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IMPROVING STUDENT LEARNING THROUGH INFORMED DECISIONS:
THE ROLE OF EDUCATION MANAGEMENT INFORMATION SYSTEMS

Why is an Effective EMIS Important?

Assessing the state of education in a country demands information about the inputs, resources, governance, operations, and outcomes of its education system. An education management information system (EMIS) collects, manages, and facilitates utilization of education data. An effective EMIS provides systematic, quality, timely data, driving efficiency and evidence-based decision making. When implemented effectively, EMIS is linked to higher student achievement and stronger education systems.

Without an effective EMIS, challenges reverberate across the education system and decision makers lack the information they require to make good decisions. With an effective EMIS, decision makers can answer questions such as:

- Are students learning? Is learning equitable? Are students graduating and finding work?
- Are effective accountability systems in place? Do communities have access to data so they can hold schools accountable?
- Are teachers qualified and equipped with effective professional development training programs?
- Are schools managed effectively? Where is money spent? Are resources allocated efficiently?

> *"Student data isn't the whole story, but it is a critical part of the story. When data is effectively collected, managed, and utilized, opportunities emerge that make the entire education system stronger."*
> Jack Smith, Chief Academic Officer, Maryland State Department of Education

Challenges to an Effective EMIS

Many countries struggle with the policies, structures, and processes necessary to establish an effective EMIS. Challenges may include:

- Policies and strategy;
- Leadership and long-term vision;
- Technical issues (e.g., integration, security, and poorly defined or classified data); or
- Utilization challenges (e.g., lack of openness and accessibility of data, limited training, and poor dissemination).

Common EMIS challenges revolve around deficiencies in three critical areas: sustainability, accountability, and efficiency. Most countries with an EMIS struggle with sustainability issues, such as: incompatibility with existing systems, poor customization of new systems, staff capacity issues, limited financial resources, or limited government commitment. Without sustainability there is no long-term use, and without long-term use there cannot be long-term impact on the classroom (Abdul-Hamid 2014, Crouch 1997). Winkler and Herstein (2005) identify three components to overcome sustainability challenges and improve information culture: 1) reorientation of the information system toward clients, 2) improved capacity to use information at the local level, and 3) increased demand for information.

Accountability is considered a critical element of service delivery that influences the incentives and actions of both the providers and recipients of information (Pritchett and Woolcock 2004). Accountability is increased when decision

makers access and use quality data to improve the education system. Conversely, accountability declines in education systems that lack reliable and timely data.

An efficient EMIS is necessary to support overall education management; inefficiency is a symptom of poor performance (World Bank 2004). Challenges around efficiency occur when education statistics and records are not effectively maintained and decision makers are not provided with accurate timely data. Inefficiency at any level is a serious obstacle blocking an effective EMIS.

What Does an Effective EMIS Look Like?

For an education system to work, the **right policies** must make the **right data** available to the **right people** at the **right time**. This sequence depends on an effective EMIS, which catalyzes data utilization in important ways.

- **Data reveals** the extent to which students are learning and where there are learning gaps.
- **Data enables** education stakeholders to be fully supported, resource allocation to match school needs, effective monitoring and evaluation, and relevant professional development.
- **Data enhances** effectiveness and efficiency in school management.
- **Data increases** return on investment.

Data utilization has the potential to increase teacher efficacy and improve student learning outcomes. Research found that when local school systems used data-driven strategies for school improvement, state assessment scores increased up to 13 percentage points (Armstrong and Anthes 2001). Further, an evaluation of the Oregon DATA Project, which was designed to increase data-driven decision making in the classroom, found that schools participating in the program were closing the achievement gap at a faster rate than schools without access to data training (Dunn 2011).

Decision makers across education systems strive for effectiveness, efficiency (including reducing costs), and equity, and to achieve these goals, they require evidence. Access to and use of education statistics is a necessary part of policy implementation and review (Kitamura and Hirosato 2009).

A well-integrated EMIS can track student data longitudinally, over time from preschool into the workforce, and integrate that data with data from other government agencies, such as higher education and labor agencies. This level of insight into policies and programs arms decision makers with extremely powerful information that they can use to make new decisions and defend or explain old decisions.

Figure 1: Longitudinal Data
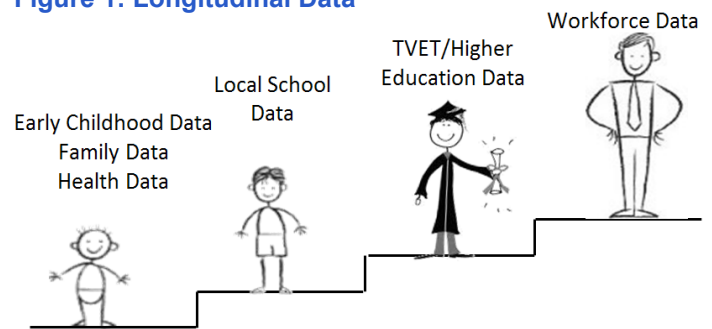
According to the Systems Approach for Better Education Results (SABER) EMIS framework, a set of functionalities and components of an EMIS are required in order for an EMIS to be effective: an information cycle, a multifaceted system, data coverage, and data use and effectiveness.

An information cycle. The collection, maintenance, analysis, dissemination, and utilization of education data in an EMIS occur in a cyclical manner which SABER-EMIS refers to as the "EMIS Information Cycle" (figure 2). The system keeps track of inputs and helps assess the quality of policies and institutions, ultimately informing decision makers on student learning and other outcomes and policy actions. Information produced by the system is provided back to the data provider (e.g., schools) to be reviewed, acted on, and improved.

Figure 2: EMIS Information Cycle
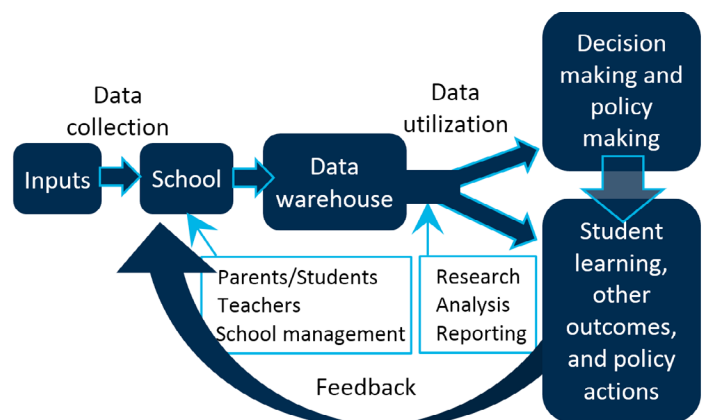
Australia's My School platform is an example of EMIS that transformed data and reporting processes to increase accountability and improve education outcomes. Before My School, communities, especially parents, had little access to data and therefore were unable to evaluate and hold schools accountable. Additionally, decision makers lacked national comparable education data. Today, My School provides information comparable across all Australian schools on student population, attendance rates average achievement, student progress over time, financial data, and staff data (ACARA 2014).

Multifaceted System. An EMIS is a multifaceted, institutionalized system consisting of technological and institutional arrangements for collecting, processing, and disseminating data in an education system. In short, a successful EMIS cannot exist in a vacuum.

Data Coverage. The coverage of statistics in a system falls into two categories: raw information and aggregate figures. An education management system maintains raw information on the education system, such as payroll, teacher qualifications, human resources, and finance. It also contains aggregate figures derived from data, such as enrollment rates and completion rates. The availability of this second type of data provides a deeper understanding of the education system.

Data Use and Effectiveness. An effective EMIS produces accessible education statistics that are easily digestible and actionable for a variety of purposes. EMIS statistics are not limited to data collectors and statisticians, but instead are a useful tool for an array of clients.

Key EMIS Policy Goals

SABER-EMIS was created to understand and measure what matters most for education management information systems. Based on a thorough review of global evidence and relevant literature, SABER-EMIS identified four core policy goals that need to be assessed. For each policy goal, a set of actions, or policy levers, are identified that decision makers can act upon in order to strengthen an EMIS. Taken together, the four policy goals and 19 policy levers comprise a comprehensive EMIS that informs and supports a quality education system (figure 3).

Figure 3: EMIS Policy Goals & Levers

Policy Goals

Policy Levers

Enabling Environment
The laws, policies, structure, resources, and culture surrounding an EMIS that make possible data collection, management, and access.

- Legal Framework
- Organizational Structure & Institutionalized Processes
- Human Resources
- Infrastructural Capacity
- Budget
- Data-driven Culture

System Soundness
The processes, structure and integration capabilities that support the components of a comprehensive system.

- Data Architecture
- Data Coverage
- Data Analytics
- Dynamic System
- Serviceability

Quality Data
Ability to accurately collect, securely save, and produce high quality timely information for use in decision making.

- Methodological Soundness
- Accuracy and Reliability
- Integrity
- Periodicity and Timeliness

Utilization for Decision Making
Utilization of information by users (e.g., parents, students, teachers, headmasters, policymakers, etc.) to make decisions at each level of the education system.

- Openness to EMIS Users
- Operational Use
- Accessibility
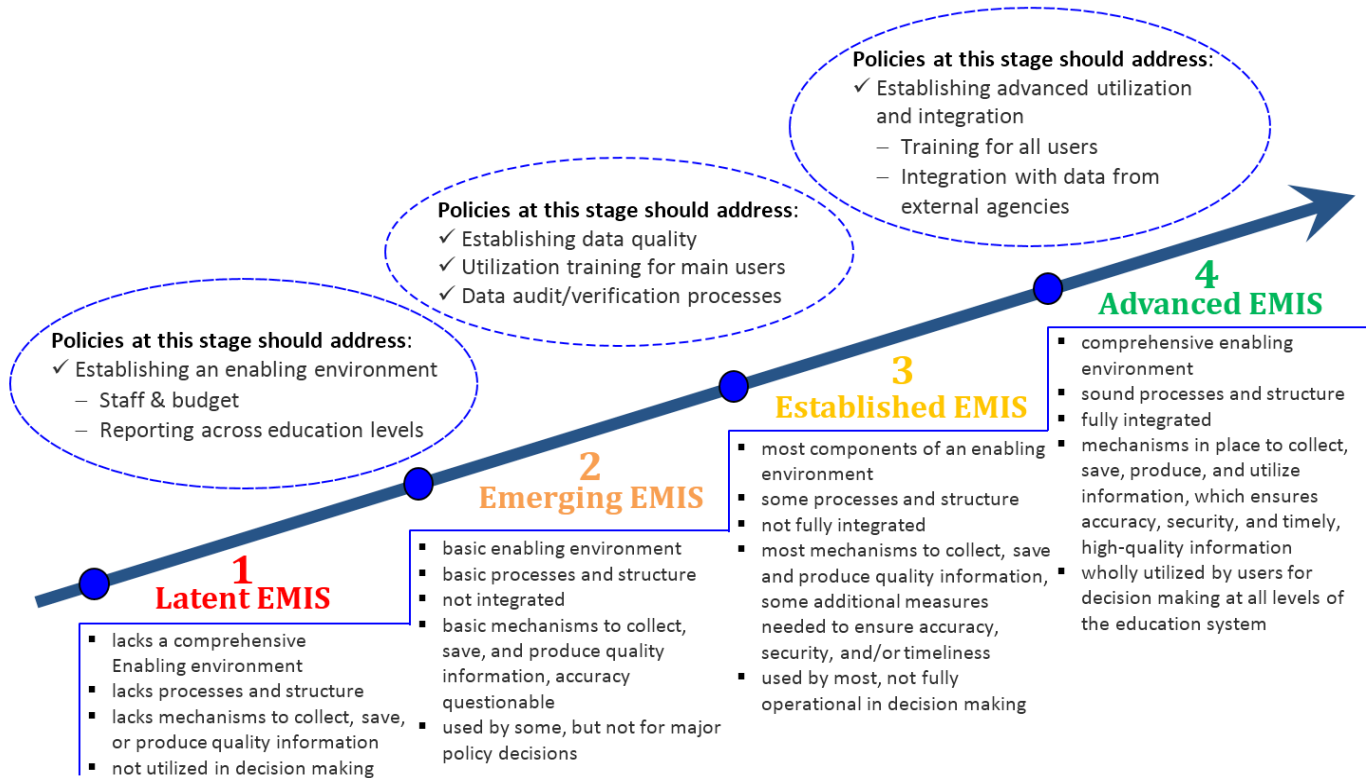- Effectiveness in Disseminating Findings/Results

Improving EMIS

Between 1998 and 2014, the World Bank helped develop and enhance more than 230 EMIS-related projects worldwide, nearly half of all World Bank education projects. Such investments from the Bank and other institutions improved the state of EMISs, but there is still a long way to go. SABER-EMIS identifies four levels of EMIS implementation. Figure 4 summarizes each level and shares potential policy considerations at each stage of development.

Figure 4: EMIS Implementation Levels and Associated Policy Recommendations

Policies at this stage should address:
✓ Establishing advanced utilization and integration
  − Training for all users
  − Integration with data from external agencies

Policies at this stage should address:
✓ Establishing data quality
✓ Utilization training for main users
✓ Data audit/verification processes

Policies at this stage should address:
✓ Establishing an enabling environment
  − Staff & budget
  − Reporting across education levels

1 Latent EMIS
- lacks a comprehensive Enabling environment
- lacks processes and structure
- lacks mechanisms to collect, save, or produce quality information
- not utilized in decision making

2 Emerging EMIS
- basic enabling environment
- basic processes and structure
- not integrated
- basic mechanisms to collect, save, and produce quality information, accuracy questionable
- used by some, but not for major policy decisions

3 Established EMIS
- most components of an enabling environment
- some processes and structure
- not fully integrated
- most mechanisms to collect, save and produce quality information, some additional measures needed to ensure accuracy, security, and/or timeliness
- used by most, not fully operational in decision making

4 Advanced EMIS
- comprehensive enabling environment
- sound processes and structure
- fully integrated
- mechanisms in place to collect, save, produce, and utilize information, which ensures accuracy, security, and timely, high-quality information
- wholly utilized by users for decision making at all levels of the education system

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