1.1 To understand the importance of data and information for education planning at the local level.

1.2 To be able to define the purpose and function of an education management information system and to distinguish different data systems that can be found at the local level.

1.3 To gain basic knowledge on how to use data and information for evidence-based decision-making as well as for monitoring and evaluation.

1.4 To learn from the lessons of other countries and be able to select and adapt relevant practices to suit the local needs.
<table>
<thead>
<tr>
<th>Module</th>
<th>Focus</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td></td>
<td>Provides an introduction to education microplanning, the functions it can serve and examples.</td>
</tr>
<tr>
<td>Module 2</td>
<td>Getting started: Initiating an education microplanning exercise</td>
<td>Getting prepared for an education planning exercise at the local level: spatial, social, economic and educational considerations.</td>
</tr>
<tr>
<td>Module 3</td>
<td></td>
<td>Conducting a needs assessment – instruments, data collection and analysis.</td>
</tr>
<tr>
<td>Module 4</td>
<td></td>
<td>Getting to understand local needs through engaging communities in planning and building capacity.</td>
</tr>
<tr>
<td>Module 5</td>
<td>Data and information for decision-making and planning</td>
<td>Using data for understanding and improving education at the local level: assessing the outcomes of planning in areas such as access, participation and learning.</td>
</tr>
</tbody>
</table>
In the previous modules of this toolkit (Modules 1 to 4), you have learned the basic techniques, processes, skills and tools for conducting education planning and how to improve learning at the local level through addressing issues relating to curriculum, assessment and teaching processes.

This module will address the topic of using data and information to improve education at the local level. It covers the following topics:

1. Why data and information are needed for the management of education at the local level.

2. What different education data systems may exist at the local level, either as a unified system or separate, fragmented systems.

3. How data and information can be used for planning and monitoring actions at the local level.
4.1 Why data and information are needed for education management

Each system is unique in the way it functions and in the results it produces. This uniqueness can often be revealed through the data and information the system collects and produces.

The education system is not an exception to this rule. Indeed, the growing complexity of education systems and the need for better regulation, coordination and accountability have made data and information essential elements of the administration, planning and monitoring of education. Without data and information, it is difficult to make good decisions.

Information provides the foundation for evidence-based decision-making at every level of the system (Carrizo et al, 2004). The various actors at different levels of management need to be informed of the performance, issues, needs and challenges of the education system.

The various actors have different information needs. For example, while students need information on the content of education, methods of evaluation and eventual benefits of learning, the teacher requires information of a pedagogical nature such as the curriculum, course organization and teaching methods. The teacher also needs to be able to monitor and evaluate the progress students make in their learning. The school principal needs information about admissions, registration and attendance of students and the performance and participation of teachers and other staff. The planner requires information about the achievement of educational objectives and targets.

The actors in the education sector (a teacher, a school principal or a decision-maker) need timely information that is relevant and easy to understand. This is quite different from the raw data that is often found in bulky official publications.
Table 1: The difference between data and information

<table>
<thead>
<tr>
<th>Data</th>
<th>Unprocessed figures and facts, e.g. the number of pupils enrolled in a school.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>Data that has been processed to make it meaningful, e.g. a report that describes the changes in pupil enrolment rates over time, and explains the possible reasons for those changes.</td>
</tr>
</tbody>
</table>

Education systems collect data from several sources and use various methods of data collection. The various methods of collecting data are presented and explained in Module 3.

Although data are generally collected in most education systems, they are not always analysed and used. The data that are collected are not always published, except in the form of bulky reports with raw data, incomprehensible statistical tables and little analysis.

Data by itself is of little use unless it is analysed to draw out meaningful information, and when there is a framework in which the information can be used for monitoring and evidence-based decision-making.

In the fast changing world today, analytical work is becoming more and more critical for policy decisions and learning enhancement. This analytical work involves the development of policy-related questions, construction of measurement techniques, data collection and analysis, and production and dissemination of policy-relevant information. The effective utilization of data requires specific skills and capacities but also a policy environment that encourages and supports the use of information for evidence-based decision-making.

Management involves verification and monitoring of services in order to detect progress and shortcomings. Questions that education managers often ask include: Do we have enough human, physical and financial resources to operate properly and produce the expected results? Are young people attending school? How are they learning? Do the educational services that are provided respond to their needs?
4.1.1 Information flow across levels of decision-making

To be useful, data and information should be adapted and made accessible to all levels of decision-making in the education system.

One can distinguish three main levels of data use, which correspond to the tasks of the three levels of education administration in most education systems: macro, intermediate and micro.

The macro level of administration is responsible for strategic decisions concerning the planning of the whole education system. The category of decisions at this level concerns the general policy directions. The information required here are aggregates that are used for setting and monitoring the policy objectives at the national and regional levels.

The intermediate level comprises decision-makers who are in charge of management and supervision with regard to the allocation and monitoring of resources. This level translates the general policy directions into more technical, operational decisions. It therefore requires more specific data to ensure efficient and equitable distribution of resources, to detect possible shortcomings and to optimize the use of resources.

The micro level corresponds to operational tasks of defining the use of allocated resources to deliver education services and to translate them into concrete results. This level is concerned with more routine activities closer to the school. The decisions here have local and immediate reach and hence will require more detailed, disaggregated information.

Thus, the three decision-making levels require distinct types of information. The levels sometimes overlap, however, and they are linked with each other because decisions at the macro level are only relevant and efficient when they are based on precise and reliable information gathered from the lower levels. To fulfil its role and functions, the information system should necessarily integrate the complex relations between the different levels of decision-making.
The diagram below shows the differences and links between the uses of information at the three levels of decision-making.

**Figure 1:** Use of information by level of decision-making

![Diagram showing the differences and links between the uses of information at the three levels of decision-making.](image)

Source: Carrizo et al, 2004. The figure has been adapted for the purposes of this module.

To strengthen management, planning and dissemination of information at all levels of decision-making, the education administration has to:

- Improve capacities in collecting, processing, storing, analyzing and disseminating data in order for managers and educators to base their decisions on timely and reliable data.
- Reduce and eliminate duplications in data collection.
- Coordinate efforts in acquiring, processing, analyzing and disseminating education data and information.
- Integrate, link and interface existing data and information systems.
- Adapt data collection to the constantly evolving needs for information.
4.1.2 Education management information systems

An education management information system (EMIS) is a sub-system of an education system that collects, stores, processes, analyses and disseminates data for the purpose of monitoring and decision-making. Every education system needs an information system.

An EMIS has to integrate all the sources of data to respond to the various needs for information. Information is needed for both allocative (i.e. decision-making on resource allocation) and operational (i.e. decision-making on the efficient and effective use of allocated resources, including the extent to which learning is being enhanced) functions and tasks.

The information generated by an EMIS helps to answer the questions facing education managers, while verifying the internal and external efficiency of the education service provision. Reliable data, provided by an EMIS and used in conjunction with appropriate analytical techniques, will generate credible information (evidence) for decision-makers. Such information can then be used in establishing a strong knowledge base and facilitating smarter decision-making.

The information produced by an EMIS should be user-oriented and user-friendly, and should not be like traditional statistical services, which tend to produce data from the producer’s point of view and often do not consider the information needs of users and the purposes of the data. Another requirement for an effective EMIS is that it has an easy access and retrieval process.

4.1.3 Purposes of an EMIS

Data and information are produced to facilitate administration of education services, analysis and planning of education development at the macro, intermediary and micro levels, and monitoring and evaluation of education performance at the system level, including programme areas and student learning.

a. Administration of education

A key aim of an EMIS is to help manage and administer education services by generating routine information for operational purposes, such as weekly, monthly and quarterly records of the attendance and movement of students and personnel, salary payments, the results of examinations, financial transactions, etc. Such information is particularly important for management of education activities at the local and school levels.
b. Analysis and planning of education

Another use of an EMIS is to collect and compile to analyse the relevance, efficiency and effectiveness of current programmes as well as to explore the options, often in a better direction, for educational development. Finding the responses to these policy concerns is a complex exercise, which not only requires specific technical skills, but also the availability of reliable and relevant information. An EMIS can provide the reliable and timely information that is required for a variety of purposes. For example, information can be used for mapping schools to ensure equitable access; projecting resource requirements to signal to policy-makers the needs of the system; and developing comparable data on student learning in order to identify key issues to address when planning a course of action for the medium and long term development of education.

c. Monitoring and evaluation of the education system

When decision-making is evidence based, it relies on the findings from the monitoring and evaluation of the implementation of education policies and programmes. Throughout the policy implementation, a functioning EMIS will provide reliable and objective information on the way the policies and programmes are being implemented, and how student learning is progressing. This can facilitate the detection of possible shortcomings and obstacles as well as the undertaking of remedial actions.

4.1.4 Data systems

Various types of data systems¹ exist at the local (school, district or school district) level. Some produce information about students for managers and planners, while others deliver information about instructional support to school leaders, educators, students and their parents. Some data systems collect statistical information and facilitate school-based education management, while others have been installed by school districts and school administrations for the purpose of monitoring the movement of staff and students, managing the resources allocated to their jurisdictions, or facilitating the teaching and learning processes.

¹ Generally speaking, the terms “information system” and “data system” are used interchangeably, but they are not the same because a data system can just mean a simple database, which cannot be called an information system.
These data systems support different needs and perform different functions and therefore do not necessarily provide a comprehensive picture of the local educational situation and do not offer the information needed to develop workable solutions to educational problems. Below are some of the data systems that one can find at the local level.

a. Statistical data systems

This is a data system through which local (lower) levels of educational administration (schools and school districts) collect quantitative data about their local education system. Statistical data is collected, such as the number and movement of students, teachers, facilities and pedagogical organization, which allow the measurement of most quantitative indicators of the education system and which can be reported to higher levels of administration. In many countries, this type of data system is used for generating statistical information for comparative purposes (over time across different school years, and between school districts).

b. Student information system

In many countries, a separate data system is put in place to capture real-time data about daily school functions (e.g. attendance, class schedules, test scores, feedback to students and parents). Such a data system, most often based on individual records, is established either on a school’s initiative or through a harmonization effort by a higher level of administration using a centralized student identification (ID) system. This data system allows for capturing and analyzing very detailed, desegregated data about students.

c. Resource management system

A third category of data system is one that supports the management of resources. There are typically three types of resources needed for providing educational services: human resources, physical resources and financial resources. Such a system often does not provide tools for analysis of the effectiveness of the use of the resources.

d. Instructional or curriculum management system

This is a data system that exists to support teachers and students in teaching and learning processes. This system provides a unifying framework to support access to curriculum, learning standards and instructional materials such as online learning modules, model lesson plans, assessment tools, performance standards, collaboration opportunities, etc. This data system is relevant for pedagogical purposes, directly supporting teaching and learning processes, therefore helping to improve student learning. It does not produce information for administration of educational services and management of resources.
The problems with this fragmented approach to data collection are as follows:

- Having multiple, distinct data systems increases the workloads of educators, school principals and district education managers because it increases the burden of data reporting and accounting, thus diverting them from their core business of facilitating teaching and learning processes.

- Because of the lack of comparison across these data systems, the use of multiple data systems can result in bottlenecks.

- Local and school actors are not able to combine data from different categories of systems, so cannot link resources with teaching and learning processes and with student learning outcomes.

To support better decisions on education policy and practice, data systems should be able to combine the data on the same student or group of students over time and to compare the performance of students with different educational experiences. An ideal EMIS should therefore provide a comprehensive picture of the education system. This requires the integration of all components and functions into a harmonized system.

**IN BRIEF:**

An EMIS:

- Collects, stores, processes, analyses and disseminates information on the education system.

- Needs to be user-oriented.

- Is a management tool that provides information to users in support of:
  - administration
  - analysis and planning (at the macro, intermediate and micro levels)
  - monitoring and evaluation

- Should provide a comprehensive picture of the education system.
4.2 Using data at the local level

Data is vital for planning local actions, monitoring student and teacher flows, identifying what the obstacles to learning are (so as to be able to improve the quality of learning), and measuring the progress students make in learning.

4.2.1 Local planning

Microplanning can be defined as a type of planning conducted at the local level to meet local needs and achieve national education goals. During the planning process, it is necessary to keep in mind three fundamental requirements in any education system: equity, quality and efficiency.

Depending on the level of decentralization in the education system, decisions on the allocation and use of human, physical and financial resources are made at the local level to address local problems and to improve the participation of young people in education. Therefore, local decision makers have to acquire the skills and master the tools to plan the delivery of education services within their areas.

In the previous modules, various tools for needs assessment were presented and discussed. Planning local actions and identifying the resources that are needed to implement these actions will require effective management of data and information. Two examples of planning tasks that require heavy use of data and information are presented below:

a. School mapping

School mapping is a planning process that identifies each school and the resources of each school in a certain area. School mapping provides the means to identify the physical elements needed to achieve the overall education goals, and can help ensure the equitable distribution of educational services within and between different geographical areas.

A sizeable quantity of detailed data and information is required for school mapping. This information is required not only during the diagnostic phase, but also when it comes to planning the actions, implementing them, monitoring progress and evaluating the achievements (see Diagram 2).
Data and information required for school mapping include:

- Geographical data (location of the schools, climate and topography affecting access to schools, etc.)
- Demographic data (population data, characteristics of the school age population, etc.)
- Geographical and demographic disparities, i.e. differences in enrolments, school distances and school conditions between geographical areas and population groups
- Resource requirements, including the number of teachers needed compared with the current number of teachers actually at each school, school buildings and facilities (needed and actual), school equipment (needed and actual), and instructional materials (needed and actual)

b. Resource projection

Resource projection (also called education policy and finance simulation) is a process that enables planners to create a costed education policy and plan. There are a number of resource projection approaches that can be used. The various modelling approaches and tools used in education planning can be found on a website developed and coordinated by UNESCO on behalf of the Inter-agency Network on Education Simulation Models (http://inesm.education.unesco.org/). Most of these simulation and projection tools are relevant for educational planning at the central and provincial levels. But, with some adaptations, these tools can also be used to support the planning process at the local level.

A sizeable quantity of data and information are required throughout the process of education planning and budgeting. Some of the types of data and information required are listed in the table below.
<table>
<thead>
<tr>
<th></th>
<th>Independent (decision) variables</th>
<th>Dependent (result) variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category “students”</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Intake rate in first grade</td>
<td>New entrants in first grade</td>
</tr>
<tr>
<td>2.</td>
<td>Flow rate</td>
<td>Number of pupils</td>
</tr>
<tr>
<td>3.</td>
<td>Pupils-class ratio</td>
<td>Gross enrolment ratios</td>
</tr>
<tr>
<td>4.</td>
<td>Proportion of multigrade classes</td>
<td>Number of classes/classrooms</td>
</tr>
<tr>
<td>5.</td>
<td>Proportion of double shift classes</td>
<td>Number of multigrade and/or double shift classes</td>
</tr>
<tr>
<td><strong>Category “Cost and Financing”</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Turnover</td>
<td>Needed teachers and new requirements</td>
</tr>
<tr>
<td>7.</td>
<td>Attrition rate</td>
<td>Other personnel and new requirements</td>
</tr>
<tr>
<td>8.</td>
<td>Supervision rate</td>
<td>Training and recruitment needs</td>
</tr>
<tr>
<td>9.</td>
<td>Proportion of non-teaching personnel</td>
<td>Annual attrition of personnel</td>
</tr>
<tr>
<td><strong>Category “Cost and Financing”</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Initial index value</td>
<td>Salary expenses</td>
</tr>
<tr>
<td>11.</td>
<td>Salary scale and other emoluments</td>
<td>Recurrent expenditures</td>
</tr>
<tr>
<td>12.</td>
<td>Budgetary allocations</td>
<td>Investment expenditures</td>
</tr>
<tr>
<td>13.</td>
<td>Macro-economic indicators</td>
<td>Evolution of education expenditures</td>
</tr>
</tbody>
</table>

4.2.2 Monitoring and evaluation

Introduction

We are all accountable for the work we do and for the use of the resources that we are given, so we need an appropriate monitoring and evaluation (M&E) system to measure how well we have succeeded in our goals and how the resources we were given have been used.

A monitoring and evaluation system needs to be able to answer the following questions:

- **Relevance**: Does the activity address identified needs?
- **Efficiency**: Are we using the available resources wisely and well?
- **Effectiveness**: Are the desired outputs being achieved? Is the organization delivering the results it set out to deliver?
- **Impact**: Have the wider goals been achieved? What changes have occurred for targeted individuals and communities?
- **Sustainability**: Will the impact be sustainable? Will any structures and processes established be sustained?

A good quality monitoring and evaluation system requires reliable data and information, and a well-functioning information management system.

Indicators

One aspect of monitoring and evaluation involves measuring the status of an activity against an “expected target”.

An example of a “target” is the Third Millennium Development Goal (MDG3): Universal Primary Education.

An indicator is a tool to measure whether an expected target (or goal) has been achieved.

An indicator:

- Measures the progress we are making towards the target.
Indicators are measured at the beginning of the activity (this is the “baseline”) and during the activity; then the measurements are compared to see whether progress has been made towards the target.

- Measures whether the expected targets have been achieved.

The indicators are measured again after the completion of the activity, to see whether the target has been achieved or not.

**Example:**

A target (goal) of every education system is to achieve MDG3: Universal Primary Education (i.e. 100% enrolment of all children of school age).

One indicator for this goal is Primary Net Enrolment Rate (NER) rate, for both sexes.

This indicator was first measured in 2000 when the Millennium Development Goals were established.

For example, a school in Cambodia measured the indicator in 2000, and found that the NER was 92 per cent. Then they measured the indicator again in 2006 to see if any progress had been made and the NER was 94 per cent. By comparing the two measurements, 92 per cent and 94 per cent, the school could see that net enrolment had increased by 2 percentage points between 2000 and 2006. The school will measure the indicator again in 2015 to see if the target (100%) was achieved or not. The school will also compare the measurement for 2015 with the baseline (the figure for 2000) to see how much progress was made over the 15-year period.

The Education for All (EFA) goals are another example of key education goals. Indicators have been also been formulated to measure progress towards these goals.

The core indicators for the EFA goals are shown in Table 2.
Table 3: The EFA goals and 18 core indicators

<table>
<thead>
<tr>
<th>Goals</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 1: Expand Early Childhood Care and Education</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Goal 2: Provide free and compulsory primary education for all</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
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<td>8</td>
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<td>9</td>
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<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td>No.</td>
<td>Indicator</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Survival rate to grade 5 (percentage of a pupil cohort reaching grade 5).</td>
</tr>
<tr>
<td>13</td>
<td>Gross Enrolment Rate in technical and vocational education and training.</td>
</tr>
<tr>
<td>14</td>
<td>Number and percentage of persons who passed the basic literacy test.</td>
</tr>
<tr>
<td>15</td>
<td>Gender Parity Index for GER in primary education.</td>
</tr>
<tr>
<td>16</td>
<td>Females enrolled as a percentage of total enrolment.</td>
</tr>
<tr>
<td>17</td>
<td>Percentage of primary school teachers having the required academic qualifications.</td>
</tr>
<tr>
<td>18</td>
<td>Pupil-teacher ratio.</td>
</tr>
</tbody>
</table>
This module has explained why and how data are used for planning education development at the local level. It clarifies the purpose of data and information and notes that at the local level, various data systems are often been established for different purposes. To provide more efficient operations, it is important to harmonize all existing data systems into a unified EMIS. This module explains that an EMIS is a management tool that supports the administration of the education system, the analysis and planning of education development, as well as monitoring and evaluation of the system and student performance. The role and functions of an EMIS are to collect, process, analyse and disseminate information for the various users at different levels of education administration.

This module also describes two examples of processes that need data and information: school mapping and resource projection. The module also explains that data and information are also needed for monitoring and evaluation. Raw data and information are required to measure indicators, which are used to identify progress towards goals.
Case 1: Experience in the Philippines – The Community-Based Monitoring System for MDGs

The Millennium Development Goals (MDGs) are eight development goals relating to the delivery of social services. In the Philippines, the delivery of social services is the responsibility of local government units (LGUs). An important prerequisite in the localization of the MDGs is the availability of good statistics and the capacity of the local government to systematically monitor, measure and report on their progress.

The Community-Based Monitoring System (CBMS) provides a good information base for policy-makers and programme implementers to monitor the impact of reforms and policies. The CBMS has been adopted by national government agencies as the local poverty monitoring system and a tool for localizing the MDGs.

Through the CBMS, MDGs were localized by the following:

1. Establishing a MDGs data base: A good number of LGUs have already consolidated their CBMS databases and can generate their own local MDG reports.

2. Formulating provincial MDG reports: Ten provinces have consolidated their CBMS data at the provincial level and subsequently formulated their provincial MDG reports with disaggregated data at the municipal and household levels.

3. Formulation of the Local Development Plans integrating MDG targets: In Pasay City of Metro Manila, it was demonstrated that the results of the CBMS can influence the integration of MDG targets in the preparation of the barangay and city plans.
4. Application in evidenced-based policy making: In the municipality of Mariveles in the province of Bataan, the results of the CBMS released in 2007 were used as a reference in crafting the municipality’s Executive-Legislative Agenda (ELA) 2008-2010.

5. Application in resource allocation and resource mobilization: Localities have utilised CBMS in decision-making, as identification of projects and beneficiaries were based on objective information and not on the political agenda of local officials.

6. Empowerment and capability building of communities and LGUs through the CBMS Process: The LGUs gained the capacity to collect, analyse, and use data in local planning and programme implementation. There is “ownership” of the information gathered and this steered the LGUs and the community to find solutions and act together.

7. Enhanced partnerships: CBMS offers a venue for collaborative efforts among researchers (developers of the tools), academic and training institutes, government agencies, non-governmental organizations, development agencies, communities and local authorities.


Case 2: Experience in the United States: Use of Education Data at the Local Level

The United States Department of Education Policy and Program Studies Service sponsored a series of surveys, studies and site visits to assess the level of involvement of United States districts in the use of data for instructional improvement. Some key findings were as follows:

- Districts are still in the process of building their data system technology capacity. Most districts have multiple, distinct data systems. The number of electronic data systems being used to support decisions about instruction in the case study districts ranged from three to seven.
Districts are taking steps to improve the capacity of their schools to use data in decision-making. One of the most commonly reported district policies to encourage schools’ use of data is to incorporate this practice into school improvement planning. Another common strategy for building school capacity to use data includes professional development activities, providing support positions for system implementation, and the development of tools for generating data and tools for acting on data.

In districts that are leaders in data-driven decision-making, the use of data in schools is encouraged not through extensive formal professional development but rather through ongoing support from colleagues and data coaches who help teachers examine data and develop instructional plans to meet student needs.

Actions that school principals can take to encourage teacher use of data include designing and implementing regular activities involving the examination of student data and the establishment of an organizational climate of trust and mutual respect. Principals encourage data use by setting an example through their own activities, designating all or part of teacher planning or professional development time as occasions for examining and reflecting on data, and communicating expectations around data use.

School staff perceptions of barriers to greater use of data include a sense of lack of time, system usability issues, the perception that the data in the system are not useful, and district policies around curriculum coverage or pacing that prohibit modifying learning time to match student needs.

LEARNING FROM THE CASES:

1. What are the different purposes, functions and benefits of data systems for decision-making and monitoring?

2. How can local planners, managers and school leaders support and help sustain the use of data and information in the daily life of data users?

3. What strategies can be considered to strengthen the technical capacity in the use of data and information?

4. What further actions can be conducted to increase access to reliable and relevant data and improve the use of information for decision-making?
EVALUATION TASKS

What are the main purposes of an education management information system?

What are the main information needs at different levels of educational administration?

Why do fragmented education data systems need to be unified into a harmonised information system?

What is an indicator?

What are some indicators used in education?


