives
- Organize and train staff to realize the objectives and goals of EMIS, which is not a one-man show
- Create an environment conducive to leading, directing, and motivating EMIS workers to effectively communicate with users

Managers need to communicate the yearly findings to internal and external users. More specifically, these users are departments and sections within the MoE, decision support systems, provincial and district managers, individuals, and other organizations. Managers also need to highlight those findings supportive of the overall objective of the MoE.

'Information service' refers to attending to users and rendering services to all. This can be explained in two ways

1. Giving support to information seekers. Users contact central EMIS requesting varieties of information, from individual school information to different kinds of aggregate data and analytical reports. Central EMIS is responsible for catering to such requests and, when retrieved, arranging the best way to pass the required information on to the users.
2. Making known the results of findings of the annual or time series information to users by using such occasions as workshops, meetings, group discussions, or ad hoc reports. It is to the advantage of both producers and users to know the outcome of, for example, the annual survey analysis, research findings, student performance level, and teacher qualifications in order to support decision-making.

Exercise 16

'One of the things that retards our work is a lack of proper communication'. Do you believe this is true? Discuss. Recall and discuss our earlier discussion about the importance of the user in our work. How does communication relate to the user? Discuss. Assume nobody uses any EMIS product. What happens? Discuss.

S. Documentation

One of the most important parts of our role at EMIS is documenting the results of our work. This is another area that is often forgotten or overlooked. Simple reports, abstracts, policy papers, mechanisms for feedback information collection, methods of monitoring activities, evaluation reports, technical and training manuals, and hardware and software manuals, etc. all have to be documented, not only for our own future reference but also for the next generation. So doing saves time, money and manpower; when results of our work are properly documented, future generations will be able to build on and learn from what we have done. They will have no need to repeat what has already been done but will be able to continue producing reports based on existing records and data.

Let us therefore preserve the outcome of our work for future professionals, who can use it to build even better systems. Give copies of your reports, abstracts, and policy papers to libraries and other documentation centers so that users can have access to it. Encourage planners, decision-makers, and users to use the resources and provide feedback. Students and teachers can find our products in the libraries within the MoE and other documentation centres such as teacher training institutes and university libraries.

For effective documentation, ensure that:

a. All records are kept in a safe place and are easily retrievable when needed.

Such records include:

- Data collection instruments
- Software and hardware manuals
- Abstracts
- Reports of various kinds
- Planning documents
- Feedback information records

- ❖ Evaluation reports
- ❖ Indicators reports
- ❖ Physical and computer files of various kinds

b. A responsible person is assigned to handle records management, and if not full-time then at least temporarily.

c. There is a clear description of what records there are, and how and where they are kept, so that accessing them is easy.

Exercise 17

We discussed the importance of documentation for all activities we do. Consider the EMIS in your country. What are the problems that relate to documentation? What good documentation culture is in place? Discuss.

T. Summary and Conclusion

Establishing and strengthening EMIS is effectively achieved when the top decision-makers realize the importance of information systems development for all functions of the MoE and commit themselves to establishing or strengthening an EMIS system by encouraging EMIS staff and allocating the necessary budget. In addition, an able, dedicated and willing management team at EMIS that can give necessary leadership in the development of an information system within the MoE is also a key requirement.

Further requirements of the EMIS management team are that it co-ordinates resources and personnel, provides leadership with vision, and explores the environment for high performance by using essential feedback information. Hence, a competent manager is required.

Finally, EMIS management must be able to take on board all stakeholders, especially the users, and achieve continuous dialogue about what is required and what can be achieved both in the short- and long-term. Management is also responsible for working with EMIS staff so that they realize the importance of the role of users in the play in the effort of establishing and strengthening an information system within the MoE. Management must also encourage EMIS staff to pool their expertise and work together, learn from one another, and be innovatory in the approach to achieving a common goal.

The ability to use the systems thinking approach of looking into the future, working back through the feedback information, assessing the current state, and planning well with good grasp of the environmental factors taken into account is indispensable. This applies to all the procedures discussed above and all relevant activities that strengthen EMIS within the MoE. Having a clear vision or dream of the future is the heart of every system.

Training personnel in EMIS, and outside EMIS but within the MoE, is a *sine qua non* of success. Learning from our own successes and failures enhances our own knowledge and provides feedback to effective problem solving strategies at a higher level. This is usual practice for any learning organization. It allows management and the EMIS team as a whole to tackle problems, leading to mastery over the skills needed to achieve the goals.

The role of EMIS is to strengthen national capacity to provide accurate, timely, and relevant information for policy-makers, planners, decision-makers, and decision support systems. In order to be able to do that, EMIS needs to develop the ability to:

a. Build a sound vision to develop an information system that supports the overall development of the education system.

b. Work and hold dialogue with users of information and learn from them on a continuous basis.

c. Plan the planning of change management effectively, implementing the plan, and developing the ability to learn during this process for the benefit of all EMIS personnel and the user community as a whole. Every year there is a change, every year we plan for a new year. Hence, a yearly assessment of every activity is needed.

The quality of the products we generate will have a far bigger impact than we can anticipate in catching the attention of users and drawing them towards information use. The more information is used the stronger the demand for it will grow and, the better the use of quality information, the better will be the decisions made, which will further advance the overhaul development of education. Hence, the EMIS leadership has to aim at and prove that the quality of all its system components is maintained. Without strong and innovative leadership and commitment of top decision-makers, a good quality EMIS system cannot be achieved.

U. Appendices

Appendix 1: Education Management Information System

Major activities planning guide

Activities	Time schedule	Responsibility	Cost estimate	Expected output	Expected outcome	Remarks
A. Survey Administration						
1 Needs assessment						
Instrument design/Review						
Pre-testing						
Publication						
Distribution						
Follow up						
B. Data Processing						
Requirements analysis						
Program design/review						
Testing						
Implementation						
Data entry						
Data cleaning						
Maintenance						
C. Data Analysis						
Requirements investigation						
Planning the analytical framework						
Draft content outline and dummy tables						
Collect and compile source data						
Compile report						
Edit report						
Evaluate the report						
Finalize report						
D. Publication						
Planning a publication						
Compile						
Process publication						
Publish						
E. Distribution						
Identification of main users						
Prepare/update users' list						
Mailing						
Web posting						

Activities	Time schedule	Responsibility	Cost estimate	Expected output	Expected outcome	Remarks
F. Feedback						
Prepare feedback data collection format						
Feedback data collection						
Review feedback information						
Incorporate feedback information						
G. Evaluation						

Appendix II: Dakar Goals

'Preparing for Dakar Goals'

(Source: http://unesdoc.unesco.org/images/0012/001211/121147e.pdf)

We hereby collectively **commit ourselves** to the attainment of the following goals:

(i) Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children

(ii) Ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to and complete free and compulsory primary education of good quality

(iii) Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life skills programs

(iv) Achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults

(v) Eliminating gender disparities in primary and secondary education by 2015, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality

Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy, and essential life skills.

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