Strengthening Education Management Information Systems to monitor the Sustainable Development Goal 4
24-26 October 2018, Dushanbe, Republic of Tajikistan
Analysis of different aspects of education

- Access
- Efficiency
- Equity
- Quality
- Participation

Outcome/Output
↑ Process
↑ Input

- Early childhood
- Pre-primary
- Primary
- Secondary
- Tertiary
- Non-formal
- TVET
- Adult education

Resources
The education system can be viewed as a form of “production” which has three components:

- Inputs
- Processes
- Outputs (and Outcomes)

Education indicators can be identified and grouped under these categories.
# Education indicators framework

## Input, Process and Outputs indicators

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>INPUTS</th>
<th>PROCESS</th>
<th>OUTPUT/OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic, social and economic context of education</td>
<td>Financial and human resources invested in basic education</td>
<td>Access, participation, progression, transition from lower level to higher</td>
<td>Achievement</td>
</tr>
<tr>
<td>Demographic and social indicators</td>
<td>EX: education expenditure per student</td>
<td>EX: Overall participation in formal and non-formal education</td>
<td>EX: reading achievement of students at grade X and W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EX: Total intended instructional time for pupil by levels of Education; Instructional time per subject</td>
<td></td>
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</tbody>
</table>

### Examples

**INPUTS**
- Proportion of GDP spent on Education
- Education expenditure per student
- Proportion of Public/private investment in education
- School level financial and material resources (building facilities ...)
- Teachers working condition (salaries, working time etc...)

**PROCESS**
- GIR/NIR, GER/NER
- ANER
- Promotion, dropouts and repetition rate
- Rate of out of school for primary and lower secondary age children
- PTR by level
- Average class size
- Proportion of trained teachers/qualified teachers
- Instructional time and time per subject

**OUTPUT/OUTCOME**
- Graduation rate
- Completion rate
- Survival rate to last grade of basic education
Framework: "Education as a Basic Social Service"

If education is viewed as a “basic social service“, education indicators can be identified under three areas:

→ Access and Participation
→ Quality and Equity
→ Efficiency and Management
Monitoring education from basic social service aspects

Access

Management, Quality and Equity

Education System

Participation

Next Level

Labour Market

Drop-out

Access
Monitoring education from basic social service aspects

**Access to education**
- Gross Intake Ratios
- Net Intake Ratios
- % of new entrants with ECCE

**Access**
- Gross Enrolment Ratios
- Net Enrolment Ratios

**Participation**
- Gross Enrolment Ratios
- Net Enrolment Ratios

**Education System**

**Performance**
- Promotion, Repetition and drop-out rates
- Internal efficiency

**Equity**
- Indicators by sex
- Gender parity Index

**Quality**
- Pupil-teacher ratio
- % of trained teachers

**Output**
- Survival rate to last grade
- Completion rate

**Labour Market**

**Next Level**

**Drop-out**

**CENTRAL ASIA SYMPOSIUM ON ICT IN EDUCATION, 24-26 October 2018, Dushanbe, Republic of Tajikistan**
Analyzing system performance towards achieving SDG-4

• Assess progress and gaps in the achievement of the national and global targets.

• Identify and locate the remaining gaps in terms of access, quality and equity at the sub-national level, with a focus on the disadvantaged and underserved populations.

• Review, identify and locate problems, issues - policies, strategies, actions and success stories.

• Use the results of the assessment to formulate better policies and strategies for achieving the goals and target
• Each of these steps requires the analysis and use of SDG4 indicators.
• The indicators for different concepts of SDG4 such as learning, participation, completion, teachers, resource inputs and educational processes etc., can be analysed according to their:
  • characteristics, distribution and patterns
  • differences, disparities and imbalances
  • changes over time
  • progress and shortfalls against targets and plans
Analyzing system performance towards achieving SDG-4

• Data analysis for monitoring Education 2030 must, therefore, cover both the spatial and temporal dimensions in that:

  • **Spatial** refers to geographical sub-divisions such as provinces, districts and local areas, whilst differentiating between urban and rural zones and remote areas.

  • **Temporal** refers to changes over time.
5 key steps involved in data analysis

**Step 1: Purpose / objectives of data Analysis**

- This includes what question that the data analyses will answer.
  - to see the **gaps** in learning in rural and urban areas,
  - to take a **stock** of achievement in basic education,
  - to compare the **progress** between various social groups,
  - to analyze whether there is enough human and technical **resources** to implement programmes effectively.

**Step 2: Selection of Indicators**

- **Selected indicators** should answer the indicated objective questions. (Direct measurement, Proxy?)
- **Quality** of data (source, coverage, disaggregation...)
Step 3: Data preparation

• The data (Raw or processed) extraction from data sources in required format to perform the data analysis.

• Carefully check completeness (data for all the areas and groups), coverage (all types of education public, private and other types of schools).

• Preparation of data includes bringing all the data from different sources to calculate desired indicator in one table or one format.
Step 4: Dealing with Missing data

• Data coming from various sources especially administrative data based on school census may have some degree of data missing for some of the variables.

• 3-types of missing data
  • Missing Completely at Random (missingness is completely random e.g. Lost forms)
  • Missing at Random (missingness is random within subgroups of other observed variables - e.g. private schools not to answer)
  • Not Missing at Random (the reason for missingness depends on the missing values themselves – e.g. schools don't want to report their income when it is below 1000 euros)
5 key steps involved in data analysis

**Step 4: Dealing with Missing data**

- 7 ways to treat the missing data
  - Deletion (Likewise or pairwise)
  - Recover the Values
  - Educated Guessing
  - Average Imputation
  - Common-Point Imputation
  - Regression Substitution
  - Multiple Imputation (http://www.stefvanbuuren.nl/mi/mi.html)
5 key steps involved in data analysis

**Step 5: Analyzing and interpretation of the data**

Different types of Analysis can be used to show the results.

- Progress Analysis
- Gap Analysis
- Equity Analysis
- Relationship analysis
- Forecasting
- Multivariate analysis
## 5 key steps involved in data analysis

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Statistical tools</th>
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<tr>
<td>Progress Analysis</td>
<td>Time series, % point increase, Annual growth etc.</td>
</tr>
<tr>
<td>Gap Analysis</td>
<td>Distance from target, Comparing between different social or geographical groups</td>
</tr>
<tr>
<td>Equity Analysis</td>
<td>Distribution statistics, parity index, range, percentile, Gini</td>
</tr>
<tr>
<td>Relationship analysis</td>
<td>Correlation coefficient, regression</td>
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<tr>
<td>Forecasting</td>
<td>Modelling, Projection</td>
</tr>
<tr>
<td>Multivariate analysis</td>
<td>Statistical technique to analyze data that arises from more than one variable (where each situation, product, or decision involves more than a single variable)</td>
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Assignment on understanding of Education Indicators