

SABER

August 2014

Education Management Information Systems
Data Collection Instrument
Training Manual



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Introduction

Welcome to the Systems Approach for Better Education Results-Education Management Information Systems (SABER-EMIS) initiative. The purpose of this manual is to support the collection, analysis, benchmarking and dissemination of comparable data about education management information systems. It details how to use the SABER-EMIS data collection instruments to collect data for the evaluation of an EMIS.

This manual covers the following areas:

1. Overview of the SABER methodology and Systems Approach
2. Overview of SABER EMIS and its instruments
 - SABER EMIS Tool
 - EMIS functionalities
3. Data Collection Methodology:
 - Terms of reference for the World Bank Staff/ Consultant
 - Checklist of key tasks for the evaluator
 - Preparation and training on how to complete the SABER-EMIS Questionnaire and conduct background research for data collection. This would include:
 - Collection of policies and background documents relevant to EMIS
 - Meetings with governments (central, regional/ provincial, local)
 - Focus group discussions with school principals, teachers and parents
 - Visits to schools and government agencies see EMIS implementation in action
 - Complete the SABER-EMIS Questionnaire
 - Submit the set of final responses and supporting documentation to World Bank Education Global Practice in digital form
 - Provide necessary notes, feedback, and clarification for the SABER country report
4. Glossary of key terms to assist in the questionnaire completion
5. Sample Quiz

This manual should be read in conjunction with the [Data Collection Instrument](#) as well as the [Framework Paper](#). It is imperative to have the instrument open on your computer or available in hardcopy at your side as you continue reading. More detailed information on the framework of the SABER-EMIS beyond this manual is available at <http://saber.worldbank.org/index.cfm?indx=8&tb=2>.

Throughout this process, training and project support for this assignment will be conducted by Husein Abdul-Hamid. You may reach him at habdulhamid@worldbank.org. Please do not hesitate to contact him should you have any questions or doubts about how to carry out the tasks.

Overview of the SABER Methodology and Systems Approach

To support the implementation of the Education Strategy 2020, the World Bank's Education Global Practice (formerly Human Development Network, Education) launched the Systems Approach for Better Education Results (SABER) initiative to help governments systematically examine and strengthen the performance of their education systems so that all children and youth can be equipped with knowledge and skills for life. SABER fills in the existing gaps in availability of policy data, information, and knowledge about the factors that might influence education quality and about the variables that can be transformed to improve the quality of education. Education Management Information Systems is one of several SABER domains (others include Early Childhood Development, Engaging the Private Sector, School Autonomy and Accountability, Student Assessment, Teachers, and Workforce Development) and each domain has a set of diagnostic toolkits. As a result, a knowledge base is developed that policymakers and citizens worldwide can utilize to identify the reforms needed to improve learning outcomes.

This SABER initiative seeks to provide standards of good practice against which countries can rate themselves through a benchmarking tool. Policymakers, educational leaders, and researchers will have access to the data collected by this initiative. This will enable users to make their own diagnoses about the status of the Education Management Information System in their countries, learn about other countries' policies, and make informed policy decisions. The information collected will be combined with information collected from other countries. It will then be disseminated through a user-friendly website, accessible to the general public for research and analysis. No individually-identifiable responses or data will be reported and country data will be reviewed by The World Bank SABER team and the country's government before information is uploaded to the SABER website. For more information on SABER, visit worldbank.org/education/saber.

Overview of SABER-EMIS and its instruments

An education management information system is responsible for producing and monitoring education statistics within an education system. An EMIS has a multifaceted structure, comprising the technological and institutional arrangements for collecting, processing, and disseminating data in an education system. It is crucial for tracking changes, ensuring data quality and timely reporting of essential information for planning and management, and for facilitating the utilization of information in decision making by policy makers. The system's effectiveness is dependent upon its sustainability, accountability, and efficiency. A successful EMIS is credible and operational in planning and policy dialogue.

The policy domain aims to eliminate the misconception often held by education stakeholders, namely, that an EMIS is simply a database or an Information Technology (IT) system. People are an important component of an EMIS in that they not only guide the collection, maintenance, and dissemination of data, but they also lead the transformation of data into statistics that are used to inform decision making. *In reality, an EMIS is a system that exists within the larger education system.*

SABER-EMIS Tool

SABER's EMIS policy domain aims to help countries identify areas for improvement in data collection, data and system management, and data use in decision making and improving the different elements of the education system. SABER-EMIS assesses education information systems with the aim of informing

the dialogue on policies related to statistics and indicators; and helping countries monitor overall progress related to education inputs, processes, and outcomes.

SABER-EMIS identifies four core policy areas that are shared by educational data systems and need to be assessed:

1. **Enabling environment:** Assessment of intended policies in relation to a sustainable infrastructure and human resources that can handle data collection, management, and access.
2. **System soundness:** Assessment of the degree to which the processes and structure support the components of a comprehensive information management system.
3. **Quality data:** Assessment of the degree to which an EMIS system accurately collects, securely saves, and produces high-quality, timely information.
4. **Utilization for decision making:** Assessment of the reality of system implementation and utilization of EMIS information in decision making.

The combination of these four areas, along with 19 associated policy levers that support the achievement of these goals, allows for the existence and use of a comprehensive education information management system that contains quality data and is critical to drive policy decisions.

The SABER-EMIS Tool provides a systematic and practical way to benchmark an EMIS. SABER-EMIS assesses education information systems with the aim of informing the dialogue on policies related to education statistics and indicators, as well as to help countries monitor overall progress related to educational inputs, processes, and outcomes. The policy domain executes this role in several ways:

- SABER-EMIS administers a set of tools, including questionnaires and a rubric for key informants, and gathers both qualitative and quantitative data (validated by legal documents) in order to assess the soundness of the information system.
- SABER-EMIS classifies and analyzes existing education management information systems based on four policy areas.
- SABER-EMIS produces country reports and other knowledge products with the intention of improving a country's education system.

Box 1: Scope of SABER EMIS

Currently, SABER-EMIS is limited to basic and secondary education, that is, formal education in public and private schools. Tertiary education is beyond the scope of this framework paper. Available data at the school level on early childhood development programs and/or kindergarten may be collected and included in a basic education EMIS.

The benchmark findings are intended for use by education policy makers in government to assess the policy areas of relevance to a country's EMIS against international best practices. The tool's evidence-based framework is also envisioned for use by education stakeholders to evaluate the intended policies behind the system, data quality, monitoring, and in utilizing the system in decision making to support improving education quality through the four above-mentioned policy areas.

Box 2: What Matters for EMIS

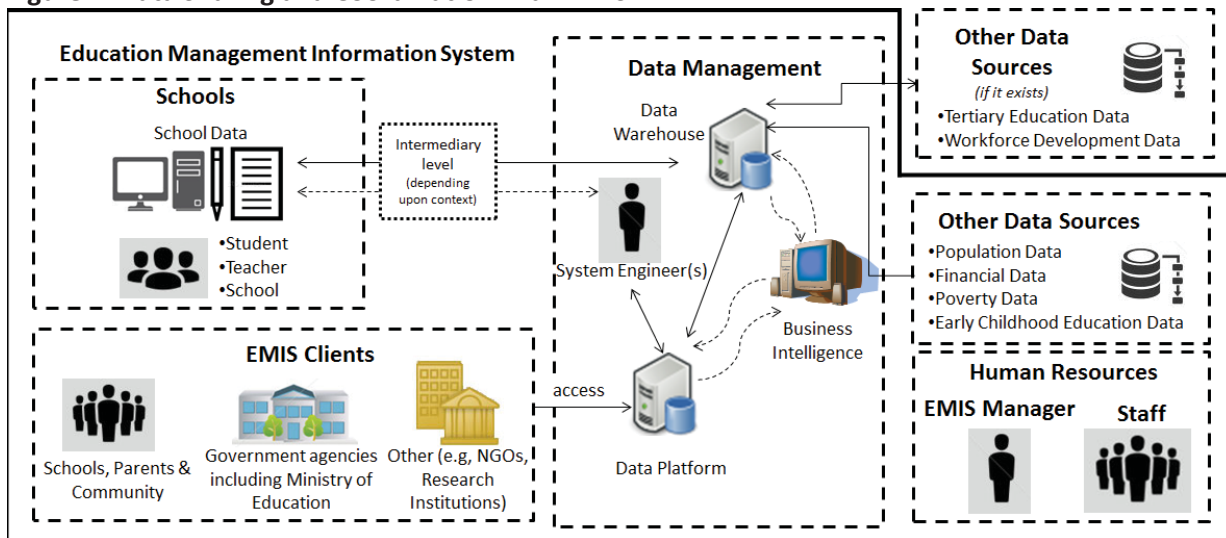
For additional background, the “What Matters Most for Education Management Information Systems” framework paper outlines how an EMIS operates to meet data-related demands, examples of features of systems that are considered to be best practices, guiding principles of an EMIS and the theoretical underpinnings behind four policy areas that need to be assessed. It also contains the SABER-EMIS tool comprised of instruments for data collection, and a rubric for scoring, benchmarking and analyzing the results.

EMIS Functionalities

An effective EMIS is one that has a fully functioning information cycle. This cycle demonstrates that an EMIS is more than a simple annual school census, which the coverage of statistics goes beyond administrative census data. An EMIS is a dynamic system that has a defined architecture, the capacity to perform analytics, and the ability to serve its users. The functioning of this cyclical process results in more effective data sharing and coordination.

The functionality of an EMIS is universal across contexts because data is the core of its operations. However, an EMIS may look different among countries depending upon the context in which it operates because of differences in how data is collected and processed. Data collection tools may differ due to differences in available technologies. Analytics can be performed on the data using business intelligence techniques,¹ and data visualization tools and dashboards can be used to better understand the results of these analytics. An EMIS database can simply be an updated, computerized statistical information system or an administrative, function-specific database. In some contexts, an EMIS is often the result of “an accumulation of largely unrelated applications, some computerized and some manual, that grew from largely unrelated project initiatives” (Cassidy 2006, 2). Also, EMIS tools and technologies may be specific to contexts in poor, post-conflict, and/or small states (including Small Island Developing States), yet data is still intended to be the center of EMIS procedures. Figure 1 depicts how data is gathered, maintained, and shared in an EMIS, as well as how it is coordinated by users through the EMIS infrastructure.

Figure 1: Data Sharing and Coordination in an EMIS



¹ Business intelligence is a set of methodologies and technologies that use data analytics to transform raw/source data into useful statistics.

It is relevant to note that in some contexts, there is an intermediary level between the schools and data management depending upon what level of government manages data (e.g., county level versus state level; provincial level versus federal level). This is because countries are increasingly progressing from a centralized system towards a decentralized system where the creation of education statistics occurs at the school, district and regional levels (Adam 2011). This shift results in an increase in demand for access to data at the lower level and subsequent creations of intermediary levels (depending upon the structure of the education system) developing their own information systems within the broader EMIS (Cassidy 2006) Regardless, data needs to inform policy makers at the highest level so that it can inform decision making.

Data Collection Methodology

SABER EMIS data is collected at both policy intent and implementation level. At the intent level, it involves reviewing all the laws, regulations and other technical documents relevant to EMIS. This would help in assessing the enabling context around which EMIS operates. At the implementation level, all procedures and practices supporting EMIS operations need to be reviewed at different levels of the education system (central, regional/ provincial and local). The data management system needs to be examined, and quality of data collected has to be assessed.

This exercise is expected to take about 1-2 weeks to complete, depending on the degree of preparedness of the staff and the time allocated to the activity. The checklist below (table 1) provides a quick reference of the activities for the data collectors to follow:

Table 1: Checklist of activities

Preparation	
<input type="checkbox"/>	Carefully read the “What Matters” framework paper for SABER-EMIS
<input type="checkbox"/>	Take note of the section containing the four policy areas
<input type="checkbox"/>	Review all provided training materials
<input type="checkbox"/>	Carefully read the SABER-EMIS Benchmarking Tool Manual (this document)
<input type="checkbox"/>	Become familiar with the key terms in the glossary
<input type="checkbox"/>	Perform an initial review of the SABER-EMIS Questionnaire and discuss questions with the SABER-EMIS team
<input type="checkbox"/>	Identify agencies/ government bodies where EMIS exists in the specific context
Data Collection	
<input type="checkbox"/>	Collect all relevant policy documents and statistics necessary for completion of the instruments
<input type="checkbox"/>	Obtain copies of all supporting laws, regulations, policies, and other supporting documentation, preferably in digital format
<input type="checkbox"/>	Hard copy documents should be scanned (for all scanned documents, please include the document title page and table of content). (Supporting documentation for SABER-EMIS is typically obtained from the following documents, among others): <ul style="list-style-type: none"> • National/local constitution • School inspection manual/framework • Annual Statistics Handbook • Ministry circulars or memos

	<ul style="list-style-type: none"> • Reform documents • School regulations manual • Statutory instruments • Education Act • Education Sector Strategy
<input type="checkbox"/>	Hold meetings with relevant government bodies (Central, Regional/ Provincial, Local)
<input type="checkbox"/>	Hold focus group discussions with:
	<input type="checkbox"/> School principals
	<input type="checkbox"/> Teachers
	<input type="checkbox"/> Parents
<input type="checkbox"/>	Organize visits to schools and government agencies to see EMIS implementation in action
Instrument Collection	
<input type="checkbox"/>	Complete the SABER-EMIS Questionnaire
<input type="checkbox"/>	Answer every question and sub-question of the questionnaires using the Questionnaire. For every question, please provide the following:
	<ul style="list-style-type: none"> • “Yes/No” answer to the question or checklist or use “Scales”
	<ul style="list-style-type: none"> • Relevant explanation or information in the notes and comments box (for example, if a question is unanswered for any reason, justification should be provided in the comments cell). Comments should be provided in English
	<ul style="list-style-type: none"> • For Policy Area 1: Include detailed citation information to support your answer, including specific sections, subsections, page numbers, or other information to direct the World Bank team to the precise location of the policy evidence or the URL or website where the official government document can be retrieved; Provide exact text from the citation, as appropriate.
	<ul style="list-style-type: none"> • For Policy Areas 2-4, include URLs or digital copies of publications or online sources where applicable to provide examples
Data Submission	
<input type="checkbox"/>	Submit all completed documents to habdulhamid@worldbank.org :
	<input type="checkbox"/> SABER-EMIS Questionnaire
	<input type="checkbox"/> All supporting laws, regulations, and other documentation
Follow-up/clarification:	
<input type="checkbox"/>	Upon submission of the documents listed above, the World Bank’s SABER-EMIS team will provide quality assurance regarding the submitted data and request any follow-up information.
	<input type="checkbox"/> Submit all requested clarifications, additional information, answers, supporting policy documents, etc. to habdulhamid@worldbank.org
Feedback on final country report:	
<input type="checkbox"/>	The information and data provided through this work will be used to create a country report describing the current policy environment surrounding the EMIS in the country. This report will be shared with the consultant for guidance.
	<input type="checkbox"/> Provide feedback to the SABER-EMIS team on the country report

Key Steps for data collection

1. Recruitment and Terms of Reference (ToR) for the World Bank Staff or Consultant

A World Bank Staff or Consultant needs to be commissioned with the following expertise:

- Master's degree in Statistics, Mathematics, Computer Science, Economics, Public Administration, Business Administration or related field
- Experience in the field of EMIS
- Knowledge of education sector data collection methodologies
- Strong interpersonal skills and good written and oral communication skills in English
- Strong analytical and computer skills.

2. Receive training on how to complete the SABER-EMIS Questionnaire and conduct background research in preparation for data collection

The preparation for data collection is extensive and requires that the data collector complete three tasks:

A. Training for data collection

In order to have a comprehensive understanding of an EMIS, training is important for all data collectors. This includes a review of the SABER-EMIS "What Matters" framework paper, this manual along with the glossary and the data collection tools. After reviewing these documents, prepare questions for discussion with the SABER-EMIS team. Additionally, it is important to become familiar with the education statistics terminology as this is important for questionnaire completion, especially Policy Goal 3.

A.1 Obtain copies of all laws, regulations and other supporting documentation related to the topics covered by the school system overview and SABER-EMIS Questionnaire

Some questions in the questionnaire relate to official laws and regulations, so it is required to obtain digital copies of all laws, regulations and other supporting documentation related to the EMIS; this is especially the case for Policy Goal 1. Thus, it is important to ensure that there is sufficient time to locate the documents and/or inquire with other experts. It is also crucial that responses to the questions are accurate and that the information reported to the general public are in fact consistent with what the laws and regulations stipulate. All supporting documents will be maintained by the SABER-EMIS team. These documents will be used to build a virtual library of EMIS activities, which will be part of the SABER-EMIS online tool.

A.2 Identifying correct questionnaire respondents

The EMIS is typically located within the Ministry of Education or the education-statistics producing agency. It is important to be cognizant of the fact that different functionalities of the EMIS may be located within different agencies. Therefore, the data collector should research which departments may contain components of the EMIS and correspond via phone and/or email with those departments for confirmation. In addition, regional/ local governments should also be interviewed to understand their role in EMIS. Focus group discussions with school principals, teachers and parents would help in understanding the use of data at the school level, and help answering questions relevant especially for Policy Goal 4.

3. Complete the SABER-EMIS Questionnaire

Data collection takes place via the **SABER-EMIS Questionnaire**. This is a single survey questionnaire with four sections, designed to collect information on existing EMIS activity in the country and current policies governing their activity.

A. SABER-EMIS Questionnaire Structure

This questionnaire takes on a cascading structure.² Each of the four policy goals has distinct levers (19 in total) for which data is reviewed, with qualitative indicators in a cascading structure of three levels, ranging from the abstract to specific (e.g., policy area, lever, indicators) (table 2).

Table 2. Cascading Structure for the SABER-EMIS Questionnaire

Policy Area + Description of best practice	
	Lever + Description of best practice
	Indicator + Questions

The questionnaire has four policy goals. Each of the four policy areas contains levers and a series of indicators that are evaluated through the completion of a questionnaire containing questions specific to each indicator. The following table lists the question series for each policy area.

Table 3: Organization of SABER-EMIS Questionnaire

Policy Area	Policy Lever	Indicator Questions	Response
Enabling Environment	Institutionalization	<ul style="list-style-type: none"> Is there a law/policy to create or establish an education management information system (EMIS), as a point of reference, that collects, processes, and disseminates education data on a regular basis? 	
		<ul style="list-style-type: none"> Is there a law/ policy that calls for an institution, an agency or an official entity to manage the EMIS? 	
	Data Supply	<ul style="list-style-type: none"> Does the education statistics agency have the legal authority to collect data required to compile educational statistics? 	
		<ul style="list-style-type: none"> Is there a legal mandate that ensures that schools provide their data to the EMIS? 	

Most of the questions in the questionnaire can be answered with either a “Yes” or “No” (Check the relevant box for each question). Some of the questions contain a checklist of items that need to be answered. For some questions, a 4-scale rating is used. The weights assigned to each question are: (1)

² See the framework paper for a more detailed overview of the construct validity of the tool.

Not at all; (2) A little; (3) Some; (4) A lot. **It is important to answer every question (including all items in the checklist) so that the EMIS can be effectively benchmarked.**

The questionnaire contains a column labeled, “Level”. When relevant to the question, use this column to indicate at which level the answer pertains by indicating one of three options: 1) Local; 2) Sub-national; or 3) National. For example, if the answer to the question is a federal policy, the level would be federal. If the answer is specific to a classroom practice, the level would be local/district. When the answer does not pertain to any level, leave the column blank.

For some questions, it will be necessary to reference specific documents (e.g., policies/legislation, reports, websites, program documents, etc.), which can be included in the “Notes” column. For each question, there is also a “Comments” box to place additional information that you think might be relevant to evaluate the EMIS. **It is important to add relevant information to the “comments” box, as needed, because the evaluation of the EMIS will consider the strengths and weaknesses of the system.** Please include the specific documents referenced to answer the question (be specific and include numbers for the Article/Section, URL where government document can be found, etc.). This space can also be used to add relevant information that will be useful when assessing the strengths and weaknesses of the system.

Table 4: Sample Questions from SABER-EMIS Questionnaire

Q#	Question	YES	NO	Level	Notes
	Are there tools to perform different levels of analysis (e.g. SPSS, STATA, R and open source statistical analysis tools)?	<input type="checkbox"/>	<input type="checkbox"/>		
	Is the system capable of producing:				
	• Projections?	<input type="checkbox"/>	<input type="checkbox"/>		
	• Predictive models	<input type="checkbox"/>	<input type="checkbox"/>		
	• Scenario analysis?	<input type="checkbox"/>	<input type="checkbox"/>		
Comments:					

B. Guidance for Specific Policy Areas

SABER studies a system in its entirety which includes the policy intent, the policy implementation and the policies and steps that bridge the intent to the implementation. The depth of the EMIS policy assessment falls into these three categories:

Table 5: Depth of EMIS Policy Assessment

Policy Intent	Bridging Policy Areas	Policy Implementation
Enabling context in which the system operates	Sound structure, processes and quality data that support the components of a comprehensive system	Utilization of the system to provide useful information to policy makers and other education stakeholders

Because of these differences, specific guidance is required for each policy goal.

- **Policy Goal 1:** It is necessary to reference specific documents (e.g., legal framework, policies, statistical reports, websites, etc.) in order to answer questions. Therefore, the questionnaire contains an additional column entitled “Notes” to reference any policies/ documents. Please indicate the specific documents referenced to answer the question (*be specific and include numbers for the Article/Section, URL where government document can be found, etc.*).
- **Policy Goals 2-4:** Since the evaluation of the EMIS will also contain a review of a system’s strengths and weaknesses, it is especially important to use the “Comments” box to include examples to justify “Yes” responses, especially in Policy Goal 4 which reviews how the EMIS is used for decision making. Include URLs or digital copies of publications or online sources where applicable (e.g., online website for report cards, platforms to disseminate administrative data by school, etc.). See “EMIS Experiences” section of the “What Matters” framework paper for some specific examples.

This questionnaire exercise can be conducted via structured interviews with individual informants and desk review of relevant documents, but it is more efficient to conduct it in a small-group setting since there is a better likelihood of reaching consensus on some of the more subjective questions. Also, participating staff in the host country should be made familiar with the materials needed for the review exercise in advance.

1. Submit the set of final responses and supporting documentation in digital form

There are two key products that are required upon completion of questionnaire: (1) responses to all of the questions on the *SABER-EMIS Questionnaire*, including specific document citations, and text excerpts (for Policy Area 1); and (2) digital copies of all laws, regulations and other documentation that support these responses or URL where government document can be found, as applicable.

All submitted answers must be in English. Documents and text excerpts do not need to be translated into English and can be submitted in the local language.

2. Provide necessary notes, feedback, and clarification for the SABER country report

After completing and submitting all required forms and documentation, the country report will be drafted. This report will be similar to reports from other SABER domains. This report will include an overview of the country’s education system with special emphasis on the education management information system. The report will then highlight the four policy areas of an EMIS in the country, and provide benchmarked scores in the policy areas of enabling environment, system soundness, quality data and utilization in decision making, as reported in the questionnaires. It will also include an evaluation of the strengths and weaknesses of the EMIS. It will be necessary to provide guidance on the creation of the report, to verify the data presented and to offer feedback for any necessary corrections or improvements.

Annex 1: Glossary

The following is a list of key terms that may be helpful when completing the questionnaire. This list is not exhaustive. **Please use your common sense by considering terms in context if a seemingly technical term is not listed but is included below when completing the questionnaire.** Refer also to the UNESCO Institute for Statistics (UIS) technical guidelines and manuals and the OECD Glossary of Statistical Terms³ for a more comprehensive list of key education terminology.

Term	Definition
API (Application Programming Interface)	A specification of how software components within a computer system interact.
Business Intelligence	A set of methodologies and technologies that uses data analytics to transform raw/source data into useful statistics to add intelligence to the EMIS.
Confidentiality	A set of rules/guidelines or understanding that limits access/ certain types of information, including related to privacy.
Data	Set of qualitative and quantitative variables that are used usually to calculate, analyze, or plan something.
Data analytics	Tools and processes are available to perform data analytics at different levels frequently. Processes to perform data analytics include descriptive and exploratory data analytics, data tabulations, data associations, correlations, predictive models and scenario analysis. Tools to perform these analytics include statistical tools such as SPSS, STATA or open source statistical analysis tools such as R. The outputs of these analytics can range from basic tables and graphs to more complex reports.
Data architecture	A set of specifications and processes that prescribe how data is stored in a database and how data is accessed (Lewis et al., 2001).
Data fields	A place where data is stored within a database (typically a column in a database).
Data warehouse	A data management system that manages the collected data, processing, and reporting within the EMIS. It takes completed databases and sends them to business intelligence via information systems (e.g., Banner, PeopleSoft, Oracle, and Concordance) that perform processing, presentation and analysis. It can exist as a layer on the data servers.
EMIS	The system responsible for producing and monitoring education statistics within the education system. Refer to <i>What Matters Most for Education Management Information Systems: A Framework Paper</i> .
EMIS Clients	Education stakeholders - individuals or entities (e.g., governments, researchers, parents, communities, private sector) - that utilize the products of an EMIS.
EMIS Users	Individuals or entities that use the education management information system (see Annex A of <i>What Matters Most for Education Management Information Systems: A Framework Paper</i>).

³ See <http://glossary.uis.unesco.org/glossary/map/terms/176> and <http://stats.oecd.org/glossary/detail.asp?ID=6152> for the resources.

Estimation Methods	A data analysis framework that uses different types of statistical analysis to estimate data and interpret results.
GIS (Geographic Information System)	A computer system that collects, maintains, analyzes and disseminates geographical data.
Imputation Methods	A process to replace missing data with substituted values.
Indicators	Indicators are a subset of statistics that provide information about a particular area of performance. For example, enrollment statistics are an indicator for access to education.
ISCED (International Standard Classification of Education)	Classification standardizing definitions to enable comparison of education statistics and indicators across contexts. Developed by UNESCO. Includes a definition of codes and UIS-ISCED mapping. See this: http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx
ISO 9000	A standard typically used for managing quality of systems. It focuses on the framework for quality management, which provides guidance on how to manage for quality and on how to perform internal audits (International Organization for Standardization, n.d.).
Metadata	Information about the content of data (for this specific SABER domain). Can be structural or descriptive.
Platform	Hardware and software frameworks that can either be standardized or customizable to meet user needs. Includes dashboards in the case of EMIS.
School registry	A list of registered schools.
Service Delivery Indicators	The Service Delivery Indicators provide a set of metrics for benchmarking service delivery performance in education to track progress across and within countries over time. The Indicators seek to enhance active monitoring of service delivery by policymakers and citizens, as well as to increase accountability and good governance. http://www.sdindicators.org/design/
Source data	Raw data.
Statistics	“Statistics is the study of the collection, analysis, interpretation, presentation, and organization of data”. http://www.amstat.org/careers/whatisstatistics.cfm
Table of specifications	A table containing all of the elements of the data architecture.
Total Quality Management Approach	Focuses on an organization approach for quality control and is considered more of an industrial concept. In the early 1990s, it was eclipsed by the ISO 9000 and this is still the case (Van den Berghe, 1998).
UIS (UNESCO Institute for Statistics)	“The primary source for cross-nationally comparable statistics on education, science and technology, culture, and communication for more than 200 countries and territories.” http://www.uis.unesco.org/Pages/default.aspx
United Nations System of National Accounts (SNA)	“The internationally agreed standard set of recommendations on how to compile measures of economic activity” https://unstats.un.org/unsd/nationalaccount/sna.asp
Wireframe	“Blueprint” of the architecture that highlights the sequences and connected relationships among the different indicators in the data.

Annex 2: Testing your EMIS Knowledge

This quiz has been designed to test your knowledge on the subject matter of EMIS. It is important to answer a minimum of 80 percent questions correctly to be able to clear this test. Please note that this is just a sample test- the actual test may vary in length and content.

Question 1: What is the objective of an EMIS?

Question 2: Who are the relevant stakeholders you would interview for data collection?

Question 3: What is an Application Programming Interface (API)?

Question 4: How would you verify responses provided during the interview by various stakeholders?

Question 4: How do you determine whether the EMIS maintains 'Quality Assurance' measures?