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Regional Capacity Development Resource Book on

Monitoring SDG4-Education 2030 in Asia-Pacific

Education 2030

UNESCO Education Sector

Education is UNESCO's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development. UNESCO is the United Nations' specialized agency for education and the Education Sector provides global and regional leadership in education, strengthens national education systems and responds to contemporary global challenges through education with a special focus on gender equality and Africa.

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The Global Education 2030 Agenda

UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to ***"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."*** The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.

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Regional Capacity Development Resource Book on

Monitoring SDG4-Education 2030 in Asia-Pacific

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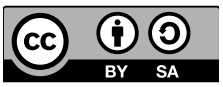

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Foreword

The sustainable development goal on Education (SDG 4) is putting strong emphasis on data generation and monitoring to manage the education sector more efficiently and effectively. The goal is very holistic and puts forward the lifelong learning approach, which demands the progress in education for all age groups and at all levels of education. This demands clear indicators and measurement to generate evidence-based international discourses and advocacy. Moreover, SDG4-Education 2030 is a universal and collective commitment of all countries regardless of their level of development. Looking at the data requirements to monitor the Education 2030, it is clear that various data sources need to be used and *"traditional approach to data may have reached their limits"* (UIS, 2016a[1]).

The Education 2030 Agenda calls for robust monitoring, reporting, and evaluating indicators from Early Childhood Education (ECE) to adult education. Thus, countries' capacity to respond to all the SDG 4 indicators will depend on whether a quality mechanism is in place.

Looking at the new agenda and its' essence to cover broad areas of lifelong learning perspectives and putting equity and quality at the forefront of education delivery, the three data priorities for the Education 2030 Agenda are:

- A broad scope across the life cycle: Indicators for areas which are on the 'margins' of the formal education system, but recognized as critically important to achieving development goals.
- Education quality: results of learning at all stages of education provision, or learning opportunities; other aspects of quality.
- Equity: measures that capture those who are excluded from education provision, or learning opportunities.

One of the most critical aspects of monitoring SDG 4 is measuring equity that necessitates disaggregated data by various characteristics such as age, sex, location, wealth, disabilities, ethnicity etc. At the country level, this requires building capacities of, and effective coordination and collaboration between the National Statistics Office (NSO) and the Ministry of Education (MOE). This necessitates understanding the SDG 4 indicators framework and identifying the roles of different parties in generating different types of data for the calculation of the required indicators for planning, management and monitoring of Education sector.

The development of robust and sustainable educational statistical and monitoring system for SDG4-Education 2030 begins with undertaking a quality assessment of data production chain, data sources, producers, data users and overall institutional arrangement for this data ecosystem to continue. A good educational statistical and monitoring system is always supported by strong political and institutional mechanism; sound methodological processes, an efficient and effective data management systems and capable human resources in managing the system generating information and use for planning and monitoring.

In this context, UNESCO Bangkok and UNICEF East Asia and Pacific Regional Office (EAPRO) have jointly developed a Regional Resource Book for Capacity Development on Monitoring SDG4- Education 2030. The main purpose of the Resource Guide is to strengthen capacities of countries in the region in effectively monitoring SDG 4 with the aim of achieving evidence-based policy and programming and solid education sector planning and management for quality education and learning for all.

[1] UIS (2016a), Laying The Foundation To Measure Sustainable Development Goal 4

The Resource Book was developed based on UNESCO and UNICEF's past experiences in working on education data and management information system development in the region and includes latest best practices in developing monitoring system for education. Adopting holistic approach in establishing monitoring system for education 2030 guided by National Strategies for Development of Education Statistics (NSDES); and development of various data production and management system such as EMIS, household survey and their use in education sector planning and monitoring, undertaking data analysis for generating useful information, the Resource Book provides complete solution for countries to develop an effective monitoring system.

To help educators, planners and monitors at different levels to access and use, the Resource Book is available for direct access online. To use the Resource Book at national training programmes, a Trainers Guide with detailed session design and corresponding PowerPoint Presentation and other resource materials will also be available soon. We look forward to your feedback.

Shigeru Aoyagi
Director
UNESCO Bangkok

Acknowledgements

Within the framework of 'Enhancing Statistical Capacities for Education – Towards Strengthening SDG (Sustainable Development Goal) 4 Monitoring in Asia and Pacific' and as a part of the Regional Monitoring Mechanism, the Regional Resource Book for Capacity Development on Monitoring SDG4- Education 2030 was jointly developed by the UNESCO Asia and Pacific Regional Bureau for Education and UNICEF East Asia and Pacific Regional Office (EAPRO) with substantive technical input and guidance from UIS Regional Office for Asia and Pacific. This Resource Book was developed to enhance Member State's statistical and data management capacities for monitoring the SDG 4 with quality data and statistics, throughout the process of collection, analysis and utilization for equitable, inclusive quality education and learning for all in Asia and Pacific region.

The Resource Book was developed after a series of consultations with experts during 2017 and 2018, and was field-tested in selected countries under the guidance of a group composed of national and international experts: Mr. Pitin Pong (Cambodia), Mr. Someth Yinsieng (Cambodia), Mr. Somkhanh Didaravong (Lao PDR), Mr. Shankar bahadur Thapa (Nepal), Dr. Sungho Park (Republic of Korea), Ms. Mu Mu Aung (Myanmar), Mr. Ko Lay Win (Myanmar), Dr. Kraiyos Patrawart (Thailand), Mr. Khin Kyu, Mr. Shiu Kee Chu, Dr. Ko-Chih Tung, Mr. James Shoobridge, Dr. Venkatraman Subramaniyam, Dr. Akihiro Fushimi (UNICEF, EAPRO), Mr. Nyi Nyi Thaung (UNESCO Bangkok), Ms. Aurélie Acoca (UIS, Bangkok) and Dr. Roshan Bajracharya (UIS, Bangkok).

The first Expert meeting was organized in 2017, which set the foundation for the development of the Resource Book including contents, structure and format. Based on the expert meeting, the early draft of the Resource Book was prepared. The Expert Group reviewed the draft and provided comments and inputs and the second version were prepared reflecting those comments/inputs.

The second version of the Resource Book was piloted in various regional and national workshops during 2018. Based on the experiences from the pilots, the Resource Book was further improved in consultation with the Expert Group.

The revised Resource Book was further reviewed during the second Expert Group Meeting in Bangkok in October 2018, followed by further improvements before editing and finalizing. The production of this Resource Book, including its conceptualization, review and finalization benefitted from the management of Mr. Nyi Nyi Thaung and Dr. Roshan Bajracharya with active support from Mr. Christian Dohrmann, Ms. Aurélie Acoca, Ms. Amalia Serrano, Ms. Aki Osawa from UNESCO Bangkok and Dr. Akihiro Fushimi (UNICEF EAPRO) and inputs from various UNICEF colleagues (Dr. Hiroyuki Hattori, Dr. Suguru Mizunoya, Ms. Sheena Bell, Mr. Daniel Kelly, Mr. Ivan Coursac, Dr. Haogen Yao, and Dr. Frank Van Cappelle). We would like to express our appreciation to their substantive contribution to the development of the Resource Book.

We would also like to express our heartfelt thanks to the main authors of this Resource Book – Dr. Venkatraman Subrahmaniyam and Dr. Roshan Bajracharya for their expertise and dedication. We are also very much grateful to the main reviewers of the Resource Book – Mr. Jim Shoobridge, Dr. Akihiro Fushimi, Ms. Aurélie Acoca and Mr. Christian Dohrmann for their professional inputs.

We encourage the Member States in Asia and Pacific, and in other regions, to adopt and utilize this Regional Resource Book to further strengthen capacities for the monitoring of Sustainable Development Goal 4-Education 2030 Agenda at the various levels of their education system and to adapt the contents to national level monitoring priorities.

We keenly look forward to acknowledging future feedback and contributions from readers and users of this Resource Book.

Background and introduction

Background and introduction to the training modules

Within the framework of 'Enhancing Statistical Capacities for Education – Towards Strengthening SDG (Sustainable Development Goal) 4 Monitoring in Asia and the Pacific' and as a part of the Regional Monitoring Mechanism, this training manual on monitoring SDG 4-Education 2030 has been developed for countries in Asia and the Asia-Pacific to fortify their statistical and data management capacities for monitoring Sustainable Development Goal 4.

This manual covers various topics that are relevant to building an effective monitoring system, such as the creation of a national indicator framework and the development of national strategies for education statistics; strengthening the administrative data production system; and increasing the household survey application in monitoring education at the national level, as well as reporting at the global level.

The manual is comprized of six modules and these are outlined in this introductory module. The purpose of this module is to introduce the SDG 4–Education 2030 Agenda to help prepare learners on the components of the SDG 4–Education 2030 Agenda.

1 Background

1.1 Education development in the new millennium

The 2015 Incheon Declaration for Education 2030 ensconces a humanistic vision of education and development based on human rights and dignity; social justice; inclusion; protection; cultural, linguistic and ethnic diversity; and shared responsibility and accountability[1]. It reaffirms that education is a public good, a fundamental human right and a basis for guaranteeing the realization of other rights. It is essential for peace, tolerance, human fulfilment and sustainable development. It recognizes education as a means to achieving full employment and poverty eradication. Its efforts focus on access, equity and inclusion, quality and learning outcomes, within a lifelong learning approach. This new vision of the Incheon Declaration looks at education development as a sustainable process and it has secured international and national commitments to work for the achievement of the Education Goal of SDG 4, expressed in terms of its ten targets with three means of implementation, which seek:

"To ensure inclusive and equitable, quality education and promote lifelong learning opportunities for all."

The Incheon Declaration 2015 was adopted after taking stock of progress made towards the achievement

Box 1: The Incheon Declaration 2015

UNESCO, together with UNICEF, the World Bank, UNFPA, UNDP, UN Women and UNCHR organized the World Education Forum 2015 in Incheon from 19 to 22 May, which was hosted by the Republic of Korea. Over 1,600 participants from 160 countries, including over 120 ministers, heads and members of delegations, heads of agencies and officials of multilateral and bilateral organizations and representatives of civil society, the teaching profession, youth and the private sector, adopted the Incheon Declaration for Education 2030, which sets out a new vision for education for the next fifteen years.

[1] Education 2030 Steering Committee, 2016: Incheon Declaration and Framework for Action for the implementation of Sustainable Development Goal 4. Access: http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf

of the Education for All (EFA) goals since 2000 and the education-related Millennium Development Goals (MDGs). The process included a review of the lessons learned; an examination of the remaining challenges and deliberation on the proposed Education 2030 Agenda; the Framework for Action; and future priorities and strategies for its achievement.

Table 1 below compares global education agendas since 2000.

Table 1: Comparison of Global Education Agendas

Global Education Agenda / Aspect of Comparison	Millennium Development Goal 2	Education For All	Sustainable Development Goal 4
Scope	Primary Education (children)	Basic Education (children, youths and adults)	Basic Education + Post-basic education and lifelong learning
Coverage	Low-income countries; conflict-affected nations	Universal in intention; focus on lower-income countries	Universal agenda Global North and South
Process led by:	United Nations	United Nations	Member States
Policy Focus	Access to and completion of primary education for all	Access to quality basic education for all	Access to quality basic education for all + equitable access to post-basic education + relevance of learning for work and citizenship
No. of targets	2	6	10

Source: Adaptation from a presentation by S. Tawil, UNESCO, as reported in NEQMAP's 4th Annual Meeting, December 2016, Bangkok in "Regional Issues/Challenges in the implementation and monitoring of SDG 4-Education 2030 Agenda".

1.2 The 2030 Agenda for Sustainable Development

The 2030 Agenda for Sustainable Development was adopted by world leaders at the United Nations Sustainable Development Summit in September 2015. It comprizes 17 SDGs. It encompasses the three core dimensions of economic, social and environmental development and offers countries a unique pathway to eradicate poverty and hunger

and to provide a life of dignity for all, while at the same time paying attention to environmental sustainability.

Besides addressing the issues of poverty and hunger, the SDGs address other important issues relating to health, education, gender equality, water and sanitation, sustainable energy, economic growth, industrialization, reduction of inequalities, safe human settlements, sustainable consumption and production patterns, climate change, use of marine resources, ecosystems and biodiversity, justice for all and revitalization of global partnerships for sustainable development.

Of universal concern in sustainable development are the three pillars of the economic, the social and the environmental. This concern implies setting a universal agenda for development based on a:

- Universality of principles (human rights);
- Universality of reach (focus on equity and inclusion);
- Universality of country coverage.

Figure 1: The Sustainable Development Goals

For more on the World Development Agenda and the Sustainable Development Goals, **access:** https://sustainabledevelopment.un.org/sdgs

Figure 2: The 5Ps

Source: Adapted from Vladimirova, K. and David Le Blanc, 2015: How well are the links between education and other sustainable development goals covered in UN flagship reports? A contribution to the study of the science-policy interface on education in the UN system. Working Paper No. 146 ST/ESA/2015/DWP/146. New York, United Nations, DESA., **access:** www.un.org/esa/desa/papers/2015/wp146_2015.pdf

The 5Ps

The world development Agenda 2030 and its SDGs sets a universal agenda for all countries, with five objectives also called the '5Ps', namely:

1. People: to end poverty and hunger.
2. Planet: to protect it from degradation.
3. Prosperity: to ensure that all human beings can enjoy prosperous and fulfilling lives.
4. Peace: to foster peaceful, just and inclusive societies.
5. Partnership: to mobilize the means required to implement this agenda through a revitalized global partnership for sustainable development.

Rationale of Education 2030

The rationale for the SDG 4-Education 2030 Agenda arises out of the historical developments on education development witnessed globally ever since the advent of EFA and the MDGs. There is no doubt about the achievements registered by EFA and MDGs, particularly in the global context. However, the importance of SDG 4 lies in the fact that it is:

- More comprehensive: provides for expanded access to all levels of education, with at least 12 years of free, publicly funded, quality primary and secondary education, higher education, Technical and Vocational Education and Training (TVET) and life-long education.
- More outcome/skills oriented, with:
  - Renewed focus on effective acquisition of foundational skills.
  - New focus on relevance of learning for securing decent work.
  - New focus on relevance of learning for social and civic life.
- Better integrated with other goals.

With SDG 4, education is mandated to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." The goal's targets are presented below with some brief statements on the main policy commitments, as derived from the Framework for Action[2].

Table 2: SDG 4-Education 2030 Targets and Policy Commitments for Actions/Outcomes

TARGETS	POLICY COMMITMENTS FOR ACTIONS/OUTCOMES
4.1. By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education, leading to relevant and effective learning outcomes.	Ensure the provision of 12 years of free, publicly-funded inclusive, equitable, quality primary and secondary education – of which at least nine years[3] are compulsory, leading to relevant learning outcomes.
4.2. By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so they are ready for primary education.	Ensure the provision of at least one year of free and compulsory quality pre-primary education, as well as that of early childhood development and care.
4.3. By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university education.	Reduce barriers to skills development and TVET, starting from the secondary level, as well as to tertiary education, including university education and provide lifelong learning opportunities for youth and adults.
4.4. By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.	Ensure equitable access to TVET and other learning opportunities using a wide range of education and training modalities, for youth and adults to acquire relevant knowledge, skills and competencies for decent work and life. Beyond work-specific skills, emphasis must be placed on developing high-level cognitive and non-cognitive/transferable skills.
4.5. By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous people and children in vulnerable situations.	Ensure all people, irrespective of sex, age, race, colour, ethnicity, language, religion, political or other opinion etc., have access to an inclusive, equitable, quality education and lifelong learning opportunities. Ensure all girls and boys, women and men have equal opportunity to enjoy an education of a high quality, to achieve at equal levels and enjoy equal benefits from education.

[2] The Education 2030 Framework for Action provides guidance for the implementation of SDG 4 at country, regional and global levels. For more details, access UNESCO, 2017: Unpacking Sustainable Development Goal 4 Education 2030, at: https://unesdoc.unesco.org/ark:/48223/pf0000246300

[3] The first nine years of formal education, i.e., the cumulative duration of ISCED 1 and 2: ISCED 1 is the primary level, typically lasting six years (with variation across countries between four and seven years), and ISCED 2 is lower secondary, typically lasting three years (again, with variation). For more, see: UIS, 2012: International Standard Classification of Education 2011, UIS, Montreal, access: http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

4.6. By 2030, ensure that all youth and a substantial proportion of adults, both women and men, achieve literacy and numeracy.	Action for this target aims to ensure that by 2030, all young people and adults across the world have achieved relevant and recognized proficiency levels in functional literacy and numeracy skills that are equivalent to levels achieved at successful completion of basic education.
4.7. By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and culture's contribution to sustainable development.	The content of such education must be relevant, with a focus on both cognitive and non-cognitive aspects of learning. The knowledge, skills, values and attitudes required by citizens to lead productive lives, make informed decisions and assume active roles locally and globally in facing and resolving global challenges can be acquired through education for sustainable development (ESD) and global citizenship education (GCED), which includes peace and human rights education, as well as inter-cultural education and education for international understanding.
MEANS OF IMPLEMENTATION	
4.a. Build and upgrade education facilities that are child, disability and gender-sensitive and provide safe, non-violent, inclusive and effective learning environments for all.	This target addresses the need for adequate physical infrastructure and safe, inclusive environments that nurture learning for all, regardless of background or disability status.
4.b. By 2020, substantially expand globally the number of scholarships available to developing countries, in particular, least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries.	In line with SDG 4-Education 2030, a focus on equity, inclusion and quality, scholarships should be transparently targeted at young people from disadvantaged backgrounds.
4.c. By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States.	As teachers are a fundamental condition for guaranteeing a quality education, teachers and educators should be empowered, adequately recruited and remunerated, motivated, professionally qualified and supported with well-resourced, efficient and effectively governed systems.

Source: Adapted from UNESCO, 2017: Unpacking Sustainable Development Goal 4 Education 2030, **access:** https://unesdoc.unesco.org/ark:/48223/pf0000246300

1.3 The Interconnectedness of SDG 4 with other goals of the Agenda 2030

The SDGs were designed with interconnectedness in mind and education can be a central goal in achieving this. When we look at the themes of other SDGs, we understand that successful achievement requires a sense of undergirding education to make informed decisions.

Let's take SDG 8 on decent work and economic growth as an example. Education impacts on a worker's capabilities and in return their productivity for the national economy. This in turn impacts on international market participation.

Education also influences what labour choices women have as education influences their decision-making capacity and informs them about the options that exist in the world of work – subsequently contributing to gender equality and women's empowerment (SDG 5).

Similarly, we can approach SDG 12 on responsible production and consumption. In order to move towards a humanity that treats natural resources with care, a paradigm shift in today's consumption and production patterns has to happen in all parts of the world.

Education is used to establish a national identity; but education serves a much greater purpose to influence citizen's behaviour and lifestyle choices (from children, to adults, to employers, to policy-makers) for less wasteful indulgencies and instead towards a resource-conscious humanity.

Education influences habits, behaviour and choices that result in a higher awareness of issues. Taking into consideration SDG 13 on taking urgent action to combat climate change – how can we expect citizens of the earth to do the right thing when we do not educate them about it?

And then there is SDG 16 on *peace, justice and strong institutions*. To ensure peaceful, just and equal societies, citizens need to learn what is unjust, unfair, or the suffering in the absence of peace. Education serves us to advance people's capacity to make humane choices with consideration for diversity and free expression, without the need for violence and oppression, or any other form of cruelty.

To name some precise Target linkages; Target 4.2 on early childhood education intersects with SDG 16 and Target 16.1 on ending abuse, exploitation, trafficking and all forms of violence against and torture of children.

Target 4.3 on TVET intersects with SDG 8, Target 8.5, which states the aim of full and productive employment and decent work for all women and men by 2030, including for young people and persons with disabilities, plus equal pay for work of equal value.

Target 4.7 on ensuring that all learners acquire the knowledge and skills needed to promote sustainable development intersects with SDG 1, Target 1.5 which states that by 2030, the resilience of the poor and those in vulnerable situations and their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters has to be fortified.

The following table depicts the interconnectedness of the SDGs as they are linked to the Targets of SDG 4.

Table 3: The SDGs intersecting with SDG 4 Targets

		Agenda 2030 - Sustainable Development Goals																
		SDG 1	SDG 2	SDG 3	SDG 4	SDG 5	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 11	SDG 12	SDG 13	SDG 14	SDG 15	SDG 16	SDG 17
SDG 4	Target 4.1	●			–	●			●			●						
	Target 4.2	●	●	●	–	●			●			●					●	
	Target 4.3				–	●			●									
	Target 4.4				–	●			●									
	Target 4.5				–	●	●		●		●							
	Target 4.6				–	●												
	Target 4.7	●		●	–	●		●	●		●	●	●	●			●	
	Target 4.a	●			–	●	●		●	●		●					●	
	Target 4.b	●			–	●			●		●							●
	Target 4.c				–	●			●		●	●						

Source: Adapted from Vladimirova, K. and David Le Blanc, 2015: How well are the links between education and other sustainable development goals covered in UN flagship reports? A contribution to the study of the science-policy interface on education in the UN system. Working Paper No. 146 ST/ESA/2015/DWP/146. New York, United Nations, DESA, **access:** www.un.org/esa/desa/papers/2015/wp146_2015.pdf

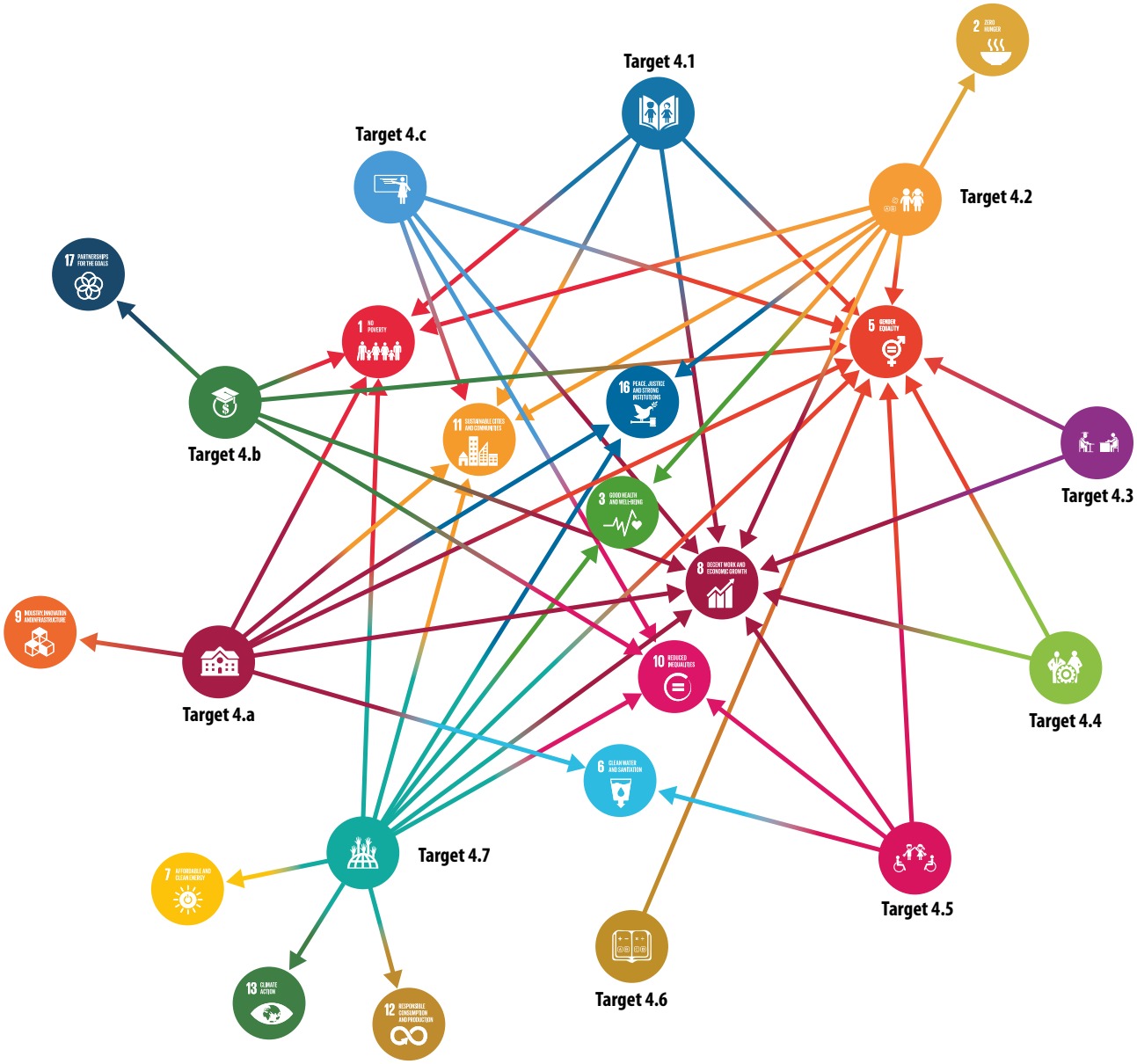
Figure 3 visualizes the interconnectedness of the SDG 4 targets with other SDGs and reveals a complex map.

To achieve the education target and the SDGs in general, as well as their monitoring, there are many areas and concepts to deal with and as part of this process, partnerships and collaboration are an important necessity.

Countries' line ministries need to work closely with local institutions. Civil society organizations, in particular, can play a very important role by bringing valuable cases to the forefront and casting light on critical issues that need to be addressed.

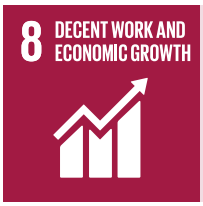
To provide further exploration of the importance of 'interconnectedness', the following overview makes reference to education in other Agenda 2030 goals.

Figure 3: SDGs are connected: Centrality of Education



Source: Adapted from Vladimirova, K. and David Le Blanc, 2015: How well are the links between education and other sustainable development goals covered in UN flagship reports? A contribution to the study of the science-policy interface on education in the UN system. Working Paper No. 146 ST/ESA/2015/DWP/146. New York, United Nations, DESA., **access:** www.un.org/esa/desa/papers/2015/wp146_2015.pdf

Figure 4: Education related targets and indicators in other SDGs

	**SDG 1: End poverty in all its forms everywhere**	Target 1.a Ensure significant mobilisation of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least-developed countries, to implement programmes and policies to end poverty in all its dimensions.	Indicator: Proportion of total government spending on essential services (education, health and social protection).
	**SDG 3: Health and well-being**	Target 3.7 By 2030, ensure universal access to sexual and reproductive health care services, including for family planning, information and education and the integration of reproductive health into national strategies and programmes.	Indicator: Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modem methods. Indicator: Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group.
	**SDG 5: Gender equality**	Target 5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the ICPD and the Beijing Platform for Action and the outcome documents of their review conferences.	Indicator: Number of countries with laws and regulations that guarantee women aged 15-49 years have access to sexual and reproductive health care, information and education.
	**SDG 8: Decent work and economic growth**	Target 8.6 By 2020 substantially reduce the proportion of youth not in employment, education or training.	Indicator: Proportion of youth (aged 15-24 years) not in education, employment or training.
	**SDG 12: Responsible consumption and production**	Target 12.8 By 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.	Indicator: Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment.
	**SDG 13: Climate change**	Target 13.3 Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.	Indicator: Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
	**SDG 16: Peace, justice and strong institutions**	Target 16.6 Develop effective, accountable and transparent institutions at all levels.	Indicator: Primary government expenditures as a proportion of original approved budget by sector (or by budget codes or similar).

2 Monitoring SDG 4

Such a universal vision places new demands on countries, especially on the producers and users of education data.

A corresponding responsibility falls on the shoulders of policy makers, planners, as well as programme implementers at the country level, as users of such data.

If the data quality is good and its reliability of a high order, this will greatly facilitate their collective task. The decision makers at the country level need to be properly sensitized on the need to allocate adequate resources to education in such a way that it helps strengthen the overall performance of the system and reduces inequalities in all areas.

To do this, they need to have access not only to inputs, but also to outcomes so they can judge if their attempts to improve quality and equity of learning opportunities are indeed making a difference.

In a converse sense, the absence of data, or the availability of bad data can leave the decision makers with no reliable evidence on which to judge whether policies and the supporting resource inputs are in fact working or not; and if not, why not?

Looking at the new agenda and its' essence to cover broad areas of lifelong learning perspectives and putting equity and quality at the forefront of education delivery, the three data priorities for the Education 2030 Agenda are:

- A broad scope across the life cycle: Indicators for areas which are on the 'margins' of the formal education system, but recognized as critically important to achieving development goals.
- Education quality: results of learning at all stages of education provision, or learning opportunities; other aspects of quality.
- Equity: measures that capture those who are excluded from education provision, or learning opportunities.

2.1 Emerging Challenges in Monitoring Education 2030

The Education 2030 Agenda calls for robust monitoring, reporting, and evaluating indicators from Early Childhood Education (ECE) to adult education. Thus, countries' capacity to respond to all the SDG 4 indicators will depend on whether a quality mechanism is in place.

Even though most of the countries in the Asia and Pacific regions have set up an education management and information system to collect, store, analyse and disseminate education data as a pillar of their decision-making processes, diverse challenges still exist across both regions to monitor progress on SDG 4 targets and these challenges are listed in detail:

Data production systems not ready for Education 2030: Basic education is the only area where more than 90 per cent of Asia and Asia-Pacific countries have a decent system to collect data. The lack of *holistic* data collection systems in education sub-sectors and the challenges in some phases of the data production cycle impedes countries from generating the necessary indicators. Similarly, resource constraints in terms of technical, financial and human resources are barriers to increasing indicator availability.

Need for multiple data sources: Education 2030 will require the adoption of new indictors, new measurements and new tools for monitoring and some SDG 4 targets. For example, global citizenship education and Non-Formal Education (NFE) are difficult to measure if a reliance is made on traditional data collection mechanisms. While many indicators that are derived from administrative sources are more likely to be collected by most of the countries, data from other sources, such as household surveys, or other alternative sources are not found in a significant proportion of countries. The use of multiple sources of information will be critical in collecting data for Education 2030.

Dearth of disaggregation to measure equity: The Education 2030 Agenda has a strong focus on equity. Without having data for all the desirable disaggregation, it is not easy to measure an existing inequity. Currently, only three per cent of indicators can be disaggregated by the five proposed characteristics. In order to better identify the dimensions of disadvantage in education and measure equity and inclusion, efforts should be made to increase the capacity of governments to disaggregate data where relevant by sex, age, location, ethnicity and disabilities.

Need to harmonize the measurement of learning outcomes: Five out of seven SDG 4 targets include and focus on learning outcomes. Various methodologies and processes have been developed and applied to measure learning outcomes at the national level. However, each assessment has its own framework and methodology. Thus, there is no standardized, nor comparable method to measure learning outcomes across countries.

Lack of culture of data sharing and cooperation: Although many types of data and indictors are collected by different departments and ministries, they are not generally shared and are not easily accessible. Establishing a culture of data sharing for cooperation among data producers is crucial for effective monitoring of the Education 2030 Agenda. Information from civil society organizations (CSOs) and other non-traditional education providers, which might collect data on aspects of education that are not covered by the traditional education providers, should be taken into consideration to fill data gaps.

2.2 An effective implementation of SDG 4 calls for a system-wide approach

The effective implementation of SDG 4 calls for a system-wide change in countries. These may relate to the following actions:

- Broaden the conceptual understanding of inclusion and equity.
- Develop relevant measurements for inclusion/inclusiveness.
- Embed inclusion, equity and gender equality in existing and core education policy and plans – not as separate policies.
- Address policies at all levels of a national education system, including at the classroom level.
- Ensure multiple level and cross-sectoral interventions, ranging from education, health, social, economic, legal, political, cultural or attitudinal are required.
- Collect and build evidence from various sources to inform policy making and planning processes.
- Make effective use of ICT and assistive technology to facilitate access and participation in learning.

2.3 Coordination mechanisms at the different levels

Effective coordination between different players is very important for SDG implementation. The following figure illustrates the coordination mechanisms at the global, regional and national levels:

Figure 5: SDGs are connected: Centrality of Education

Global Steering Committee, Global Education Meetings (GEM), CCNGO.

Asia-Pacific Regional Meeting of Education 2030 (APMED), RTWG-Education 2030+, Institutional collaboration of sub-regional organizations (e.g. ASEAN, PIFS, SAARC, SEAMEO), Asia-Pacific Network of National Coordinator, ESCAP-RCM and technical and capacity development collaborations, and knowledge management coordination.

Government-led headed by National SDG 4 Coordinators; building on existing structures (e.g. ESWG, LEG, etc.); system-wide approach; integration in national plans; linkage with broader SDGs. coordination; ensure inclusive processes.

3 Overview of the Modules

Module 1: Monitoring SDG 4 - Global and Thematic Indicators and International Comparable Education Statistics

This module introduces the Incheon Declaration and SDG 4-Education 2030 monitoring framework and compares SDG 4 with the earlier MDG 2 on education. It introduces the different levels of monitoring SDG 4 and all the SDG 4 indicators. The module then discusses the concepts of an indicator, the sources we can draw upon to collect data from and the elements to ensure we capture quality data. The third major part of this module familiarizes the reader with the requirements for international reporting of comparable education data.

Module 2: Developing a National Education Indicator Framework and Strategies for Education Statistics

The purpose of this module is to strengthen institutional capacities. Therefore, this module elaborates on the organizational and institutional aspects of managing data, while also introducing National Strategies for the Development of Education Statistics (NSDES) which aid in the formalization of responsibilities of different institutions in the development of national statistical capacities and ultimately in monitoring education sector performance.

The module will elaborate step-by-step on procedures to develop a National Education Indicator Framework (NEIF) and explain the mapping of data sources, as well as a detailed assessment of data quality. These elements form part of NSDES and are crucial for the introduced results-based management approach in establishing NSDES.

Module 3: Strengthening the Education Management Information System for Monitoring SDG 4

This module has been prepared with the intention of familiarizing readers with the basics of structuring and managing an Education Management Information System (EMIS), as well as to raise awareness about the importance of EMIS in monitoring SDG 4. This module seeks to facilitate a better understanding of what constitutes an enabling environment, a support system, the production of quality data and the dissemination of such data. It also facilitates a better understanding of data gaps and how to address them.

This supports the collection of individual data at the school level through a School Management and Information System (SMIS) and its integration into the EMIS. Topics such as 'innovation,' 'big data' and the collection of qualitative data and their integration into EMIS are deliberated in this module.

Module 4: Household Surveys for Monitoring SDG 4

This module familiarizes readers with the types of household surveys that exist and it details how to utilize these surveys more effectively to monitor education in terms of SDG 4, which will subsequently aid in establishing better collaborations between survey designers and education specialists. The module illustrates what education indicators can be retrieved from household surveys, as well as the challenges in collecting education related data. This module also provides guidance on setting up an institutional mechanism for collaboration in order to ensure the application of household surveys to their full potential in producing SDG 4 indicator data.

Module 5: Analyzing Data and Communicating the Results

One of the challenges regional countries are facing is an inability to analyse data for use at various levels. This module teaches the basics of education data analysis, starting from a distinction between qualitative and quantitative analyses, to clarifying what makes for a good indicator, with a comprehensive step by step overview of data analysis procedures. For greater clarity, the module also provides practical examples.

Data is also often not disseminated to all the relevant audiences, thus not informing many education stakeholders, such as the public, about progress or shortcomings for which support is needed in education development. The dissemination of comprehensive, reliable and timely data is increasingly viewed as an issue of transparency and thus crucial for confidence in the data. Therefore, this module is also concerned with providing illustrative examples and guidelines on disseminating education data analysis results that are relevant in the country, as well as internationally.

Module 6: Monitoring Challenges beyond Traditional Aspects of Education

The purpose of this module is to raise awareness about some of the crucial topics in monitoring SDG 4 and some that pose challenges in collecting data. Technical Vocational Training and Education, Education for Sustainable Development and Global Citizenship are inclusive environments with an eye on disability and refuge status, as well as the learning assessments that exist to assist us with capturing all the relevant populations, including those hard to reach. This module stresses the importance of the fact that we are dealing with a new, different vision of education. It underpins the point that the targets set against this goal have been inspired by a humanistic vision of education and development based upon human rights and dignity; social justice; inclusion; protection; cultural-linguistic-and-ethnic diversity; shared responsibility and accountability.

Module 1: Monitoring SDG 4 – Global and Thematic Indicators and International Comparable Education Statistics

Module overview – objectives, topics and learning outcomes

Education 2030 marks an important shift in emphasis from access to education, to quality learning; learning that is inclusive, equitable and relevant and which should take place throughout one's life and across all levels and types of education. Education 2030 is universal in nature and warrants the collective commitment of all countries, regardless of their individual levels of development.

SDG 4-Education 2030 has strong emphasis on monitoring. The International Advisory Expert Group has proposed 11+ global indicators to monitor global progress in SDG 4. Similarly, the Technical Cooperation Group has proposed 43+ thematic indicators, including the global indicators, to monitor education sector development holistically. These indicators are internationally comparable and inform on progress in universal education and quality learning at global and regional levels.

It is important for countries and personnel involved in education statistics and monitoring to understand these SDG4 global and thematic indicators and the different levels of monitoring and production processes of international statistics so that countries are ready for their data reporting at the global level – which ultimately strengthens data and statistical reporting at the national level as well.

Countries should have a clear understanding of indicators and monitoring methodologies, data requirements and available sources and data analysis/interpretation and utilization, among others. This module is designed to outline concepts in global and thematic monitoring and their indicator framework, as well as to inform stakeholders in education and statistics on the global processes of monitoring and reporting on SDG 4-Education 2030.

The following topics are covered in this module:

- Monitoring SDG 4, the global and thematic indicator framework;
- Understanding SDG 4 indicators, their concepts and methodologies;
- Producing and reporting internationally comparable education data at the regional and global levels.

After completing this module, learners will have acquired the following learning outcomes:

- Able to explain the global and thematic monitoring framework on SDG 4;
- Able to define the SDG 4 indicators and their methodologies for quality data production;
- Able to discuss international education statistics and their processes.

1 Monitoring the SDG 4 -Education 2030 Agenda

Recent demands for global data to inform sustainable development policymaking are unparalleled. In the document "Transforming our World: The 2030 Agenda for Sustainable Development", countries underscored the importance of "quality, accessible, timely and reliable disaggregated data […] to help with the measurement of progress and to ensure no one is left behind" (Paragraph 48)[1]. Furthermore, countries recognized the crucial role of "increased support for strengthening data collection and capacity building" and committed to addressing the gaps in data collection for the targets of the 2030 Agenda, so as to better inform the measurement of progress (Paragraph 57).

The 'Cape Town Global Action Plan for Sustainable Development Data' highlighted the role of data and monitoring in the SDGs by calling on *policy leaders to achieve a global pact, or alliance that recognizes the funding of National Statistical Systems' (NSS) modernization efforts that are essential to the full implementation of Agenda 2030*[2].

However, at the Global Education Meeting 2018 in Belgium it was acknowledged by Member States that meeting the targets embedded in SDG 4-Education 2030 is **not on track**. Also, according to a survey conducted in preparation for the Asia-

Box 1: Cape Town Global Action Plan for Sustainable Development Data

The Cape Town Global Action Plan for Sustainable Development Data was informally launched at the first UN World Data Forum on 15 January 2017 in Cape Town, South Africa. It was adopted by the United Nations' Statistical Commission at its 48th Session in March 2017. The Action Plan is referenced in the Resolution on the work of the Statistical Commission, adopted by the General Assembly in July 2017 (RES/71/313). The current version incorporates input received by the statistical community, including national statistical systems and other stakeholders, following an open consultation held in November 2015.

[1] UN General Assembly, 2015: Resolution Adopted by the General Assembly on 25th September 2015. "Transforming the World: the 2030 Agenda for Sustainable Development", UN, New York, access: https://www.preventionweb.net/publications/view/45418

[2] Cape Town Global Action Plan for Sustainable Development Data, Prepared by the High-level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development Adopted by the UN Statistical Commission at its 48th Session March 2017, access: https://unstats.un.org/sdgs/hlg/cape-town-global-action-plan/

Pacific Forum on Sustainable Development 2019, the vast majority of countries in the region have highlighted that 'data and monitoring' as well as 'capacity building' are the most important areas for their efforts towards SDG 4[3]. In the wake of the urgency of this situation, the High-Level Political Forum in September 2019 will review, reflect and step up progress on SDG 4 to reinstate the critical importance of achieving the 2030 Agenda for Sustainable Development[4].

SDG 4-Education 2030 explicitly calls for enhancing capacity building to support national plans on implementing SDG 4 on education, as much as on the other SDGs due to their interconnectedness. To do so, the Education 2030 Agenda emphasizes strengthening monitoring systems to track progress with achieving the Goals. Effective planning, follow-up and review of the implementation of the Education 2030 Agenda requires the collection, processing, analysis and dissemination of an unprecedented amount of education data and statistics at the local, national, regional and global levels, as well as by multiple stakeholders.

Our next analysis looks at the difference between the past Millennium Development Goal (MDG) 2 and the present Sustainable Development Goal (SDG) 4 on education to comprehend the increased demand on monitoring education.

1.1 The global and thematic indicator framework

The 2030 Agenda for Sustainable Development differs from the MDGs in several ways. The most prominent is that the SDGs have been determined through an international consensual process that was led and is therefore owned by countries, rather than the United Nations. Meaning, the countries of the world have established the current world development agenda that is to be adhered to. This process has determined the established goals and targets, as well as the framework to review progress until 2030.

MDG 2 on education stressed universal primary education and gender parity in participation by education level. This approach was recognized by some countries as not directly relevant to their own in-country contexts. The SDGs stress the universality of their goals and targets, with relevance for countries at all levels of development.

The SDGs are more comprehensive in scope (i.e. beyond primary/basic education and towards life-long learning); more results-oriented (i.e. a focus on both access and learning outcomes); and more equity-focused (i.e. based on the principle of 'no one left behind') compared to the MDGs. The characteristics of the SDGs have substantive impact on data requirements and monitoring frameworks.

[3] UN ESCAP, 2018: Survey to support the development of Goal Profiles for Sustainable Development Goal Roundtables during the 6th Asia Pacific Forum on Sustainable Development (APFSD) (internal). For more information, please contact UN ESCAP, access: www.unescap.org

[4] UNESCO, 2018: Global Education Meeting 2018, Brussels Declaration, ED-2018/GEM/1, access: https://unesdoc.unesco.org/ark:/48223/ pf0000366394

SDG 4 in particular covers learning from early childhood to adulthood, spanning all ages. At the same time, it stresses the themes of: quality, skills acquisition, inclusion and equity. It is more extensive in approach yet also adaptable to national contexts.

SDG 4 monitoring is carried out at four levels

NATIONAL LEVEL MONITORING of SDG 4 is linked to the needs of national and sub-national governments in developing education sector plans and informing education policies. Data that provides high-level granularity and adapts to the specificities of the national context – such as in the sub-national geographical units, specific disadvantaged groups, or by wealth – offers greater capacity to inform policy by examining relevant disparities in education outcomes.

Monitoring at this level benefits from the active participation of a diverse group of stakeholders who represent their respective constituencies and education-related concerns.

REGIONAL LEVEL MONITORING of SDG 4 sets out indicators to take account of priorities and issues of common interest that are shared by countries in a particular region, as outlined in regional planning documents, or frameworks. The Regional Roadmap for the SDG 4-Education 2030 Agenda in Asia and the Pacific (2015-2030) provides countries with a strategic approach[5].

GLOBAL LEVEL MONITORING relies on a more limited and carefully selected group of leading indicators to provide an overview of progress towards each target. It provides harmonization of monitoring and reporting of SDGs for cross-country

Box 2: Lesson excerpt from the MDGs

There have been great improvements in data gathering under the MDGs, but the goals do not serve as either a management tool, or a real-time report card. MDG data comes with too great a time lag – often three or more years – and too often the data is incomplete and of a poor quality. MDG monitoring also gave too little attention to what should be measured, so, to this day, we lack some important metrics for key development priorities. Similarly, there was insufficient investment in strengthening statistical capacity to ensure effective real-time monitoring of the MDGs and to establish statistical standards and quality requirements. The SDGs require annual reporting of high-quality data from all countries. This in turn will require much greater investment in building independent, impartial national statistical capacities and strengthening quality and standards. National Statistical Offices (NSOs) must be actively involved in the development of global and national indicator frameworks through a multi-stakeholder process that could be convened by the UN Statistical Commission. The SDGs will be goals for the world – applicable to all countries, as well as multiple, diverse actors. As such, the best input from business, science, academia and civil society should be sought in their development, as well as in the development of the accompanying monitoring architecture.

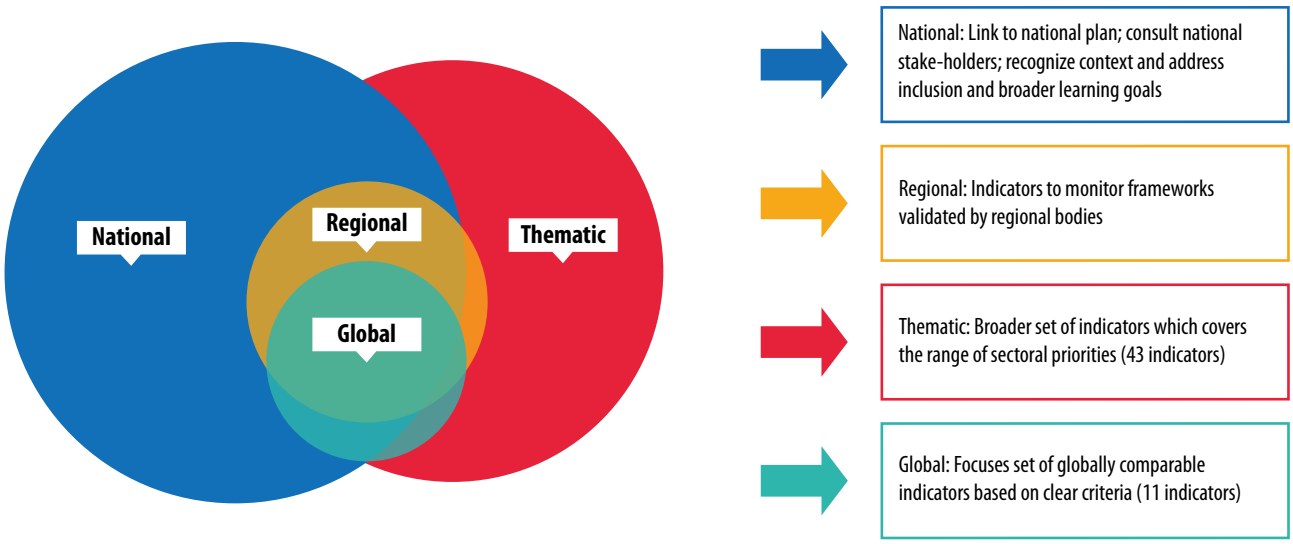
Source: Sustainable Development Solutions Network, 2015: Indicators & Monitoring Framework for SDGs (draft version 6, Feb, 2015), **access:** http://unsdsn.org/wp-content/uploads/2015/01/150116-Indicators-and-a-Monitoring-Framework-for-SDGs-working-draft-for-consultation.pdf

[5] UNESCO, 2018: The Regional Roadmap for the SDG 4-Education 2030 Agenda in Asia and the Pacific (2015-2030). Presented at the 4th Asia Pacific Meeting on Education 2030, Bangkok, Thailand, 14 July 2018, access: https://teams.unesco.org/ORG/fu/bangkok/public_events/Shared%20Documents/IQE/2018/4th-APMED2030/Meeting%20Documents/SDG4%20National%20Coordinators%20Network%20Documents/Regional%20SDG4%20Roadmap%20(9July2018)_CLEAN.pdf

comparability, which is of critical importance to countries to see where they stand at a particular point in time in comparison with other countries. This will also provide insights in measuring performance, driving policy reforms and allocating resources in an equitable manner in order to improve learning among all population groups.

THEMATIC LEVEL MONITORING works with comparable indicators within a specific sector, such as education, environment, energy, health, etc., or it may be about a cross-cutting theme, like gender and poverty. Thematic indicators serve as a framework to track progress on a cross-nationally comparable basis. It provides a better in-depth view of sectoral priorities that are available in the global monitoring framework.

Figure 1: Four levels of monitoring



Note: For more on the thematic monitoring see the Quick Guide to Education Indicators for SDG 4, **access:** http://uis.unesco.org/sites/default/files/documents/quick-guide-education-indicators-sdg4-2018-en.pdf

Source: Sustainable Development Solutions Network, 2015. Indicators & Monitoring Framework for SDGs (draft version 6, Feb, 2015), **access:** http://unsdsn.org/wp-content/uploads/2015/01/150116-Indicators-and-a-Monitoring-Framework-for-SDGs-working-draft-for-consultation.pdf

The nature of monitoring indicators at the different levels

While the global indicators are obligatory in nature, they have been set as a set of 11 indicators that are internationally comparable, which the countries are expected to report on at the global level. It may be noted that these have been developed by the UN Inter-Agency and Expert Group, IAEG-SDGs.[6]

The 43 thematic indicators are optional and are of a nature of a more comprehensive set of internationally-comparable indicators that countries may use to report on progress towards SDG 4 at the global level.

These indicators have been developed by the Technical Cooperation Group (TCG) and of which UIS is the secretariat. Other agencies, such as UNICEF, are members which provide technical input to ongoing global discussion and guidance.

Regional indicators are specific indicators that are common to countries within a specific region. They may also be developed to collectively monitor and report on progress.

An example for a target-by-target analysis is the *Paving the Road to Education* report that explores and details the indicators of SDG 4 by data available at that time[7].

National indicators help the process of monitoring at the country level. They may also include context-specific indicators that are considered essential for monitoring and regulating national educational development.

The UN Inter-Agency and Expert Group repository [8]

[6] For further information on: IAEG-SDGs: Inter-agency and Expert Group on SDG Indicators; Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development; Tier Classification for Global SDG Indicators; SDG Indicators: Metadata repository, access: https://unstats.un.org/sdgs/iaeg-sdgs/

[7] UNESCO, 2018: Paving the Road to Education. A Target-by-target analysis of SDG 4 for Asia and the Pacific. Bangkok, UNESCO, access: https://bangkok.unesco.org/content/paving-road-education-target-target-analysis-sdg-4-asia-and-pacific

[8] Inter-agency and Expert Group on SDG Indicators, access: https://unstats.un.org/sdgs/iaeg-sdgs/

2 Understanding the SDG 4 Indicators, Concepts and Methodologies

2.1 The indicators and their concepts

As mentioned, there are 43 thematic indicators, which allow us to monitor education more comprehensively. The targets in SDG 4 cover a broad range of aspects of education, therefore, monitoring must cover a wide range of data. Consequently, the thematic indicators have been developed to capture different concepts of education, such as provision, policy, participation, learning, skills, equity, etc.

Table 1: Concepts behind the SDG 4 indicators

4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes		
Learning	4.1.1	Proportion of children/young people in Grades 2/3 at the end of primary and at the end of lower secondary achieving at least a minimum proficiency level in reading and mathematics.
	4.1.2	Administration of nationally-representative learning assessments in the early grades of primary (2/3), at the end of primary and at the end of lower secondary.
Completion	4.1.3	Gross intake ratio to the last grade (primary, lower secondary).
	4.1.4	Completion rate (primary, lower secondary, upper secondary).
Participation	4.1.5	Out-of-school rate (primary, lower secondary, upper secondary).
	4.1.6	Percentage of over-age children (primary, lower secondary).
Provision	4.1.7	Number of years of free and compulsory primary and secondary education guaranteed in legal frameworks.
4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education		
Readiness	4.2.1	Proportion of children under five years who are developmentally on track in health, learning, psychosocial well-being.

Participation	4.2.2	Participation rate in organized learning (one year before the official primary education entry age).
Readiness	4.2.3	Percentage of children under five years of age experiencing positive and stimulating home learning environments.
Participation	4.2.4	Gross early childhood education enrolment ratio in (a) pre-primary education; and (b) early childhood educational development programmes.
Provision	4.2.5	Number of years of free and compulsory pre-primary education guaranteed in legal frameworks.
4.3 By 2030, ensure equal access for all women and men to an affordable and quality technical, vocational and tertiary education, including university		
Participation	4.3.1	Participation rate youth and adults in a given age-range in formal and non-formal education and training in the previous 12 months, by type of programme.
	4.3.2	Gross enrolment ratio for tertiary education.
	4.3.3	Participation rate in technical and vocational education programmes (15- to 24-year-olds).
4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship		
Skills	4.4.1	Proportion of youth/adults with information and communications technology (ICT) skills, by type of skill.
	4.4.2	Percentage of youth/adults who have achieved at least a minimum level of proficiency in digital literacy skills.
	4.4.3	Youth/adult educational attainment rates by age group, economic activity status and level of education and programme orientation.
4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous people and children in vulnerable situations		
Equity cross-target	4.5.1	Parity indices (female/male, rural/ urban, bottom/top wealth quintile and others such as disability status and conflict-affected as data becomes available) for all education indicators on this list that can be disaggregated.
Policy	4.5.2	Percentage of students in primary education whose first or home language is the language of instruction.
	4.5.3	Extent to which explicit formula-based policies reallocate education resources to disadvantaged populations.
	4.5.4	Education expenditure per student by level of education and source.
	4.5.5	Percentage of total aid to education allocated to the least developed countries.

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy		
Skills	4.6.1	Proportion of the population in a given age group achieving at least a fixed level of proficiency in functional literacy and numeracy skills.
	4.6.2	Youth/adult literacy rate.
Provision	4.6.3	Participation rate of youth/adults in literacy programmes.
4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development		
Provision	4.7.1	Extent to which global citizenship education and education for sustainable development are mainstreamed in national education policies, curricula, teacher education and student assessment.
	4.7.2	Percentage of schools that provide life skills-based HIV and sexuality education.
	4.7.3	Extent to which the framework on the World Programme on Human Rights Education is implemented nationally, as per the United Nations General Assembly (UNGA) resolution 59/113.
Knowledge	4.7.4	Percentage of students of a given age group (or education level) showing adequate understanding of issues relating to global citizenship and sustainability.
	4.7.5	Percentage of secondary education students showing proficiency in their knowledge of environmental science and geoscience.
4.a Build and upgrade education facilities that are child, disability and gender-sensitive and provide safe, non-violent, inclusive and effective learning environments for all		
Resources	4.a.1	Proportion of schools with access to basic drinking water, single-sex basic sanitation facilities and basic handwashing facilities. Proportion of schools with access to electricity, the Internet for pedagogical purposes and computers for pedagogical purposes. Proportion of schools with adapted infrastructure and materials for students with disabilities.
Environment	4.a.2	Percentage of students experiencing bullying, corporal punishment, harassment, violence, sexual discrimination and abuse.
	4.a.3	Number of attacks on students, personnel and institutions.

4.b By 2020, substantially expand globally the number of scholarships available to developing countries – in particular the least developed countries, small island developing states and African countries – for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries		
Number	4.b.1	Volume of Official Development Assistance (ODA) flows for higher education scholarships by beneficiary country.
	4.b.2	Number of higher education scholarships awarded by beneficiary country.
4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially the least developed countries and small island developing states		
Trained	4.c.1	Proportion of teachers in pre-primary, primary, lower secondary and upper secondary who have received at least the minimum organized and recognized teacher training pre-service and in-service required for teaching at the relevant level in a given country, by type of institution.
Trained	4.c.2	Pupil-trained teacher ratio by education level.
Qualified	4.c.3	Percentage of teachers qualified according to national standards by education level and type of institution.
Qualified	4.c.4	Pupil-qualified teacher ratio by education level.
Motivated	4.c.5	Average teacher salary relative to other professions requiring a comparable level of qualification.
	4.c.6	Teacher attrition rate by education level.
Supported	4.c.7	Percentage of teachers who received in-service training in the last 12 months by type of training.

Note: The highlighted indicators are to be monitored and reported on at the global level.

Source and details: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

Different types of data are needed to produce different indicators in order to monitor different aspects of education. Although most of the needed data to populate indicators is quantitative, qualitative data is also needed to monitor some of those aspects.

Indicators constitute the backbone for monitoring progress towards the achievement of SDG 4 at the national level – just as they do at regional and global levels.

The national education indicator framework for SDG 4 should address the particular gaps in measuring outcomes of quality indicators, for which further methodological development may be required within national and local contexts.

Equally important is the need to focus on those who are left behind. It is again true that those who are left behind are often those who are hidden from policymakers and planners' view.

In this regard, equity is emphasized with respect to those who are marginalized as they are the ones left behind. Socially responsible statistics should ensure that everyone is counted, so that those who tend to be left behind can be effectively addressed[9].

The above-mentioned demands on monitoring require creating and maintaining data quality standards and the development of new measurement methodologies.

These standards consist of definitions, concepts, classification systems and methodologies. They help improve harmonization and comparability of official statistics.

By doing this, new data sources will have to be identified and the already existing ones will have to be assessed, extended, improved and integrated with other data sources.

Integration with other data sources may warrant better coordination between ministries of education, national statistics offices and other ministries, as for example on health (as for the Demographic Health Survey); on labour (as for the Labour Force Survey); or other socio-economic issues in general (as for other surveys such as the Multiple Indicator Cluster Survey). For more information, see Module 4.

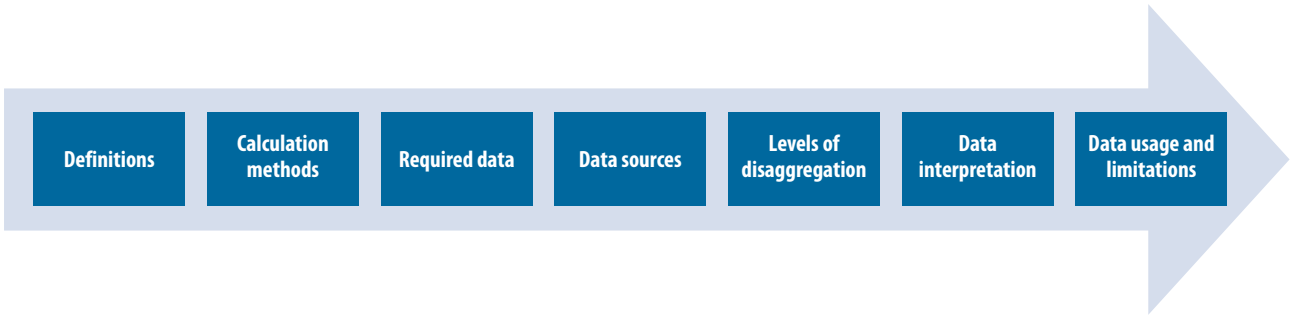
All these, in turn, would mean a mobilization of additional resources to strengthen coordinated and integrated national data collection mechanisms.

2.2 Clarity in definition and methodologies

It is important that countries develop their national education indicator framework as part of the education sector plan and a guiding document, or metadata, to ensure everyone involved in data collection and analysis will have a single guiding document on concepts and methodologies and avoid misinterpretation of information. Such a document should include, for each indicator, the elements as illustrated in Figure 2.

[9] UNESCO, 2016: Education 2030: Incheon Declaration and Framework for Action for the Implementation of Sustainable Development Goal 4. ED-2016/WS/28. Paris, UNESCO; also see: UNICEF, 2017: The State of the World Children 2016. A fair chance for every child. New York, UNICEF, access: https://www.unicef.org/publications/index_91711.html

Figure 2: Important aspects to consider for selecting national indicators for monitoring education

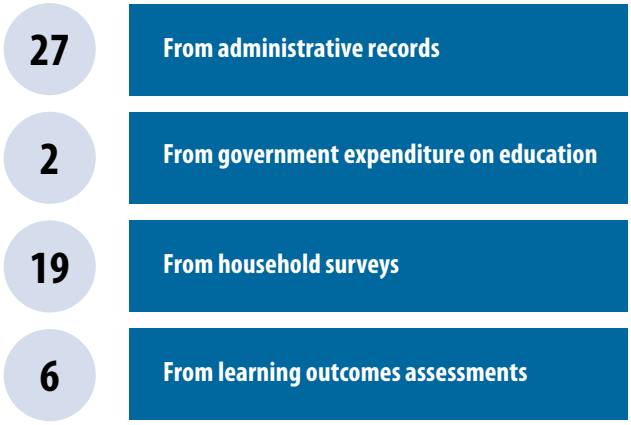


Source: Adapted from UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

Based on such documents, concerned officials and staff can be trained on education indicators. Those involved in monitoring SDG 4 should thoroughly understand the relevant indicators and their methodologies. The following box shows an excerpt from a metadata document for the indicator on the gross intake ratio to the last grade.

The UIS metadata document for the global and thematic SDG 4 indicators[10]

Figure 3: Number of thematic and global SDG 4 indicators that can be derived from different data sources



Note: The number of indicators exceeds the total number of global and thematic indicators because some indicators can be retrieved from more than one data source.

Source: UIS, 2017: SDG 4 Data Digest, UIS, Montreal, **access:** http://uis.unesco.org/sites/default/files/documents/quality-factor-strengthening-national-data-2017-en.pdf

[10] UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, access: http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

Box 3: Example of metadata for an indicator: Gross intake ratio to the last grade (primary, lower secondary)

Definition: Total number of new entrants into the last grade of primary education, or lower secondary general education, regardless of age, expressed as a percentage of the population at the intended entrance age to the last grade of primary education, or lower secondary general education. The intended entrance age to the last grade is the age at which pupils would enter the grade if they had started school at the official primary entrance age, had studied full-time and had progressed without repeating, or skipping a grade.

Purpose: This is a proxy measure of primary completion. It reflects how the impact of policies on access to and progression through the early grades of each level of education impact the final grade of that level. It also indicates the capacity of the education system to cater for the completion of the population of the intended entrance age to the last grade of the given level of education. It assumes that pupils entering the last grade for the first time will eventually complete the grade and hence the given level of education.

Calculation method: The number of new entrants in the last grade of the given level of education, regardless of age, is expressed as a percentage of the population of the intended entrance age to the last grade of that level of education.

$$\mathbf{GIRLGn} = \frac{\mathbf{NEl,n}}{\mathbf{Pn,a}}$$

where:

- **GIRLGn** = Gross intake ratio to the last grade **l** of level **n** of education.
- **NEl,n** = New entrants to the last grade **l** of level **n** of education.
- **Pn,a** = Population of the intended entrance age **a** to the last grade of level **n** of education.
- **n** = 1 (primary) or 2 (lower secondary).

Note: If data on new entrants is not collected directly, they can be calculated by subtracting the number of pupils repeating the last grade from total enrolment in the last grade.

Interpretation: A high ratio indicates a high degree of primary, or lower secondary education completion.

Disaggregation: By sex and level of education.

Data required and source: New entrants to the last grade of each level of education (or enrolment minus repeaters in the last grade); population of the intended entrance age to the last grade of each level of education and data on the structure (entrance age and duration) of each level of education. Administrative data from schools on enrolment and repeaters, or new entrants by grade; population censuses and surveys for population estimates by single year of age; administrative data from ministries of education on the structure of the education system.

Limitations and comments: This is a gross measure and may therefore exceed 100 per cent if there are large numbers of pupils who entered school either early, or late and/or who have repeated earlier grades. The fact that the GIR can exceed 100 per cent also makes it more difficult to interpret than the completion rate. Compared to the completion rate, the gross intake ratio to the last grade does not indicate how many children complete the last grade, only how many children enter that grade. If students in the last grade leave school before graduation, the gross intake ratio to the last grade overestimates completion.

Source: For detailed information: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

2.3 Data sources for calculating various indicators

As mentioned earlier, no single data provider can produce all the data, or information to monitor SDG 4. To monitor different concepts in education, data accordingly needs to be produced from different sources. The following figure shows the number of global and thematic SDG 4 indicators that can be derived from different data sources.

A brief explanation of the data sources

ADMINISTRATIVE DATA: According to official protocol, ministries of education, or NSOs complete the UIS survey, based on administrative records from school questionnaires. Administrative data constitutes the source for many of the SDG 4 indicators, as seen in figure three above. Countries produce education data mainly from administrative data, namely through an Education Management Information System (EMIS). Although this data is collected for administrative purposes, it represents the opportunity to facilitate research for scientific advances as it offers population-wide information tracked over large periods of time. The UIS too has based its database to a large extent on administratively provided data. One of the two global education surveys, conducted annually by UIS, is on formal education programmes and administrative data is utilized in this approach.

HOUSEHOLD SURVEYS: These surveys are used to produce indicators to examine specific individual characteristics of populations that are available only in such sources. They provide demand-side information on education, such as, participation and completion and also non-participation of the population surveyed, plus educational attainments of adults and literacy rates. The latter two are also part of the global data collection, conducted by the UIS and this approach uses survey data. Household surveys constitute the source for as many as 19 monitoring indicators of SDG 4. Large international household surveys, such as the Multiple Indicator Cluster Survey, supported by UNICEF and the Demographic and Health Survey, are also valuable sources for data on learning opportunities for children before entry into primary school.

These two surveys are particularly good sources for producing education statistics and given their wealth of socioeconomic data and other information about households, disaggregation of the data is possible. The Data Quality Assessment Framework (DQAF) for household surveys by UIS is helpful in assessing the utility of various household data sources to apply in education statistics[11]. See Module 4 on Household Surveys for more details.

LEARNING ASSESSMENTS: Cross-national learning assessments such as, LaNA, PASEC, PILNA, PIRLS, PISA, SACMEQ, SEA-PLM, TERCE and TIMSS have been identified to calculate

[11] Got to the UIS Capacity Development Tools for the DQAF for household surveys, access: http://uis.unesco.org/en/capacity-development-tools

some indicators relating to learning outcomes for SDG 4[12]. Large scale assessments focus on defined learning domains, such as reading and mathematics, which are usually measured against the knowledge required by the national curriculum at specific grade levels and defined in the assessment framework, or expected competencies at different education levels.

Data for some indicators for SDG 4 targets 4.1, 4.2, 4.4, 4.6 and 4.7 can be accessed from learning assessments. The Principles of Good Practice in Learning Assessment is proposed by UIS as a support to the international commitment to the management of SDG 4 data quality for learning assessments (more on Learning Assessment in Module 6).

FINANCIAL AND EXPENDITURE DATA: This area includes information on government spending on education, such as teacher salaries and this is maintained by ministries of finance and/or education. Public finance data is more widely reported, but data handlers face persistent difficulties in updating and maintaining information on private and other funding sources.

Again, considerable research effort is needed to compare budget estimates for education by different budget allocation heads, revised estimates and final modifications with reference to a particular financial year. Similarly, efforts may be needed to obtain data on amounts actually spent under each budget account at the close of the financial year, the amount surrendered and the reasons for such surrenders.

In order to get a comprehensive picture on expenditure on education, it is necessary to rely on other sources, such as household surveys for assessing private expenditure on education and information from ministries, or other organizations responsible for obtaining information on official development assistance.

2.4 Quality of the data

When looking at different sources of data, it is important to see whether the available data is of a good quality. For all data sources, it is important to assess how countries maintain their data quality and this can be evaluated in general by several criteria identified in Table 2.

[12] See: Literacy and Numeracy Assessment (LaNA), access: https://www.iea.nl/lana; Programme d'analyse des systems educatits de la CONFEMEN (PASEC), access: http://www.pasec.confemen.org; Pacific Islands Literacy and Numeracy Assessment (PILNA), access: https://www.spc.int/resource-centre/publications/pacific-islands-literacy-and-numeracy-assessment-pilna-2018-0; Progress in International Reading Literacy Study (PIRLS), access: https://www.iea.nl/pirls; Programme for International Student Assessment (PISA), access: http://www.oecd.org/pisa/; Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), access: http://www.sacmeq.org; Southeast Asia Primary Learning Metrics (SEA-PLM), access: http://www.seaplm.org/seaplm/; Tercer Estudio Regional Comparativo y Explicativo (TERCE), access: http://www.unesco.org/new/fileadmin/MULTIMEDIA/FIELD/Santiago/pdf/Kit_TERCE.pdf; Trends in International Mathematics and Science Study (TIMSS), access: https://www.iea.nl/timss

Table 2: Data quality assessment criteria

CRITERIA	DESCRIPTION
Relevance:	The extent to which the data serves to address the purposes for which they are sought by users.
Accuracy:	The degree to which the data correctly estimates, or describes the quantities or characteristics that they are designed to measure. Accuracy refers to the closeness between the values provided in the product and the (unknown) true values.
Reliability:	This refers to the closeness of the initially released values of a statistical output to the values that are subsequently released for the same reference period.
Coherence:	This reflects the degree to which a statistical output is logically connected and mutually consistent with other statistical outputs.
Timeliness of data:	This refers to the length of time between the availability of a statistical output and the event or phenomenon it describes. Timeliness is assessed in terms of a time scale that depends upon the period for which the data is of value – that is, sufficiently timely to be acted upon.
Punctuality:	The punctuality of a statistical output implies the existence of and adherence to an output dissemination schedule.
Accessibility:	This reflects how readily the data can be discovered, located and accessed from within data holdings.
Interpretability:	The interpretability, or clarity of a statistical output reflects the ease with which users can understand and properly use the data.
Objectivity:	Statistical methods and outputs are determined by statistical considerations and not by pressures from providers, users, or other stakeholders.
Impartiality:	Impartiality refers to commentaries and press releases being objective and non-partisan.
Transparency:	Users are informed about sources and methods and also about changes to sources and methods that might affect outputs. Again, the limitations of the outputs and of the processes by which they are produced are acknowledged.
Credibility:	This refers to the confidence users have in the products, based primarily on their image of the producer and its statistical outputs, as well as in their trust in the objectivity and impartiality of the methods used.
Validity:	Validation of data is done through a process of documenting all discrepancies, or data issues and following up on these with data producers. If after such a follow up, the data quality is still deemed questionable, then decisions are taken either to suppress the data, or replace it with suitable estimates, or alternate sources are utilized.
Coverage:	Data coverage is defined with a consideration of aspects, such as target population size, representativeness of sample, etc.
Methodological soundness:	This refers to the methodological basis for the statistics that follows internationally-accepted standards, guidelines and good practices.
Frequency:	This refers to the interval of time between two data collection periods, such as quarterly, half-yearly, annual, once-in-five-years, once-in-ten-years, etc.

Source: UIS, 2017: SDG 4 Data Digest, UIS, Montreal, **access:** http://uis.unesco.org/sites/default/files/documents/quality-factor-strengthening-national-data-2017-en.pdf

3 International Comparable Education Data Production and Reporting at the Regional and Global Levels

3.1 The importance of international comparable data in education

The successful implementation of SDG 4 at the different levels hinges upon the tenacity of two policy pillars, namely, ensuring a strong focus on monitoring and improving learning outcomes; and ensuring a similar focus on those who are left behind. Doing the latter is more difficult as such people often remain hidden. Hence the importance of socially responsible statistics, as this would ensure that everyone is counted, thus making it more directly helpful to policymakers and other stakeholders of education to address the specific education needs of such people.

The international education statistics serve two main purposes:

1. To provide global and regional data and essential indicators:
   - For advocacy;
   - To mobilize resources (at the national, global and regional levels);
   - To hold governments and other duty bearers, donors, and international organizations accountable.
2. To facilitate comparison:
   - In order to learn from one another and to demonstrate what can be achieved;
   - For benchmarking;
   - To act as a catalyst for debate.

To ensure comparability, there should be international agreed standards and methodologies which allows users to collect/compile and present data from different countries in a comparable manner. The following sections will present some of the tools and standards that are used at the international level for the purpose of comparability.

3.2 How do we explain the difference between international and national statistics?

National statistics are calculated based on specific national context and therefore, definitions and methodologies can differ from one country to another. For example, the duration of primary education in different national education systems can vary. Indeed, some countries have a primary education of only four years, whereas other countries could have a duration of five years, six years or even eight years. In national monitoring, the calculation of relevant indicators would be based on their own education system, meaning that a country with eight years of primary is monitoring, in fact, basic education. Therefore, unadjusted direct comparison of national statistics should be avoided.

To ensure comparability among different countries, common frameworks for collecting and organizing information are needed. The frameworks' role is to facilitate exchange and comparability of statistical information between countries and agencies. They are applied to the structure and content of data and metadata and could be applied to the statistical production process.

To ensure international comparability of statistics, UIS utilizes population data produced by the United Nations Population Division, which applies the same projection methodology for all countries in estimating their population data. In its pursuit of calculating cross-nationally comparable data, UIS also uses financial data from the World Bank and International Monetary Fund (IMF). Again, these two agencies produce data with standardized methodologies that are applicable to all countries.

To ensure comparability of education statistics produced at the global level, of major importance is the *International Standard Classification of Education (ISCED)*, which is the framework to classify educational activities.

United Nations Population Division Databases[13]

[13] United Nations Population Division Databases, access: http://www.un.org/en/development/desa/population/publications/database/index.shtml

World Bank Databank[14]

International Monetary Fund Data[15]

3.3 International Standard Classification of Education 2011

The UIS is the custodian of classifications, standards and methodologies that are implemented by countries to ensure cross-national comparability of education indicators. A classification is the aforementioned ISCED. It is relevant to note in this context that UIS also maintains the classification of fields of study; sets out measurement concepts; and maintains methodologies for assessing data quality.

National education systems may vary in terms of structure and curricular content. Therefore, it may be difficult to benchmark performance across countries over time, or to monitor progress towards national and international goals. In order to understand and properly interpret inputs, processes and outcomes of education systems from a global perspective, it is vital to ensure data is comparable. This can be done by applying ISCED – the standard framework used to categorize and report cross-nationally comparable education statistics.

ISCED is composed of three components:

- Internationally agreed concepts and definitions;
- The classification systems;
- National ISCED mappings of education programmes and related qualifications.

[14] World Bank Databank, access: https://data.worldbank.org/

[15] International Monetary Fund Data, access: https://www.imf.org/en/Data

What is ISCED?

ISCED belongs to the United Nations International Family of Economic and Social Classifications, which are applied in statistics worldwide with the purpose of assembling, compiling and analyzing cross-nationally comparable data.

It is the reference classification for organizing education programmes and related qualifications by education levels and fields. ISCED is a product of international agreement and adopted formally by the General Conference of UNESCO Member States.

Remember!

ISCED is needed to produce cross-nationally comparable data.

It is designed to serve as a framework to classify educational activities as defined in programmes and the resulting qualifications into internationally agreed categories. The basic concepts and definitions of ISCED are therefore intended to be internationally valid and comprehensive of the full range of education systems.

The classification of education programmes is done by their content using two main cross-classification variables: levels of education and fields of education. ISCED 2011 has also introduced a related classification of educational attainment levels based on recognized educational qualifications.

Information compiled, according to ISCED, can be used for assembling statistics on many different aspects of education which may be of interest to policymakers and other users of international education statistics. These aspects include:

- Enrolment or attendance;
- Human or financial resources invested in education;
- The educational attainment of the population.

ISCED facilitates the transformation of detailed national education statistics on participants, providers and sponsors of education, compiled on the basis of national concepts and definitions, into aggregate categories that can be compared and interpreted internationally.

Data collection on education, as per ISCED, can be from different data sources, such as, administrative registers, individual and household surveys, as well as macroeconomic aggregated statistics. Guidance on such implementation of ISCED is included in an operational manual and other training materials.

ISCED mapping

ISCED mappings are an essential tool for organizing information on national education systems, their programmes and related qualifications in order to ensure the comparability of ISCED-level information and to support their interpretation for international statistical purposes.

ISCED mappings ensure a transparent process of coding national education programmes and related qualifications into comparable categories for use in international statistics by

linking the classification criteria to the properties of the education programmes and their related qualifications.

Units of Classification

The basic units of classification under ISCED are the national (and sub-national) education programme and the related recognized educational qualifications. In the context of ISCED, an education programme is defined as a coherent set of sequence of educational activities or communication designed and organized to achieve pre-determined learning objectives, or accomplish a specific set of educational tasks over a sustained period.

The objectives encompass improving knowledge, skills and competencies within any personal, civic, social and/or employment related context. Learning objectives are typically linked to the purpose of preparing for more advanced studies and/or for an occupation, trade, or class of occupations, or trades, but may be related to personal development, or a leisure aspect.

A common characteristic of an education programme is that, upon fulfilment of learning objectives or education tasks, successful completion is certified[16]. As ISCED is pertinent to international data collection, processing and the reporting process, it is strongly advisable that all Member States produce their ISCED mapping. This mapping should be carried out with in-depth discussions and wide-ranging consultation with all stakeholders of education providers in the country.

ISCED Levels

There are nine different levels of ISCED, as illustrated in Table 3.

Table 3: Different ISCED levels.

ISCED 0	Early Childhood Education	**ISCED 5**	Short-Cycle Tertiary Education
ISCED 1	Primary Education	**ISCED 6**	Bachelor or Equivalent
ISCED 2	Lower Secondary Education	**ISCED 7**	Master or Equivalent
ISCED 3	Upper Secondary Education	**ISCED 8**	Doctoral or Equivalent
ISCED 4	Post Tertiary Non-Secondary Education		

Source: UIS, 2012: International Standard Classification of Education 2011, **access:** http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

[16] For a better and more detailed understanding of this formulation, refer to section 2, points 12 to 25, of the International Standard Classification of Education: UIS, 2012: International Standard Classification of Education 2011. Montreal, UNESCO Institute for Statistics, access. http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

Figure 4: Example of a country ISCED mapping – Kiribati 2011

ID	Name of the education programme (National language)	Name of the education programme (English)	Minimum entrance requirements (National language)	Minimum entrance requirements (English)	Main diplomas, qualifications or certificates awarded at end of programme (National language)	Main diplomas, qualifications or certificates awarded at end of programme (English)	Theoretical entrance age	Theoretical duration (in years)	ISCED 2011 level		ISCED 2011 Type (ECED/Pre-primary) or Orientation (G/V/U)	ISCED 2011 Completion (F/P/N) & Position in national degree structure	ISCED 2011 Access (Y/N)	Notes	ISCED 2011 Programme code (ISCED-P: 3 digit)	ISCED 2011 Attainment code (ISCED-A: 3 digit)
1	Preschool	Preschool	3	3	NA	NA	3	3	Early childhood education	0	Pre-primary	-		-	020	020
2	PrimaryEducation (years1-6)	Primary	6	6	PrimaryEducation (years1-6)	PrimaryEducation (years1-6)	6	6	Primary education	1	-	Full completion	-	-	100	100
3	Junior Secondary (Year 7 to9)	Junior Secondary (Year 7 to9)	12	12	Junior School Certicate	Junior School Certificate	12	3	Lower secondary education	2	General	Full completion	Yes,to ISCED 3	-	244	244
4	Senior Secondary (Year 10 and11)	Senior Secondary (Year 10 and11)	Junior School Certicate	Junior School Certicate	Kiribati National Certificate	Kiribati National Certificate	15	2	Upper secondary education	3	General	Partial completion	-	-	342	342
5	Senior Secondary Year 12	Senior Secondary Year 12	Kiribati National Certificate	Kiribati National Certificate	Kiribati National Certificate	Kiribati Senior School Certificate	17	1	Upper secondary education	3	General	Partial completion	-	-	342	342
6	Senior Secondary Year 13 (SPBEA)	Senior Secondary Year 13 (SPBEA)	Kiribati National Certificate	Kiribati Senior School Certificate	SouthPacific Form 7 Certicate	SouthPacific Form 7 Certificate	18	1	Upper secondary education	3	General	Full completion	Yes,to ISCED 4 and5,6,7 (tertiary)	-	344	344
7	Senior Secondary Year 13 Foundation (USP)	Senior Secondary Year 13 Foundation (USP)	Kiribati National Certificate	Kiribati Senior School Certificate	USP Foundation	USP Foundation Certificate	18	1	Upper secondary education	3	General	Full completion	Yes,to ISCED 4 and5,6,7 (tertiary)	-	344	344
8	Technical,Colleges andVocational (TVET)	Technical,Colleges andVocational (TVET)	Kiribati National Certificate	Kiribati National Certificate	Technical Certifcates/Diploma	Technical Certificates/Diploma	17	3	Upper secondary education	3	Vocational	Full completion	Yes,to ISCED 4 and5,6,7 (tertiary)	-	354	354
9	Pastoral/Theological Institutes	Pastoral/Theological Institutes	Kiribati National Certificate	Kiribati National Certificate	Diploma	Diploma	17	3	Upper secondary education	3	Vocational	Full completion	No	-	353	353
10	Universityof South Pacific Bachelor degree	Universityof South Pacific Bachelor degree	Form 7 or Foundation	Form 7 or Foundation	Bachelor Degree	Bachelor Degree	19	3	Bachelor'sor equivalent level	6	Unspecified	Full completion: First degree (3-4 years)	-	-	665	660

Type (ISCED2011 level 0)
ECED= Early childhood educationaldevelopment
Pre-primary

Orientation(ISCED2011 levels 2-8)
G = General
V = Vocational
U= Unspecified orientation (ISCED6-8)

Access (ISCED2011 levels 2-4)
Y = Programme provides direct access to a higherISCEDlevel
N= Programme does not provide direct access to a higherISCEDlevel

Completion (ISCED2011 levels 2-8)
F = Fullcompletion of level
P = Partialcompletion of level(ISCED2&3 only)
N= No completion of level

Position in national degree structure (ISCED2011 levels 6-7)
First degree
Long first degree
Second forfurtherdegree (afterBachelorequivalent)
Second forfurtherdegree (afterMasterequivalent)

Source: UIS ISCED Mappings, **access:** http://uis.unesco.org/en/isced-mappings

As ISCED is in international data collection, processing and reporting framework, it is strongly advisable that all countries produce their ISCED mapping. As previously stated, this mapping should be carried out through broad discussions and consultations with all stakeholders of education providers in the country.

The International Standard Classification of Education 2011 [17]

ISCED 2011 Operational Manual [18]

3.4 International data collection

It has already been noted that one level of monitoring is at the national level, where it is likely to have the largest set of indicators in order to reflect the specificities of national education systems and local contexts.

We have also seen that monitoring at this level should be linked to the needs of the national government in preparing education plans and informing policies. Countries can also think of considering thematic, regional or other indicators to reflect their unique circumstances and development priorities.

At the regional level of monitoring, a set of indicators may be developed to reflect the priorities and issues of common interest of the countries in a particular region. As for thematic or sectoral monitoring, a set of globally comparable indicators has been proposed based on consultations within the different sectoral stakeholder groups, such as, education, environment, energy and health. The range of the sectoral priorities are wider in comparison to those of the global framework.

[17] UIS, 2012: International Standard Classification of Education 2011. Montreal, UNESCO Institute for Statistics, access: http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

[18] OECD, European Union and UIS, 2015: ISCED 2011 Operational Manual: Guidelines for Classifying National Education Programmes and Related Qualifications, OECD Publishing, access: http://uis.unesco.org/sites/default/files/documents/isced-2011-operational-manual-guidelines-for-classifying-national-education-programmes-and-related-qualifications-2015-en_1.pdf

3.4.1 Collection, compilation and dissemination of international data on education

As mentioned earlier, UIS is the official source of cross-nationally comparable data on education and the main source for the preparation of the Global Education Monitoring Report (GEMR).

UIS, through its two annual surveys on education, collects and compiles education data from all the countries. Every year, it sends out annual questionnaires to countries and requests them to provide data on a regular basis in order to be able to produce historical trends.

Two types of data have been collected through UIS annual surveys:

TYPE 1: Education surveys which includes three questionnaires:

- Questionnaire A on: Students' access and participation in education, as well as teachers (ISCED 0 to 4);
- Questionnaire B on: Education expenditures (ISCED 0 to 8);
- Questionnaire C on: Students' participation and graduation in tertiary education, as well as teachers (ISCED 5 to 8).

TYPE 2: Literacy and education attainment survey:

- Educational attainment of 25+ population;
- Literacy status of 15+ population.

The following items are the main areas covered by data collection:

- Regular/formal education in early childhood education (including pre-primary), primary, basic and secondary schools and in colleges, universities and other higher education institutions;
- Education in public (or state) and in private schools, colleges or universities;
- Special needs education (both in regular schools and in special schools);
- Distance education (especially at the tertiary, or higher education level);
- Both full-time and part-time education;
- The education of international students as well as of nationals or citizens of your country.

For the education survey, Member States are requested to report their data using administrative data sources, whereas in the Literacy and Educational attainment survey, data is mainly provided using household surveys (see Module 4 on Household Surveys).

It is important for all the countries to submit/report their data on the aforementioned areas to UIS for it to calculate and publish internationally comparable data on education at global and regional/sub regional levels.

3.4.2 Process of international data collection and dissemination

DATA COLLECTION: Data is collected through the excel questionnaire, which Member States fill and send back to UIS every year. To help Member States to complete the questionnaires, UIS has also developed instructions manuals. On-site support can be provided through UIS field staff, on request.

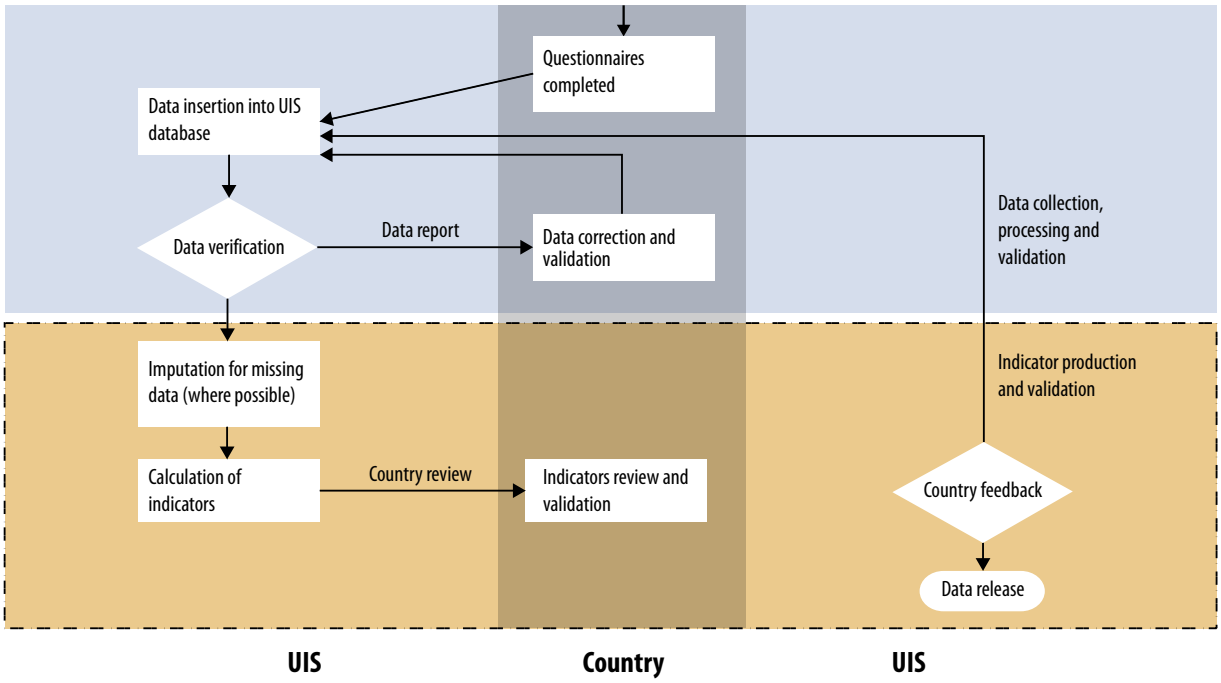
DATA PROCESSING AND VERIFICATION: Once questionnaires have been received back by UIS, data entry and data processing starts. The data processing includes data entry as well as data check which are based on historical data, data definition and internal consistency of the data. A data report is prepared highlighting any discrepancies in the data observed and it is sent to the respective country for clarification.

INDICATOR PRODUCTION: Based on an individual country's feedback to the data report, the data is revised and the data can be used to calculate indicators. The process is then followed by the preparation of a draft Indicators Review. This document includes a wide range of indicators that will be published in the international database. This document also provides definitions and methodologies of indicators. Countries are requested to carefully review these indicators and confirm that they can be published.

DISSEMINATION: The validated data and indicators are published and disseminated through the UIS data centre (UIS. stat) and other online databases (e.g., the World Bank database), as well as in global publications for wider stakeholders to access and use.

Figure five provides a comprehensive overview of the UIS global comparable data production process.

Figure 5: UIS International comparable data production process



Source: UIS, 2017: SDG 4 Data Digest, UIS, Montreal, **access:** http://uis.unesco.org/sites/default/files/documents/quality-factor-strengthening-national-data-2017-en.pdf

3.4.3 Global SDG 4 data dissemination and reporting

Monitoring the SDGs at the global level relies on a limited and carefully chosen set of indicators that aim to provide an overview on progress towards the targets. For the SDG 4, the challenges of measurement need to be addressed through a universal agenda with indicators that are relevant for all countries.

The targets look at not only learning throughout the life-cycle but also go beyond traditional areas of measurement to reflect a comprehensive and integrated view of the skills and capacities needed by the learner in relation to their living and contribution towards the society and the environment in a sustainable manner. Equity is emphasized in order to specifically focus on those who are socio-economically marginalized and those who have been left behind.

Monitoring of SDG 4 at global and regional levels will, mainly, rely on the comparable data/indicators produced by UIS annually. The global monitoring of SDG 4-Education 2030 is carried out through the publication of the *Global Education Monitoring Report*[19]. This report is a mechanism for global monitoring and reporting on SDG 4 and on education in the other SDGs. It reports on the implementation of national, regional and international strategies.

[19] For the latest information on and from the Global Education Monitoring Report, access: https://en.unesco.org/gem-report/

UIS is the overall coordinator on SDG 4 monitoring

As the overall coordinator for SDG 4 indicators, UIS interacts with a range of other partners who collect, or contribute data towards a specific target, or indicator. UIS also contributes to the other goals in its field of responsibility.

The UIS is also a member of the UN Statistical System Coordination Group which promotes system-wide integrated and coherent actions to enhance and modernize sustainable statistical data collection across all UN agencies. It contributes to the adoption and implementation of international statistical standards in line with the Fundamental Principles of Official Statistics, which has been adopted by UNGA.

The United Nations Statistics Division has gathered data from the UN and other organizations for each of the global indicators. These have been published in an SDG Indicator Database hosted by the said Statistics Division[20]. The UIS has compiled data for each of the global indicators under its mandates of education, science and culture. When the database was launched, the first SDG progress report was also published.

UIS, in particular, is mandated to produce comparable education indicators, cross-nationally and to work with partners through a country-led process and technical advisory groups to develop indicators, statistical approaches and monitoring tools in order to better assess progress towards the achievement of the education targets.

UIS will continue to be the official sources of comparable data on education and:

- It will continue to produce international monitoring indicators based on its annual education survey and on other data sources.
- In addition to collecting data, UIS will work with partners to develop new indicators, statistical approaches and monitoring tools to better assess progress across the targets that are related to UNESCO's mandate, working in coordination with the Education 2030 Steering Committee.

For more information:

Laying the Foundation to Measure Sustainable Development Goal 4[21]

Education Indicators for SDG 4[22]
(See Chapter 3 on: 'What is the UIS role in SDG 4 monitoring.')

[20] Sustainable Development Goal indicators website, access: https://unstats.un.org/sdgs/

[21] UIS, 2016: Sustainable Development Data Digest. Laying the Foundation to Measure Sustainable Development Goal 4. Montreal, UNESCO Institute for Statistics, access: http://uis.unesco.org/sites/default/files/documents/laying-the-foundation-to-measure-sdg4-sustainable-development-data-digest-2016-en.pdf

[22] UIS, 2018: Quick Guide to Education Indicators for SDG 4. Montreal, UNESCO Institute for Statistics, access: http://uis.unesco.org/sites/default/files/documents/quick-guide-education-indicators-sdg4-2018-en.pdf

Module 2: Developing a National Education Indicator Framework and Strategies for Education Statistics

Module overview – objectives, topics and learning outcomes

Before deciding on the system of data collection, for every country it is important to understand existing data collection strategies and coverage, as well as identifying the existing data producers relevant for national education indicators.

National indicators of education need a supporting legal framework with norms and standards that help formalize the role of different institutions and develop national statistical capacities to own the production of education data and monitoring performance.

Developing a National Education Indicator Framework (NEIF) does not only help identify the indicators to be monitored at the national level, but this approach will help provide specifications and mechanisms to collect and report data at both the national and global levels.

Therefore, countries should have their own National Education Indicator Framework to institutionalize a priority list of indicators relevant to their own national education policies, plan and priorities.

Countries also need to develop strong strategies to generate data that is needed to calculate the set of these indicators, which in turn requires setting clear objectives that show purposeful results. This process is called National Strategies for the Development of Education Statistics.

This module will discuss the development of the National Education Indicator Framework and explain the process of preparing National Strategies for the Development of Education Statistics.

The following topics are covered by this module:

- Understanding the instruments for monitoring SDG 4, including the methodologies needed to calculate the indicators;
- Developing a National Education Indicator Framework for SDG 4;
- Instructions and resource materials to map education data sources;
- Creating National Strategies for the Development of Education Statistics through a results-based management approach for improved SDG 4 monitoring.

After completing the module, learners will have acquired the following learning outcomes:

- Able to explain the importance of and requirements for developing a National Education Indicator Framework;
- Able to develop a National Education Indicator Framework for the individual's own country;
- An understanding of the means to conduct data source mapping;
- An understanding of conducting a data quality assessment of national data sources;
- Able to explain the rationale and process/steps of creating National Strategies for the Development of Education Statistics;
- Able to apply the process and utilize the tools for developing National Strategies for the Development of Education Statistics for the individual's country.

1 Strengthening Institutional Capacities to Monitor SDG 4

The discussions in this module will demonstrate the need for strengthening institutional capacities for effective monitoring of SDG 4. This topic looks into organizational and institutional structures for managing education data and examines some available tools for both data quality improvement and the development of national strategies for the development of education statistics.

1.1 Organizational and institutional structures for managing education data

There are different institutions that collect education data at different levels. National and international household surveys are often the responsibility of a national statistics office, with little interaction with the statistics unit of the ministry of education. There are not only limited horizontal data exchanges (among the different ministries), but also limited vertical integration of data (among the different levels of administration, such as, local, district/provincial/state and national levels).

Other instances relate to the production of education statistics being completed in silos, separate from other sectors, such as, social protection, health, or civil registration statistics. On top of all this, the data relating to education activities of the private sector and NGOs may not feed in to the national data system. Such a situation may result in a lot of useful data collected not being put to proper use.

The net result of all these issues may be the creation of blind spots in the national education dashboard; that is to say that the quality and quantity of education delivered, often to some of the most marginalized and vulnerable groups, is neither fully assessed, nor in the same way as for the public sector[1].

Remember!

The management initiatives taken to contextualize SDG 4 commitments must be country-led and country-owned.

[1] UNESCO, 2016: Mainstreaming SDG 4 Education 2030 in sector-wide policy and planning. Pairs, UNESCO, access: http://unesdoc.unesco.org/images/ 0024/002464/246475e.pdf

This includes a review of the existing organizational and institutional structures at the country level, with particular reference to a review of the existing sector mechanisms and processes for coordination, in tandem with the system-wide inclusiveness and transparency requirements of the Education 2030 Agenda.

Simultaneously, partner dialogues may also have to be organized in order to ensure coordinated efforts to contextualize SDG 4 commitments. It is important that these efforts are country-led and country owned. It is also essential that they are also embedded in the national education policy and planning processes and structures.

Similarly, multi-stakeholder partnerships linked to broader SDG processes are essential for translating SDG 4 commitments into national education development efforts.

1.2 Managing institutions for the production of data

Data production takes place at different levels and institutions within a country's context and as levels and institutions vary, so does the number of reporting units. The reporting units can be identified as follows:

- Individuals in society (in household surveys), students (in learning assessments);
- Schools, colleges, vocational and technical training institutions;
- Teacher training institutions;
- Institutions on employment (in labour market surveys);
- Communities, social groups (in large qualitative studies, e.g. ethnographic data, focus group discussions, spatial studies);
- Sub-district consolidation units;
- District consolidation units;
- State/provincial consolidation units;
- National consolidation units.

Some units may also report data on specific studies conducted on a subject of education by academic institutions, by the national statistical office, by institutions for education research and by institutions for policy research.

With the many institutions collecting data for many groups and individuals on many different topics, several ministries of education, home, labour, health, child development, planning, finance, etc., will have to be involved in the organization, consolidation and managing of data.

It is crucial that the work of all these ministries is coordinated and sensitized to prioritize and harmonize the data on SDG 4 and their indicators. It may be necessary, if not already

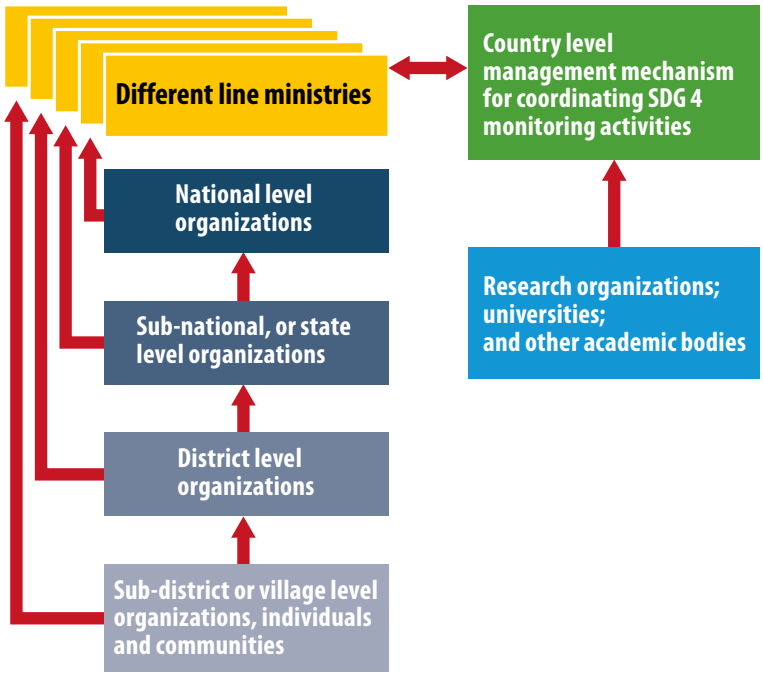
done so, to establish an inter-ministerial steering group or committee for the purpose of collaborating on monitoring the progress towards achieving SDG 4 in the country. At this point it should be mentioned that the same inter-ministerial coordination is required for all the other SDGs!

It would be helpful if the already existing mechanisms for such coordination and partnerships at the country level are employed to establish, strengthen and/or adapt them for a truly sector-wide, inclusive and country-led monitoring process. A possible structure of such a mechanism is illustrated in Figure 1.

Remember!

A well-coordinated and managed data collection system will improve data quality and its use for policy planning for education development.

Figure 1: Coordination mechanism for SDG 4 monitoring at the country level



Source: UIS, 2017: SDG 4 Data Digest, UIS, Montreal, **access:** http://uis.unesco.org/sites/default/files/documents/quality-factor-strengthening-national-data-2017-en.pdf

This figure represents a possible management mechanism for coordinating the monitoring of SDG 4 indicators at the country level. This may vary for different countries.

However, it is important to ensure that the central management mechanism is fully representative of the interests of all stakeholders and adequately empowered to function effectively.

The data gathered for both regional and global monitoring should then be consolidated and systematically fed in to the concerned institutions at those levels.

Case Study: Managing education data in Pakistan

Education data management in Pakistan struggled with missing common standards in data collection and processing and subsequently with harmonizing the education indicators from its eight provinces.

Some provinces showed delays in the collection, processing and reporting of the data due to limited capacities, such as absent data validation mechanisms, insufficient data analysis competencies and low priorities in resource allocation to the Education Management Information System (EMIS). Some provinces also did not collect relevant data from all sectors of education. Also, the usability of the data for policy making and education planning was limited.

To tackle the challenges, face-to-face advocacy and sensitization seminars were conducted among EMIS stakeholders to improve the data collection within the EMIS. This required developing common data standards valid for the time of collection until the time of dissemination. The improvement of the coordination with and among the many education data stakeholders was crucial in this process.

- Key achievement and sustainability -

The most recent achievement that has emerged from improved standardization and coordination in Pakistan has been the establishment of the Education Atlas. This has resulted in six publications to date and an interactive website on presenting institution-level data to visually compare education indicators by district and identify geographical areas that require attention.

This was possible thanks to establishing regulatory committees within the provinces and providing technical support to the provincial EMIS. The data now collected, processed and analysed is distributed to national and international entities, such as the Economic Survey of Pakistan, or the UNESCO Institute for Statistics (UIS).

In order to ensure effective management of education data, the established EMIS regulatory committees play a pivotal role in provincial coordination and ownership. Hereby, EMIS' role is at the federal level and acts as the standard setting agency for all provinces. The federal EMIS coordinates and facilitates sub-national data production, analysis and applications.

1.3 Introducing the National Strategies for the Development of Education Statistics[2]

The National Strategies for the Development of Education Statistics (NSDES) is a powerful policy instrument designed by government and its partners to establish the National Education Statistical System, with holistic education data strategies. The NSDES aims to provide a medium-term vision for where the National Education Statistical System (NESS) should be in five to ten years; set the milestones for getting there; and fully integrate it into broader National Strategies for the Development of Statistics (Please note: National Strategies for the Development of Statistics (NSDS) is not to be confused with NSDES).

The development of NSDES itself builds on the establishment of a National Education Indicator Framework and the Data Quality Assessment Framework (DQAF). These frameworks – with their respective instruments and methods – are helpful for governments to generate most of the multiple input needed for the development of NSDES and build quality data into a comprehensive and well-coordinated statistical system.

Ideally, the stakeholders of the National Education Statistical System, who have a mandate to produce official statistics for policy and planning, should be able to produce and share quality, relevant statistics from multiple data sources through a coordinated national effort aimed at improving the mechanisms and processes for data production.

However, the National Education Statistical System consists of discrete information systems working in isolation in each sub-sector, as in early childhood, basic education, Technical and Vocational Education and Training (TVET) and tertiary education.

Development partners support the development of a sector-wide approach to education statistics in order to strengthen the statistical capacity of the National Education Statistical System to produce data to monitor SDG 4. The development of national strategies for the development of education statistics hinges upon national ownership of data production, as well as a holistic approach to the same.

The challenges to data collection for SDG 4 can be addressed with a fair amount of ease from the angle of national policy priorities and needs of the stakeholders for such data. Coordination between the various data sources poses the main challenge in the production of quality data. Specifically, the existence of data silos creates analytical gaps in understanding the progress of education.

Besides, there are concerns about partial sectoral or sub-sectoral data and challenges of harmonization of data between education and non-education sectors and between countries.

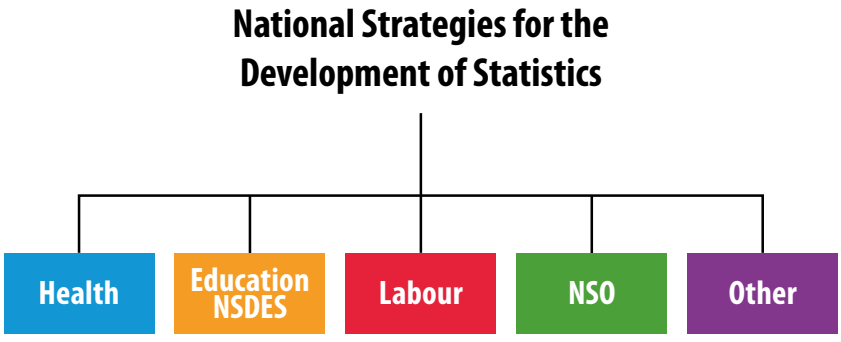
[2] The UNESCO Institute for Statistics (UIS) has been supporting several countries in Asia-Pacific region to develop NSDES for holistic education statistics production at national level. The UIS has developed several resources and tools for developing NSDES (http://uis.unesco.org/en/capacity-development-tools).

The strength of NSDES:

- It is a **country-led process**. The NSDES is the responsibility of the national government which has to make the final decisions in terms of committing resources, as well as for its implementation. The strategy must be grounded in a government's commitment to the preparation process and this commitment should deepen through the process.
- It is an **inclusive process**. The strategic planning process should be accompanied by a participatory policy dialogue among multiple stakeholders that builds consensus on and commitment to the development of strategies. Existing mechanisms for such policy dialogue between the government and its development partners include the Sector Working Group (sometimes called the Local Education Group).
- It is a **well-organized process**. Clarity is required on the roles and responsibilities of the multiple stakeholders, especially those who lead and coordinate. NSDES structures may include a steering committee to oversee and guide the process, a National Technical Team (NTT) to coordinate the technical work, thereby bringing together all the ministry's directorates and departments and selected working groups to focus on specific themes, or sub-sectors.
- It is a **process of growing mutual accountability for education statistics**. This entails the respective accountability of multiple-stakeholders working together toward shared outcomes, where each stakeholder is accountable for its own contribution.
- It is a **capacity-development process**. Plan preparation is itself a form of 'learning by doing' capacity development, making the process of NSDES preparation as important as the strategy itself.

Box 1, below, shows NSDES as a participatory exercise designated to reinforce synergies among all education data producers and users.

Box 1: National strategies for the development of statistics (NSDS)



Note: The National Education Statistical System would source relevant data from all of the above.

Source: Paris21, 2018: NSDS Guidelines. Guidelines for the elaboration of a National Strategy for the Development of Statistics. April 2018, **access:** https://nsdsguidelines.paris21.org/NSDS-GUIDELINES-full-lang-en.pdf

For a quick understanding, these frameworks establish essential criteria for developing NSDES and education statistics:

- An integrated process as part of the National Strategies for the Development of Statistics (NSDS);
- An integrated process for national planning and national statistical capacity development;
- An integrated element of the overall education sector development plan;
- Captured education data needs arising out of policy priorities, objectives and commitments;
- A framework for international and bilateral assistance;
- The means of adequate monitoring and evaluation;
- A holistic perspective for including all aspects and units of the data production chain.

The processes of developing NSDES

NSDES is developed and implemented through a national expert group on education data, which provides an avenue for dialogue between the relevant governmental institutions and its stakeholders and partners. Following a preparation phase during which the education data platform will be initiated, the design of NSDES takes place as follows:

- Developing a National Education Indicator Framework;
- Mapping data sources and identifying data gaps against SDG 4 indicators;
- Conducting a Data Quality Assessment (DQA) in the National Education Statistical System for all the relevant data sources;
- Developing and validating NSDES.

We will look section-by-section into mapping the relevant data sources, developing the National Education Indicator Framework, the Data Quality Assessment and finally, the National Strategies for the Development of Education Statistics.

2 Developing a National Education Indicator Framework

The NEIF is an instrument to define data needs and the demands of a country with regard to its policy priorities. Establishing the NEIF, aligned with international indicator frameworks, has the benefit of streamlining processes of data collection, meeting international definitions and standards in education and integrating global development goals into the national planning processes.

The capacity development support must be guided by partnership development, national ownership and a holistic approach[3].

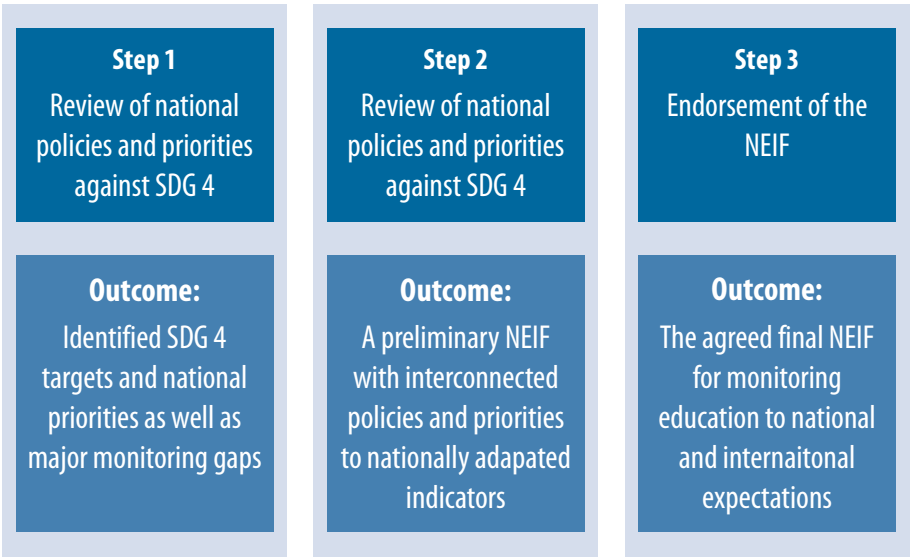
The benefits of setting up a National Education Indicators Framework will lead to:

- Determining data needs for monitoring SDG 4 from a national perspective;
- Harmonizing the collection of quality education data from various sources (see also the DQAF section below);
- Facilitating the preparation of data for dissemination to national policy-makers, planners and other stakeholders;
- Improving the national information system on education data collection;
- Aligning national indicators of education with international frameworks for internationally comparable definitions and standards;
- Integrating SDG 4 into national planning processes to avoid inefficiencies.

Developing NEIF is a systematic process and needs thorough consultations with, and among all stakeholders, data producers and data users, including planners. The country should have well planned and valid national education policies and priorities before developing this Framework. The Framework should focus on monitoring national policies and priorities, as well as agreed international goals. The development should follow the suggested three steps with their respective outcomes, as outlined in Figure 2. We will go through each step in ensuing sections.

[3] UIS, UNESCO, UNICEF and other partners can support the countries in preparing their NEIF. The UIS has developed Capacity Development Tools that can be found at: http://uis.unesco.org/en/capacity-development-tools.

Figure 2: Overview of the NEIF development process



2.1 Step 1: Review of national education priorities against SDG 4 targets

Before any monitoring mechanism can be modelled to track national and international education goals, countries must have translated national and internationally agreed aspirations into achievable targets.

Presumably, this is done with the development of a national education sector plan that outlines a country's policy priorities and addresses the strategies that are to be employed to realize these priorities. It goes without saying that every education sector plan requires monitoring too. Creating the NEIF, therefore, provides the double benefit of monitoring national priorities, as well as internationally agreed goals; in this case SDG 4 on education.

The instruments to review for priorities to monitor are typically:

- The type of learning assessments;
- Household surveys and census surveys;
- Political commitments of access to, quality of, and equality and equity in education.
- The policies related to:
  - Out-of-school-children;
  - Non-formal education;
  - TVET;
  - Gender equality;

Box 2: Ideal composition of the NEIF

In essence, the NEIF is composed of:

National education indicators;

\+ Global SDG 4 indicators;

\+ Additional indicators (e.g. SDG 4 thematic indicators; Other SDG indicators, such as SDG 13.3).

= **National Education Indicator Framework**

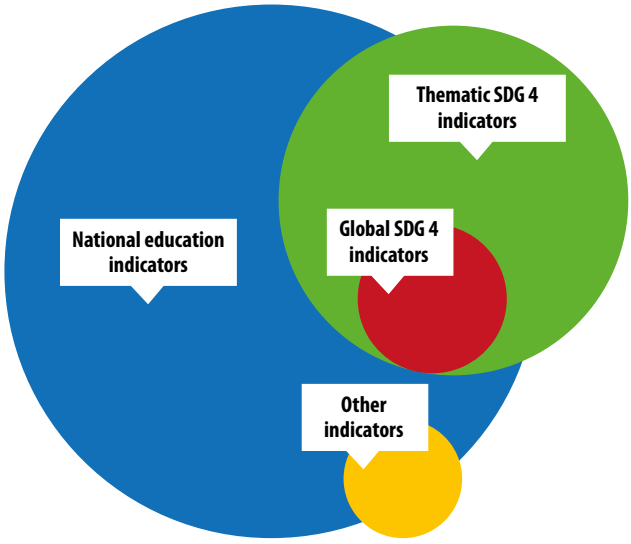
- Disability;
- Marginalized populations (ethnic groups, migrants, refugees, among others);
- Education in emergencies in accordance with the emergency;
- Teachers.

- Education for sustainable development and global citizenship education, including peace education;
- Laws, or Acts on education, including international frameworks (e.g. human rights);
- Budget priorities for education.

Note that some policy priorities of a country can be unique to a particular country and may not be covered by the SDG 4 targets. In this case, NEIF should also include indicators to monitor specific and unique priorities.

2.2 Step 2: Identifying national indicator sets against SDG 4

Figure 3: Schematic outline of indictor coverage at the national level



Identifying the global and thematic indicators on SDG 4, as they are potentially present in established national indicators, will ease the burden of monitoring national priorities, while also ensuring the relevance for global data requirements.

This applies especially to national policy frameworks on education, such as a national education sector plan which will include reference to populations, ratios, resources and other means that are to be measured. The NEIF can therefore build upon national education sector plans (or similar frameworks), the globally committed SDG 4 targets and selected thematic indicators as they relate to nationally relevant objectives.

As the NEIF must facilitate clear and transparent reporting and effective communication about

the objectives at each stage of implementation, different stakeholders and partners, including donors and NGOs, should be consulted in the formulation of the Framework.

Some countries may need to involve provincial/district partners in the discussions. Therefore, a series of consultative meetings can bring all stakeholders together to discuss and agree on a purposeful education monitoring framework. The following is a short outline on the criteria to apply when selecting indicators. More on indicator development will be discussed in Module 5.

Box 3: Criteria for selecting indicators

- Indicators must be **relevant**: They must reflect the most critical national policy themes in the SDG 4 Targets and vice versa. Generally acknowledged among the education community has been the emphasis on measuring learning outcomes and equity.
- The indicators must have proper **alignment**: They must have the same meaning and significance in all settings, be ideally measured by a similar question, or item in different surveys.
- Indicators must be **feasible**: This implies regularity in the collection of data. This also implies being cost-effective.
- Indicators must be **communicable**: They must be easily understood and narrate progress towards aspirations.
- The indicators must be **interpretable**: Their values can change; this change must be easily understood by keeping in mind the time, circumstance, or population they originated from.

The following table is an example of a developed NEIF for Cambodia on the topic of Early Childhood Education (ECE). It shows which results are expected overall; which concepts they address; which indicators have been chosen to track the expected results; and to which type (global, thematic, or additional) of indicator they belong; as well as which national strategy they link up with. The latter, especially, allows for policymakers and planners to cross-check which indicator to choose for which national priority.

Table 1: Example of a National Education Indicator Framework for the Cambodian national priority area on early childhood education (ECE)

Expected results in line with SDG 4	Indicators to monitor policy priorities			Linkage with national indicative strategies
	Concept	Indicator	Type	
Priority 1: All girls and boys have access to quality ECCE and pre-primary education and complete free, equitable and quality basic education (primary and lower secondary) with relevant and effective learning outcomes.				
1.1 All young children under 5 years of age have increased access to quality early childhood development, care and pre-primary education and are fully prepared for primary education,	Readiness	1.1.1. Proportion of children under 5 years of age who are developmentally on track in health, learning and psychosocial well-being, by sex	Global	1.1.2; 1.1.3, 1.1.4f
		1.1.2. Percentage of children under 5 years experiencing positive and stimulating home learning environments	Thematic	1.1.2; 1.1.3
		1.1.3. Percentage of new Grade 1 students with pre-school or ECCE experience	Additional	1.1.2
		1.1.4. Percentage of children with an acceptable nutritional status	Additional	1.1.3
	Participation	1.1.5. Participation rate in organized learning (one year before the official primary entry age), by sex	Global	1.1.3
		1.1.6. GER of Pre-primary	Thematic	1.1.3
		1.1.7. NER of ECCE and Pre-primary	Additional	1.1.3
	Provision	1.1.8. Number of years of (a) free and (b) compulsory pre-primary education guaranteed in legal frameworks	Thematic	1.1.2; 1.1.3
		1.1.9. Percentage of ECE services which meet quality standards	Additional	1.1.3f
	Qualified and trained	1.1.10. Pupil-qualified teacher ratio	Thematic	1.1.4
		1.1.11 Percentage of teachers qualified according to national standards	Thematic	
		1.1.12 Pupil-trained teacher ratio	Thematic	
		1.1.13. Percentage of teachers in pre-primary who have received at least the minimum organized and recognized teacher training pre-service and in-service required by type of institution	Global	
	Equity	Parity indices (sex, location, age, wealth and disabilities)		

1.2 All girls and boys complete nine years of free, publicly funded, inclusive equitable and quality basic education (primary and secondary) and acquire functional literacy and numeracy skills, as well as subject knowledge and cognitive and non-cognitive skills that enable them to develop to their full potential (4.1).	Learning	1.2.1. Proportion of children and young people (a) in Grades 2 or 3; (b) at the end of primary education; and (c) at the end of lower secondary education achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex	Global	1.2.4
		1.2.2. Administration of a nationally-representative learning assessment (a) in Grade 2 or 3; (b) at the end of primary education; and (c) at the end of lower secondary education	Thematic	1.2.4
	Completion	1.2.3. Completion Rate by levels of education	Thematic	
		1.2.4. Gross intake ratio to the last grade (primary education, lower secondary education)	Thematic	
		1.2.5. No. of districts that achieved primary education completion rate of at least 80 %	Additional	1.2.3
	Participation	1.2.6 Out-of-school rate (primary education and lower secondary education)	Thematic	1.2.3
		1.2.7. Percentage of children over-age for grade (primary education, lower secondary education	Thematic	
		1.2.8. Net Admission Rate	Additional	
		1.2.9. Transition rate from primary to lower secondary education	Additional	
		1.2.10. Transition rate from lower secondary to upper education	Additional	
		1.1.11. Percentage of students enrolled in private institution as a total enrollment by levels of education	Additional	
	Provision	1.2.12. Number of years of free primary and secondary education guaranteed in legal framework	Thematic	1.2.1; 1.2.2
		1.2.13. Percentage of child friendly schools at intermediate and developed levels	Additional	
		1.2.14. Number of students completed in re-entry program to be integrated into primary and lower secondary programmes	Additional	

Source: Ministry of Education, Youth and Sport (MoEYS) 2018: Cambodia's Sustainable Development Goal 4-Education 2030 Roadmap. Phnom Penh, Royal Government of Cambodia (RGC).

2.3 Step 3: Endorsement of the indicator framework

Finally, as the framework is going to be a guiding document to strengthen a national education data production system, in a holistic manner, it must be endorsed by the highest level of authority to ensure appropriate support and allocate resources for its implementation.

A ministerial decree can be issued for approval, instructing all the concerned ministries, departments and agencies to apply the framework for monitoring SDG 4.

It is further important that the framework is agreed upon by the national monitoring body, for example a national statistical office, for monitoring the development agenda 2030 and the SDGs.

To find more instruments to assist with the development of NEIF:

UIS Capacity Development Tools[4]

[4] UIS Capacity Development Tools, access: http://uis.unesco.org/en/capacity-development-tools

3 Mapping Data Sources and Identifying Data Gaps

After establishing the education indicators within the NEIF, it is crucial to identify the sources that deliver the data for calculating the indicators.

The mapping of relevant SDG 4 data sources is a relatively straight-forward process and is therefore kept short.

For this purpose, UIS has created a SDG 4 Data Mapping Questionnaire to aid countries with this identification process. The questionnaire is meant to assess the availability of data that is required to produce the proposed indicators for monitoring SDG 4. Moreover, the information that can be collected with this questionnaire will assist in the identification of potential data gaps, or areas requiring further development.

The questionnaire includes a worksheet for each of the 10 targets of SDG 4 and each of these requires information on data availability for specific indicators. In addition, two annexes are included to request extra information on data sources' characteristics and the definitions established for the data items of interest.

Mapping potential data sources to monitor SDG 4[5]
(Please view: 'Matrix: SDG 4 Data Mapping Questionnaire')

[5] UIS Capacity Development Tools, access: http://uis.unesco.org/en/capacity-development-tools

Figure 4: Example of the data mapping questionnaire for Target 4.3

4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

Concept	Indicator		Q1. Does your country collect data/information required to produce this indicator? Choose answer from drop-down list -Yes **(please answer Q2 to Q11)** -No **(please answer Q12)** -Do not know **(please answer Q13)**	Q2. Year of last available data	Q3. Frequency of data collection? (Please specify, e.g. annual, every 2 years…)
Participation	4.3.1 (a)	Participation rate of youth and adults in formal education and training in the last 12 months			
	4.3.1 (b)	Participation rate of youth and adults in non-formal education and training in the last 12 months			
	4.3.2.	Gross enrolment ratio for tertiary education			
	4.3.3.	Participation rate in technical-vocational education programmes (15- to 24-year-olds)			

If you answered "Yes" to question1								
Do you collect the data disaggregated by the following dimensions? Choose your answer from the drop down list (Yes, Partially, No, Do not know)					Q9. Data Source			
Q4. Age	Q5. Sex	Q6. Location (e.g. urban, rural)	Q7. Wealth	Q8. Disability	For guidance, typicalsource of indicator	Q9.1 Please provide the main source of data (e.g., name of survey or data registry)	Q9.2. If the indicator requires more than one data source, please provide the name of that second source needed	Q9.3. Please provide an alternative data source, if exists, that could be used to compute the indicator
					Administrative records /Household surveys			
					Administrative records /Household surveys			
					Administrative records /Household surveys			
					Administrative records /Household surveys			

		If you answered "No" to question1		If you answered "Do not know" to question1	
Q10. Has this indicator (or related data) been officially published? Choose your answer from the drop down list : **Yes, No, Do not know**	Q11. If "Yes" to Q10, provide (a) name of publication or (b) URL	Q12. Does your country intend to collect these data in the near future (3 years or less)? (Yes, No, Do not know)	If Yes, please provide details such as (a) the expected date and (b) responsible authority	Q13. Please provide (a) the name and (b) address of the authority who may be able to provide information about this indicators or related data	Comments (if any)

Source: Matrix: SDG 4 Data Mapping Questionnaire, **access:** http://uis.unesco.org/en/capacity-development-tools

4 Conducting a Data Quality Assessment for Education

In order to monitor the education sector, the NESS must effectively integrate different data sources, including administrative datasets, household surveys, learning assessments and finance and expenditure datasets. Maintaining data quality is not an easy task.

Data quality assumes a lot of importance in monitoring, particularly when monitoring aspects of equality, inclusiveness, equity, human rights, lifelong learning and other factors that determine people's lives.

The Education Data Quality Assessment Framework (Ed-DQAF) is a national level tool to define and evaluate the elements that are necessary for producing quality data by implementing a 'Code of Practice' for education statistics, which is further constituted of a set of statistical principles.

The Ed-DQAF is meant to identify weaknesses and strengths in the existing data production system. The education data quality assessment is therefore a building block in the design of a national strategy to address the new monitoring challenges in the context of SDG 4. The NEIF and the mapping of data sources help plan specific DQAFs.

4.1 The Education Data Quality Assessment Framework

UIS and the World Bank developed Ed-DQAF in 2005 by leaning on the Data Quality Assessment Framework of the International Monetary Fund (IMF)[6]. Ed-DQAF is a national level tool that provides a comprehensive evaluation of the quality of education data to meet the production challenge posed by the SDG 4 indicators – namely, producing quality national education data to global standards. Ed-DQAF is an evidence-based, diagnostic process of assessing the quality of the education data produced by different sources. It is a self-assessment process and mainly applied by national stakeholders. Ed-DQAF itself is

[6] The International Monetary Fund Data Quality Assessment Framework – Generic Framework, access: https://dsbb.imf.org/content/pdfs/dqrs_Genframework.pdf

a tool of the DAQF, as there can be other DQAFs in other areas than education.

The Ed-DQAF assessment methodology relies on the assumption that national education statistics meet data quality standards when they are produced in a process that meets the standards and norms defined by it.

The Data Quality Assessment Framework by its dimensions[7]

Code of Practice

Ed-DQAF represents a scoring matrix to assess the quality of country-produced data and to formulate recommendations for improvements. To assess the quality of data and to provide recommendations systematically, UIS has proposed a Code of Practice (CoP) to apply in education statistics. CoP is composed of eight principles of quality that can be distinguished by addressing three pillars of: a) the institutional environment; b) the statistical data production processes; and c) education data outputs. The eight principles are to guide the evaluation and harmonization of different data sources by addressing dimensions of data quality. The three pillars help categorize the individual dimensions.

Box 4: The eight principles of the Code of Practice

Pillar 1: Institutional Environment	1. Policy and legal framework
	2. Adequacy of resources
	3. Sound methodology
Pillar 2: Organizational/Statistical Processes	4. Accuracy and reliability
	5. Relevance
Pillar 3: Education Data Outputs	6. Periodicity & timeliness
	7. Consistency
	8. Accessibility and clarity

Source: UIS, 2017: Ed-Data Quality Assessment Framework to Evaluate Administrative Routine Data Systems: Manual for the Conduct of an Evaluation by A National Technical Team, **access:** http://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

[7] For a description of the IMF DQAF, see: Committee for the Coordination of Statistical Activities, 2010: IMF's Data Quality Assessment Framework. Paper submitted to and presented at the Conference on Data Quality for International Organizations, Helsinki, Finland, 6 and 7 May 2010, access: https://unstats.un.org/unsd/accsub/2010docs-CDQIO/Ses1-DQAF-IMF.pdf; The Data Quality Assessment Framework by its dimensions: IMF, 2012, access: https://dsbb.imf.org/content/pdfs/dqrs_Genframework.pdf

The Ed-DQAF scoring matrix is then organized in a cascading structure that proceeds from general dimensions to specific details.

The matrix does not result in a single numerical measure (or index) for data quality. Instead, the matrix provides the individual score for each item to determine the nature of the data quality of that particular item. These item scores are not used for inter-country comparison purposes but rather to put forward recommendations for improving data quality at the national level.

Each scoring level in the Ed-DQAF is applied in the following way:

- Level 4: Meets quality standards;
- Level 3: Room for improvement (Acceptable Statistics);
- Level 2: Questionable Statistics;
- Level 1: Poor Statistics.

For each level, a statement is made as to why the level was assigned.

Items scored at level 1 or level 2 should be used to propose recommendations and be regarded as the priority areas for improvement of the data quality. See the following figure for an example of the scoring matrix.

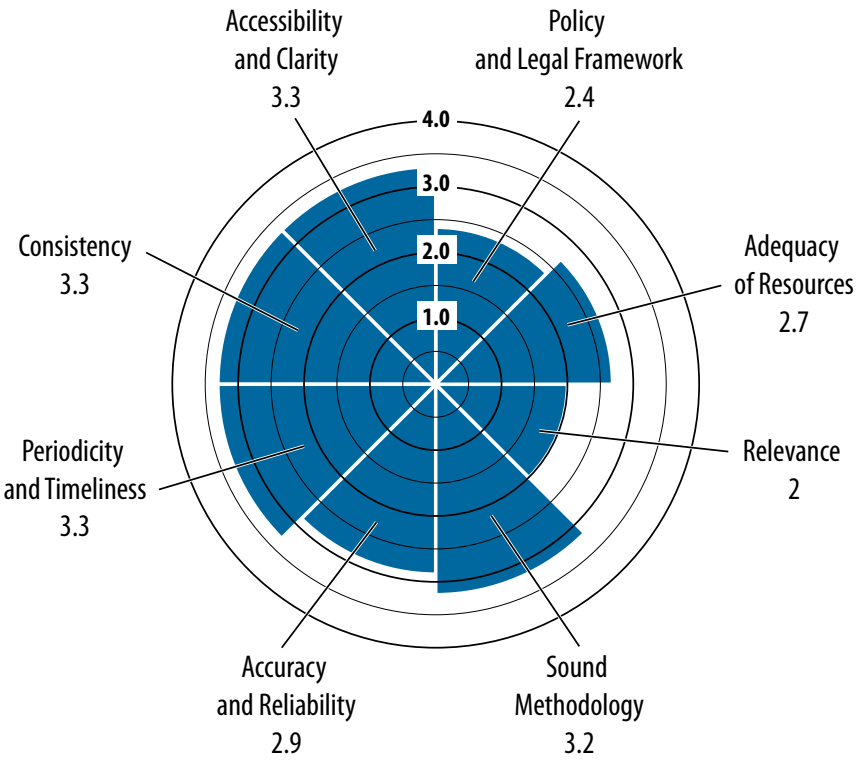
Figure 5: Example excerpt from the Ed-DQAF scoring matrix for administrative data

	Data Quality Assesment Framework	Level 4	Level 3	Level 2	Level 1	Evidence notes	Brief additional explanation	Recommendations for improvement	Examples for Training
1	Principle 1: Policy and legal framework								
1,1	The responsibility for collecting, processing, and disseminating statistics is clearly specified								
1	The **structure in charge** of the data source has a legal mandate	An Act exists and is implemented	A policy exists and is implemented	An Act or a Policy exists but is implemented in and ad hoc manner	There are no Acts, Policies or any formal arrangement for the production and dissemination of eduaction data	Education Act, Statistical Act or any formal legal arrangements such as policies, etc.	Revision of Act to be included	Structure in charge develops an EMIS policy	Act of countries
2	The structure in charge of the **data source** is informed of data collection conducted by other structures and is empowered to authorize and coordinate it. It seeks to reduce respondents burden.	Arrangements exist and implemented		Arrangements exist but not implemented	No formal arrangements exist	Policy or Formal arrangement in the form of documents available	Structure in charge the only source and not other data collection processes on the same data and in the same institutions	Put a policy in place	Emis Policy
3	The statistical activities is governed by methods and standards produced by the **National Statitical Agency (NSO)** and regular meetings take place between NSO and line ministries	Methods and standards exist and is implemented		Methods and standards exist but not implemnted	NSO plays no role	NSO standards and mininutes of meetings	NSO plays an overarching and leading role in the production of data sources through regular meetings, consulataion and engagements	Enforce the Statistical Act	Statistical Act
1,2	Respondents' data are to be kept confidential and used for statistical purposes only								
4	Mechanisms (ACTor Policy) exist to ensure that individual data are treated with confidentially	Mechanisms are in place and adhered to		Mechanisms are in place but not always applied	Mechanisms are not in place	Confidential related issues are included in the Act (e.g.ucation, Statistical Act)	References about confidentiality in Act (e.g. Education Act), policies or documents(as circulars)	Include in Act or Policies	A legal document with confidentiallity included (Examples)
5	Mechanisms exist to ensure that **individual data** are treated with confidentiality	Mechanisms are in place and adhered to		Mechanisms are in place but not always applied	Medchanisms are not in place	No abuse of individual data (Documentation and interview result with management)	Dissemination of individual data is properly managed and secured		Official documentation
2	Principle 2: Adequacy of resources								
2,1	Staff and their qualification commensurate with EMIS functions and policies for retention are in place								
6	Overall, the number of staff is adequate to perform the required tasks.	Official **staff establishment** exist and all positions are filled	Staff establishment exists, not al posistions are filled	There is no staff establishment an staff shortages are limited	There is no staff establishment but staff shortages are major	Staff establishment document, Resource tables to motivate anwer	The allocation and appointment of staff according to an official document and process	Post provisioning should be according to needs and a specific formula.UN principles should apply with specific reference to effective measures (adequate staff) to ensure compliance of respondent	Staff establishment examples, guidance on possible post provisioning. Staff resource tables to be completed by country delegates
7	The qualifications, skills and experience of the staff are adequate.	100% related qualifications and related experience	80% related qualifications and related experience	50% related qualifications and related experience	Less than 50% related qualifications and related experience	Table with staff and their qualifications	What are the related qualifications and experience for EMIS staff	Strong recommendation: They are provided formal and on-the job training in statistics and related subjects)	Staff with qualifications. Tables to be completed by countries.
8	Efforts are made to ensure the retention at any point of time of a core contingent of skilled staff (e.g. **succession planning** is take into account).	Strategy exists and applied	Strategy exists and is applied in an ad hoc manner	Strategy exists and not applied	No Strategy	Strategy document			

Source: Data quality analysis: Administrative routine data systems, **access:** http://uis.unesco.org/en/capacity-development-tools

The final scores can be visualized as the average for each CoP principle for easier interpretation, as in the following example:

Figure 6: Graphical example of the score for each CoP principle



For more guidance on the DQAF Scoring Matrix, see:

Ed-Data Quality Assessment Framework (Administrative Routine Data Systems)[8]

For the Matrix, see:

Data Quality Assessment Framework Matrix[9]

[8] UIS, 2017: Ed-Data Quality Assessment Framework to Evaluate Administrative Routine Data Systems, access: http://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

[9] The UIS Capacity Development Tools, Data quality analysis: Administrative routine data systems, access: http://uis.unesco.org/en/capacity-development-tools

(See 'Data quality analysis: Administrative routine data systems')

4.2 Phases in applying the Ed-DQAF

It is necessary to have a country team in operation that is fully trained in DQAF concepts, methodologies and processes, including tools. It is important that the team be inclusive of different education data producers. Representatives from the national statistical authorities should also be included in the team. As the DQAF exercise will include information gathering, data collection, observation visits and discussions with relevant officials, including consultation meetings, appropriate resources – both technical and financial – should be made available. Based on experiences from pilot countries, a data quality assessment can be implemented in four phases, as illustrated in Table 2.

Table 2: Four phases of DQAF

PHASES	ACTIONS	TOOLS
Preparatory	• Setting up a team • Training/orientation on undertaking DQAF, including tools • Planning of undertaking DQAF in the field	DQAF Manual
Evidence Gathering	• A one to two weeks investigation period where the sub-groups will meet and interview the relevant staff in the different departments concerned with the data source • Collection of data collection instruments, metadata, policy documents etc.	Interview guide Inventory list
DQAF Scoring	• Analysis of the data, information • Completing DQAF Assessment matrix with score and indicative recommendations • Recommendation to organize small workshop for completing the matrix	DQAF matrix
Report Writing and Validation	• Preparation of the report with findings and clear recommendations • Validation of DQAF recommendations	DQAF Manual

Source: Adapted from UIS, 2017: Ed-Data Quality Assessment Framework to Evaluate Administrative Routine Data Systems: Manual for the Conduct of an Evaluation by A National Technical Team, **access:** http://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

4.3 Reporting on the education data quality assessment

The major findings extrapolated from the data quality analysis should be included in the report. The eight principles outlined in the CoP categorize the findings of the data quality assessment exercise. For each principle, a description of the data system should be given, detailing and summarizing the different items.

When providing recommendations, this part of the process should also identify good practices and opportunities to improve the current situation for optimal adherence, with accepted statistical standards. Based on the findings of the analysis, it is suggested that recommendations are categorized as follows:

- **INSTITUTIONAL AND POLICY ENVIRONMENT** (Acts, policies, etc.) and coordination among the relevant structures in charge of data sources should be presented. Suggest strengthening the official texts governing the production of statistics and stating the responsibilities and roles of the different concerned ministries and the NSO. Provide Examples of Acts and policies to be implemented.
- **ORGANIZATIONAL/STATISTICAL PROCESSES:** Recommendations on data collection processes should be emphasized, e.g. questionnaire design, questionnaire dissemination, data capturing, quality controls at different levels of the data collection chain, dissemination schedule, data use and dissemination, documentation (operational manual), etc.
- **TECHNICAL CAPACITY** (data system and dissemination)**:** Focus on the functionality of the system that is required within the ministry of education and sub-national levels to improve data quality.
- **HUMAN RESOURCE CAPACITY:** Adequate training and capacity building strategies should be included as part of the recommendations.

The following example shows how the data quality assessment illustrates the weaknesses and strengths of the education data system in the country and it provides clear recommendations to improve the situation.

Figure 7: Example of DQA findings

Principles and indicators	Admin	HHS
Principle 1: Policy and legal framework		
Roles & Responsibility		
Confidentiality and protection		
Principle 2: Adequacy of resources		
Staff qualification & retention		
Computing and physical facilities		
Financial resources		
Principle 3: Relevance		
Consultations with data's users		
User satisfaction		
Principle 4: Sound Methodology		
Statistical standards		
Scope		
Classification systems		
Archiving of source data		
Principle 5: Accuracy and reliability		
Coverage		
Sources validated		
Statistical techniques		
Principle 6: Periodicity and timeliness		
Periodicity and timeliness		
Principle 7: Consistency		
Consistency within a dataset		
Consistent over a reasonable period		
Consistent with other sources		
Principle 8: Accessibility and clarity		
Adequate dissemination		
Metadata available		
Support to users		

Table 3: DQA recommendations

Institutional and policy environment Establish a multi-sectoral education data coordination group (education data platform) and harmonize the efforts in a coordinated manner. Develop policies and strategies for quality learning assessments at different levels of education programmes. Increase financial resources for strengthening production of timely and reliable education data.	**Organizational/statistical processes** Review, develop and update data standards for all the sub-sectors. Develop methodological documents with clear calculation methods and data sources, interpretation and data use. Develop Standard Operation Procedures (SOP) for education data production for all the sub-sectors. Review and improve the school annual census questionnaire in line with SDG4 data demand.
Technical capacity (data system and dissemination) Develop an integrated education data collection system with a modular approach to cover basic education, higher education, TVET, ECE and NFE. Develop an integrated database to store and retrieve data collected through various modules. Provide necessary physical facilities, (working spaces with needed tools). Install backup and security systems for the safety of the data. Establish a system to disseminate the data in appropriate formats and to engage users and stakeholders in data improvement activities.	**Human resource capacity** Train a core technical group in the technical areas of software development, networking and security and database management. Organize data awareness training events for all the line ministries and departments to ensure understanding of data standards and methodologies, as well as interpreting data for various purposes. Develop staff retention plans to ensure a minimum core team remains available for educational statistical activities/programmes at different levels – a team which can continuously instruct new staff.

5 Results-Based Management in the National Strategies for the Development of Education Statistics

After going through the mapping of indicator data and sources, developing the NEIF and exploring the Data Quality Assessment, we come back to the NSDES where the DQA results will serve to design the NDSES' results framework.

Results-based management to develop monitoring strategies

You may already have noticed – developing the NSDES requires a change of thinking towards results instead of interventions. Generally, results-oriented planning shifts the direction of thinking towards how to achieve results? Conventional planning approaches, on the contrary, often start with the interventions and required resources: "If X activities are implemented, using Y resources, then Z result will be achieved." – The focus here is on implementation.

Box 5: The NSDES results chain

Result level 1 - Impact: This is the long-term change in social or economic conditions.

Result level 2 - Outputs. These are the supply-side deliverables, as in products or services that stem from a development intervention in the short/medium-term. A distinction between an output (a specific good or service) and an outcome can be that the output is a change in the supply of goods and services (supply side), whereas the outcome reflects changes in the utilization of goods and services (demand side).

Result level 3 - Outcome: This is a medium-term change in development conditions, measured in terms of institutional performance and/or changes in the behavior of a specific group of people or organization. An outcome is the intended benefit to a specific community, group of people, or organization that is measurable and specific.

Intermediate outcomes: These are sometimes used to specify results proximate to an intended final outcome, but are more measurable and achievable in the lifetime of a programme than the intended final outcome.

Remember!

NSDES is a policy instrument that helps bring together education data producers and users to strengthen the National Education Statistical System.

The NSDES, however, employs a results-based management (often called RBM) approach that entails planning 'in reverse'.

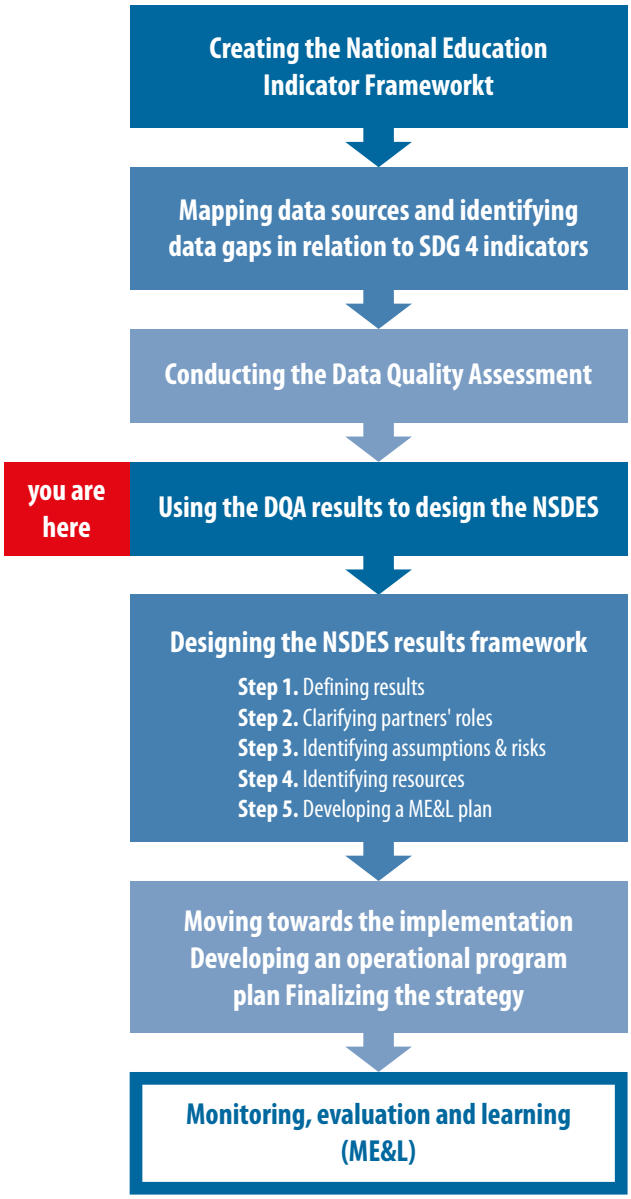
That means, to start making plans from the impact-level result (the overall goal to achieve) and move to the immediate objective-level results (the outcome[s] that trigger the goal) before detailing with the interventions (activities as expressed in services or products).

A result is change that can be described and measured. Results can be intended, or unintended changes, positive or negative. It is expected that a results-oriented strategy and/or programme will lead to positive and intended change. However, this is not always the case. As change can sometimes lead to unintended, or negative consequences, it is important that the intervention is carefully monitored and adjusted in line with the programme's monitoring data. Typically, results-based management strategic planning and programming foresee three main levels of result: impact; output; and outcome results.

Impact-outcome-output level changes are derived from a cause-and-effect relationship, which is set in motion by a development intervention or programme.

The cause-and-effect sequence is the **Results Chain** – sometimes referred to as the results logic, or intervention logic, or logic model. The causality between results extends further to the attribution between inputs-activities and the results that are generated in the form of outputs, outcomes and impact. A results chain should also clearly represent the change achieved through the cause-and-effect relationship between inputs-activities and the results.

Figure 8: The process of designing an NSDES



Source: Adapted from UIS, 2017: Ed-Data Quality Assessment Framework to Evaluate Administrative Routine Data Systems: Manual for the Conduct of an Evaluation by a National Technical Team, **access:** http://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

It is important to note that the terminology and level of detail used to describe the elements of a results chain can differ from programme to programme, depending on the scope of the intervention.

In the case of NSDES, the results chain needs to take into account the capacity-building function of a strategy to develop education statistics in a given country; the NSDES results chain also needs to anticipate the eventual integration of the NSDES into broader strategic planning frameworks such as the country's education sector plan and the umbrella multi-sector National Strategies for the Development of Statistics. The following table explains the corresponding elements in the NSDES results chain and the generic logic model; Figure 8 illustrates the NSDES results chain.

Table 4: Description of applying RBM to NSDES

GENERIC RESULTS CHAIN	NSDES RESULTS CHAIN
Higher-order result/impact. The long-term effects near, or at the top of the results chain in terms of improved social, or economic conditions. Generally, a standalone intervention alone will not achieve the higher-order result; but a programme should identify the country development goal it seeks to influence.	**Development goal** The high-level country development goal, or sectoral development goal; e.g. SDG 4, the national poverty-reduction goal, and/or the NSDS goal. It may be achieved through a combination of development interventions, including NSDES.
Programme development objective The intended benefits to a specific community, group of people, or organization that are to be realized through the programme.	**NSDES Vision statement/goal** This seeks to influence the above development goal, or sectoral development goal. The vision/goal should clearly indicate the target group of the NSDES capacity-building intervention and what they will be doing better, or differently as a result of the programme.
Programme outcome (final and intermediate) The change in institutional performance or behaviour change among users of outputs that demonstrates the uptake, adoption, or use of the programme outputs by the targeted stakeholders. An **intermediate outcome** specifies a result that leads to the intended final outcome, but is more measurable and achievable in the lifetime of a project than the intended final outcome.	**Strategic objective(s) of capacity development.** These are the final outcomes of the NSDES that are intended to be achieved by the end of the programme's first phase. They are informed by DQA recommendations and describe the benefits to the targeted stakeholders (e.g. education data platform) in relation to one or more of four targeted NSDES components. **Intermediate outcomes** specify the results leading to a specific final outcome. They are intended to be achieved in one to three years of an overall five-year programme life-cycle.
Outputs The supply-side deliverables, including the events, products, or services that result from the intervention.	**NSDES programme outputs** Knowledge, products and services.

Figure 9: The NSDES results chain

Note: The NSDES results chain outlined above is itself a generic logic model, and open to modification. For example, in some country contexts the intermediate outcome results-level may not be required, while in other more complex situations it is.

Source: Adapted from UIS, 2017: Ed-Data Quality Assessment Framework to Evaluate Administrative Routine Data Systems: Manual for the Conduct of an Evaluation by A National Technical Team, **access:** http://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

To support Member States in developing their NSDES, the UIS has developed a practical toolkit

Using the DQA results to design the NSDES

- Tool 1: Prioritizing recommendations and setting strategic objectives

Designing the NSDES results framework

- Tool 2: Results matrix template and guidance
- Tool 3: Risk matrix template and guidance
- Tool 4: Monitoring and Evaluation (M&E) matrix template and guidance

Moving towards the implementation

- Tool 5: Costed programme plan template/Annual Work Plan (AWP) template

The NSDES toolkit: http://uis.unesco.org/en/capacity-development-tools
(Click on Practical Tools under: 'From assessment to recommendations: Drafting the National Strategy for the Development of Education Statistics (NSDES)')

Module 3: Improving Education Management Information Systems (EMIS)

Module overview – objectives, topics and learning outcomes

Assessing the state of education in a country demands information about the types and level of differing inputs, resources, governance, operations and outcomes of a country's education system. Measurement of educational outcomes needs to inform the Educational Management Information System (EMIS), in consonance with the dictum that anything that is measured gets done. An EMIS provides systematic, quality data in a well-structured enabling environment that facilitates utilization of the information produced in planning and policy dialogue.

This module has been prepared with a view to helping managers in the education system in familiarizing themselves with the basics of structuring and managing an EMIS. The role of EMIS in monitoring SDG 4 and its targets is especially underpinned. In this module we review the history of EMIS in different country contexts and the challenges of implementing EMIS. We evaluate what makes a good EMIS; how the elements of an EMIS can fit together; and different ways in which EMIS data can be utilized. We review the different types of systems which comprise EMIS and how these can fit together to create a national EMIS. We also review some of the common methodologies used to evaluate an EMIS in a country.

The following topics are covered by this module:

- Understanding EMIS;
- What constitutes an effective EMIS;
- Utilization of EMIS data in education and monitoring SDG 4;
- Improving EMIS through collecting individual data with an integrated School Management Information System;
- Innovations related to data collection with EMIS.

After completing the module, learners will have acquired the following learning outcomes:

- Understanding an enabling environment, the necessary support systems, the production of data and dissemination;
- A better understanding of EMIS data that is utilized in education planning, administration, monitoring and evaluation;
- An understanding that EMIS can report information regarding gender, disability and children in and out of the formal education system;
- Understanding how EMIS caters to the Non-Formal Education (NFE) sector;
- Knowledge about School Management Information Systems (SMIS) and their relation to EMIS;
- Ensuring the tracking of individuals through EMIS, while also guaranteeing their privacy.

1 Understanding the Education Management Information System

The following chapter provides an introduction to EMIS and gives an overview of the direct role EMIS plays in education planning, monitoring, evaluation and administration and how, as a rich source of information, EMIS provides important data for all stakeholders in education. This chapter explores how EMIS can be defined depending on the purpose it has been developed for. This section also reviews the historic development of EMIS.

1.1 What is EMIS and why do we need it?

For any organization, a general management information system is designed to assist managerial and professional workers by processing and disseminating vast amounts of information to managers and administrators organization-wide[1].

The information is selected and presented in a format that is suitable for managerial decision-making and for planning and monitoring of an organization's activities. Management information systems can be used to support education managers to make strategic, tactical and operational decisions.

Administrative management information systems can help provide accurate, comprehensive and timely data collection which can promote more rational and effective education policy-making. This can result in improved decision-making regarding the volume and allocation of public financing; the best way to reach children that are most in need (due to socio-economic circumstances, special needs, etc.); staff recruitment; training and quality; and adherence to standards[2].

A management information system for education may therefore be construed as an integrated technology framework that automates the entire end-to-end management of education and its related information. The primary aim is to collect and analyse the relevant

[1] Alavi, M., & Leidner, D. (1999). Knowledge management systems: Issues, challenges, and benefits, Communications of the Association for Information Systems, 1(7).

[2] Ishimine K., Tayler C., Bennett J. (2010). Quality and Early Childhood Education and Care: A Policy Initiative for the 21st Century, International Journal of Child Care and Education Policy, November 2010, Volume 4, Issue 2, pp 67–80.

Figure 1: What EMIS Requires

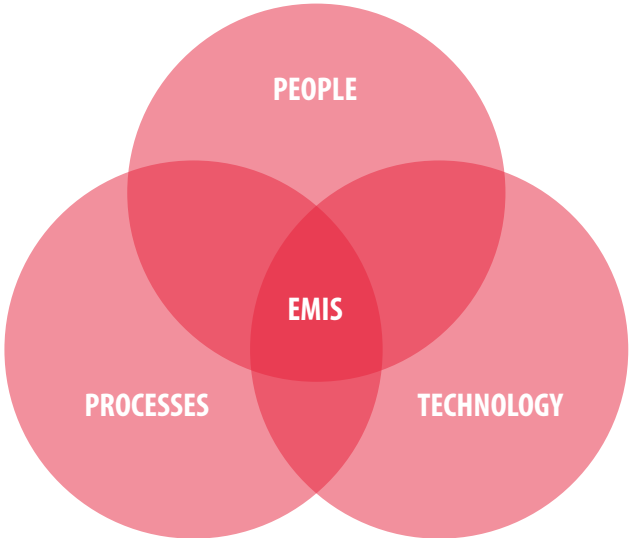
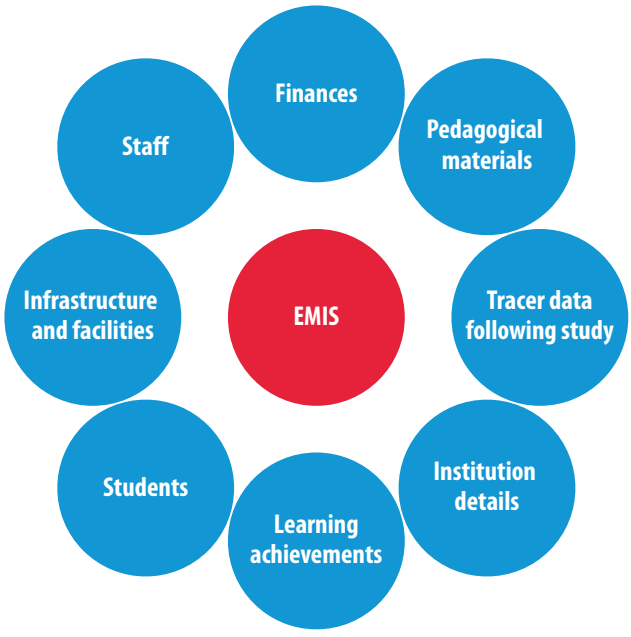


Figure 2: Elements of an EMIS covering all sub-sectors of the education sector



information for better decision-making and to facilitate administration of the education system.

An EMIS can be defined as the ensemble of operational systems and processes – increasingly supported by digital technology – that enables the collection, aggregation, analysis and use of data and information in education, including for management and administration, planning, policy formulation and monitoring and evaluation (M&E). This definition insists on the systemic nature of EMIS – a fact which is often overlooked in efforts to reinforce government information systems[3].

A comprehensive EMIS is defined as not only including **ADMINISTRATIVE AND PUPIL DATA**, but also **FINANCIAL**, **HUMAN RESOURCES** and **LEARNING DATA** as well as data on graduates after the completion of their studies. This information can and should be available, both at the individual and aggregate level, for policy-analysis and formulation, planning, monitoring and management at all levels of an education system[4].

It is a system of people, technology, models, methods, processes, procedures, rules and regulations that function together to provide education leaders, decision-makers and managers at all levels with a comprehensive, integrated set of relevant, reliable, unambiguous and timely data and information to support them in the completion of their responsibilities[5]. It is crucial for tracking changes, ensuring data quality and timely reporting of information and facilitating the utilization of information in decision-making. This very circumstance makes it one of the principal sources of data to monitor education sector plans, as well as SDG 4 commitments.

[3] UNESCO. (2018). Working Papers on Education Policy Re-Orienting Education Management Information Systems (EMIS) towards inclusive and equitable quality education and lifelong learning, Working Paper 5.

[4] Abdul-Hamid, Husein. (2014). 'What Matters Most for Education Management Information Systems: A Framework Paper.' SABER Working Paper Series No. 7, World Bank, Washington, DC.

[5] UNESCO. (2012), Education Micro Planning Tool Kit, Module 5, Data and Information for Decision-Making and Planning, UNESCO Bangkok.

The type of data entered into the system needs to follow a logic, fixed methodology and have a well-defined purpose. A successful EMIS is credible, operational in planning and policy dialogue, as well as teaching and learning. It produces and monitors education statistics within an education system and has a multifaceted structure, comprising the technological and institutional arrangements for collecting, processing and disseminating data[6].

As the potential users of data, education administrators, managers and staff, such as teachers, are systematically provided with accurate and timely information so that decision-making, planning, project development and other management functions and operations can be carried out effectively.

1.2 The usefulness of EMIS in Education

The main use of EMIS data is – and has been at the national level. It is used little at the district level because little responsibility is typically allocated to this level. Countries primarily use EMIS for national-level planning and budgeting and resource allocation, but not yet as a tool for the management of routine and day-to-day education system activities.

Countries do not usually provide application of EMIS data at the institutional (school) level. However, the application of EMIS data can expand the role of day-to-day management in EMIS, such as recording transactions related to teachers, students and equipment which can contribute to increased transparency, improved administrative management quality – and at the same time, the provision of quality data for M&E.

To be useful, EMIS data should be adapted and made accessible to all levels of decision-making within the education system. UNESCO distinguishes three main levels of data use, which correspond to the tasks of three levels of education administration in most education systems[7]. The higher the level of detail and disaggregation of information to use, the lower the level of decision-making, i.e., closer to the school level.

Across these three levels of decision-making, EMIS creates value in four distinct, but interrelated educational processes:

1. Management and administration;
2. Planning;
3. Policy formulation;
4. Monitoring and evaluation[8].

[6] Abdul-Hamid H. (2014). Lessons Learned from World Bank Education Management Information System Operations Portfolio Review, 1998–2014, The World Bank Group, access: http://dx.doi.org/10.1596/978-1-4648-1056-5

[7] UNESCO. (2012). Education Micro Planning Tool Kit, Module 5, Data and Information for Decision-Making and Planning, UNESCO Bangkok.

[8] UNESCO. (2018). Working Papers on Education Policy Re-orienting Education Management Information Systems (EMIS) towards inclusive and equitable quality education and lifelong learning, Working Paper 5.

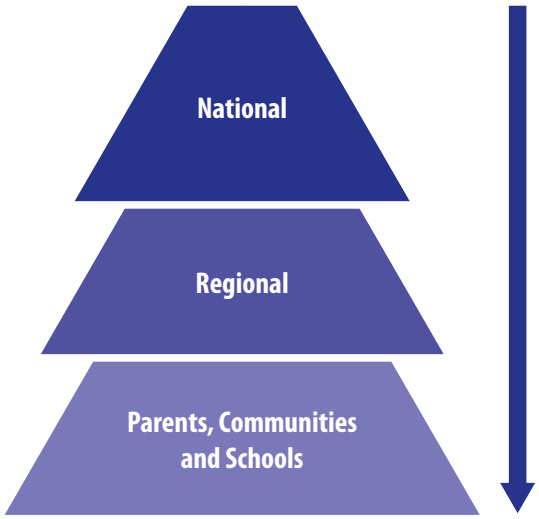
1.3 EMIS and the changing perspectives of different stakeholders

EMIS can contribute towards the changing perspectives of the different stakeholders including government, parliament, the media, the public and communities. With this in mind, the following initiatives are supported:

- **ENCOURAGE ITS USE IN EDUCATION PLANNING, MONITORING, AND OTHER ACTIVITIES:** Making data available in the correct format can help ensure that decision-makers use data to support and justify their actions and institutionalize the use of EMIS data for decision-making.
- **ENCOURAGE INVESTMENT IN THE EDUCATION SECTOR:** Adopting evidence-based management encourages governments to increase investment in the education sector by government, the community and development partners.
- **EMIS DATA CAN HELP PROMOTE EQUALITY AND ENCOURAGE COMMUNITY PARTICIPATION:** The availability of EMIS data helps improve school facilities, staffing and staff morale through improved career management. Good data can also be promoted through the media and used to advocate for community participation in education. Civil society can be empowered through data to conduct policy dialogue with the government and to mobilize community contributions towards education.
- **EMIS DATA CAN HELP INFORM PARENTS AND CHILDREN:** EMIS can help parents and communities be more informed and help them understand if their schools are meeting national standards or not.

Figure 3 on the next page illustrates the relationship between EMIS data and changing attitudes, from the national level to the community level. This exemplifies how a well-functioning EMIS can spur an environment that is more beneficial to education sector development and specifically better learning outcomes.

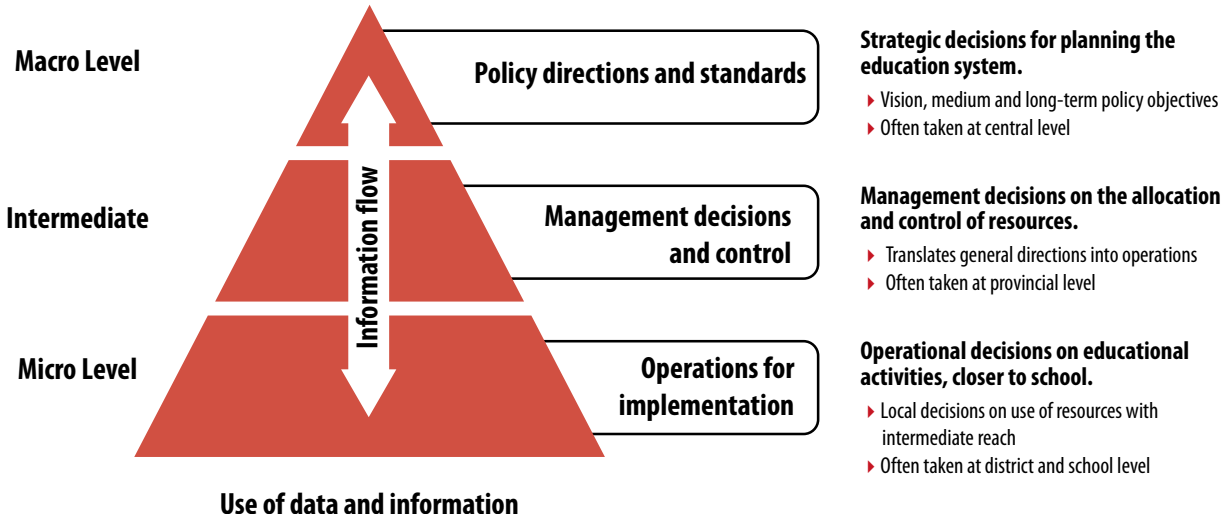
Figure 3: Elements of an EMIS covering all sub-sectors of the education sector



- Increased use of empirical data to analyse the sector, undertake research and justify planning and decision-making.
- Increased awareness of equity issues in education sectors and increased action to mitigate disparities.
- Increased funding for education.
- Improved resource allocation to the education sector and improved staff management leads to more motivated teachers with potentially better learning outcomes.
- Increased stakeholder and partner participation in analysis of the education sector and education planning.
- Increased community awareness about education and increased community participation in education.
- Increased recognition of the role of communities and increased community mobilization in education.
- Greater empowering of civil society and NGOs to help address education issues.t

Different stakeholders require answers to different questions; a well-functioning EMIS provides data that can respond to the various questions posed by actors across all levels of the education system. The level of detail of data and information decreases as the level of decision-making goes up, where information becomes more aggregated and synthesized, integrating all available data so that assessment of the education system can take place over regions rather than individual schools. Figure 4 illustrates the use of EMIS data by the different levels of decision makers.

Figure 4: Use of EMIS data by level of decision-making



Source: UNESCO. (2012). Education Micro Planning Tool Kit, Module 5, Data and Information for Decision-Making and Planning, UNESCO Bangkok. **Note:** Operational decisions are often accommodated in transactional systems such as Human Resource Information Systems (HRIS), School Management Information Systems (SMIS or SIS) and Financial Management Information Systems (FMIS).

Remember!

The three decision-making levels, which sometimes overlap with each other at the administrative levels, require different types of reports and functions requiring education data in order for education actors to be able to make judgements appropriate to their role in the education system. A good EMIS should be capable of providing information and facilitating functions for each of these levels of operation.

MACRO-LEVEL ADMINISTRATION

- Responsible for strategic decisions concerning the planning of the whole education system.
- Concerns general policy directions.
- Information required are aggregates that are used for setting and monitoring the policy objectives at the national and regional levels.

INTERMEDIATE LEVEL

- Comprises decision-makers who are in charge of **management and control** in the allocation and monitoring of the use of resources.
- Translates general policy directions into more technical, operational decisions.
- Requires more specific data to ensure an efficient and equitable distribution of resources, to detect possible shortcomings and to optimize the use of resources.

MICRO-LEVEL

- Corresponds to operational tasks of defining the use of allocated resources to deliver education services and to translate them into concrete results.
- Concerned with routine activities closer to the school.
- Decisions have local and immediate reach and hence will require more detailed information.

1.4 Understanding the different EMIS types and data

When describing information systems, we often classify them according to the type of data they store, or the functions they manage. For example, a system that manages financial information may be termed a Financial Management Information System (FMIS).

Such a system may be a stand-alone system, or it may be part of an **integrated** (or shared) system. It may be operated on completely different information standards and even through different departments, or ministries. Each system may cover a single sub-sector, such as basic education.

The following table lists and describe the main categories of a system which are typically part of an overarching EMIS. The specific names and terms is very much dependent on the nature of the systems operated under each ministry and department and may therefore vary occasionally.

Table 1: Different Types of Information Systems comprising an EMIS

Type of Data	Module or System Names	Description
Student Records and Information	Student tracking or information System.	Individual student records exist that collect and store information on individual students and update this information during the duration of the student's stay in the school. Background information on students can collect information on deprived students and those that receive financial aid, such as grants, or scholarships. Student tracking systems will also usually contain additional information on the condition of the student, including information such as disability, ethnicity, language at home and even the wealth, or income status of the family. In sophisticated systems, financial allocations to individual students may be tracked such as the award and disbursement of disability allowances, stipends and scholarships.
Student Academic Record keeping	Student tracking or information system. Examinations or assessment system,	These manages information on the academic performance of the students at regular intervals, such as by each semester and the end of the academic year. Depending on the nature of the EMIS system, this information may be available to teachers and even to pupils and parents under secure access.

General Staff Management	Personnel or Human Resource Management Information System	Staff records are often maintained in a Personnel Management Information System (PMIS). The full biodata, academic history and in-service training records of staff may be managed through this system. The PMIS may also manage payroll and other functions such as leave, disciplinary action, promotion and demotion, however the extent to which it does will often depend on the relationship and roles assigned to ministerial bodies such as ministries of finance, home affairs and education and the extent to which each ministry shares information.
Teacher information	Teacher or personnel management information system	This relates to information on teachers, such as, their attitudes, innovations used in teaching and outcomes of teaching-learning in terms of achievements by students. It can also include information relating to the activities a teacher undertakes at the school-level, such as their teaching hours and subjects taught.
Financial Information	Financial Management Information System.	This includes all data on financial transactions within the school such as, grants received, salaries paid, maintenance charges, fees collected, scholarships disbursed, expenditure incurred on welfare measures, such as the school lunch programme and money spent on enhancing school infrastructure. In many ministries, this data will be stored under Financial Management Information Systems (FMIS) which support the automation and integration of public financial management processes, including budget formulation, execution (e.g. commitment control, cash/ debt management, treasury operations), accounting and reporting.
Procurement and Asset Data	Asset Management Information System. Procurement System.	Asset data includes the allocation and condition of fixed and variable assets owned by the school. This can be as simple as completing an asset inventory on an annual census form, or it may be a more complex and dedicated system capable of managing and tracking all institution fixed, mobile, hard and soft assets, including documents relating to asset procurement. This system may often be part of a financial system.
Physical facilities	Facilities.	Physical facilities include fixed assets under the school such as the number and condition of classrooms, Water, Sanitation and Hygiene (WASH), playgrounds and other physical facilities. This data may be recorded once annually, or it may be part of a procurement and asset data system, or a greater financial system.
Textbooks and Instructional Material	Textbook Information System.	Textbooks, teachers' guides and other pedagogical materials are often managed through distribution and procurement systems which help determine how many textbooks are required for each subject for each school or institution. As in the case of asset systems, these types of systems may be simple or complex depending on the country context.
Planning and Scheduling	School Academic Planning	This relates to planning of activities for the school each year in terms of actions planned, implementation, spending of earmarked budgets and assessing performance.

1.5 Evolution of EMIS

EMIS has existed in one form or another in many countries for decades and in some cases centuries. Bureaucracies, such as those in the British Empire, India and China, have compiled education statistics on students, teachers and other aspects of education institutions for centuries.

EMIS rarely appears out of a void but rather evolves or is enhanced from an existing statistical system through focused efforts such as those of projects, programmes and government initiatives.

- For example, in Myanmar the government has collected and manually compiled information on teachers, students, finances and other aspects of schools on a monthly basis prior to initiating modern EMIS development programmes to help automate the task of compiling and analysing data.

Increasingly, EMIS are moving away from using data narrowly for counting students and schools. Instead, they use data to drive system-wide innovations, accountability, professionalization and most importantly, quality and learning[9]. This broader use of data also benefits classroom instruction and support in schools.

The diagram below shows the evolution of EMIS in countries[10]. The diagram highlights the path EMIS has taken from independent annual census collection, through to fully integrated and decentralized government systems. EMIS also becomes increasingly granular with the introduction of web-based individual student tracking systems and human resource management information systems.

Drivers of change

- Changing technologies;
- Increased expectations from education stakeholders, administrators and planners;
- Evolving national and international standards (SDG, equity, disability etc);
- Increased accountability to the public;
- Increased complexity of education systems, for example public, private, Non-Formal (NF), Technical and Vocational Education and Training (TVET) and Higher Education (HE);
- Increased focus on outcomes (learning, wellbeing);

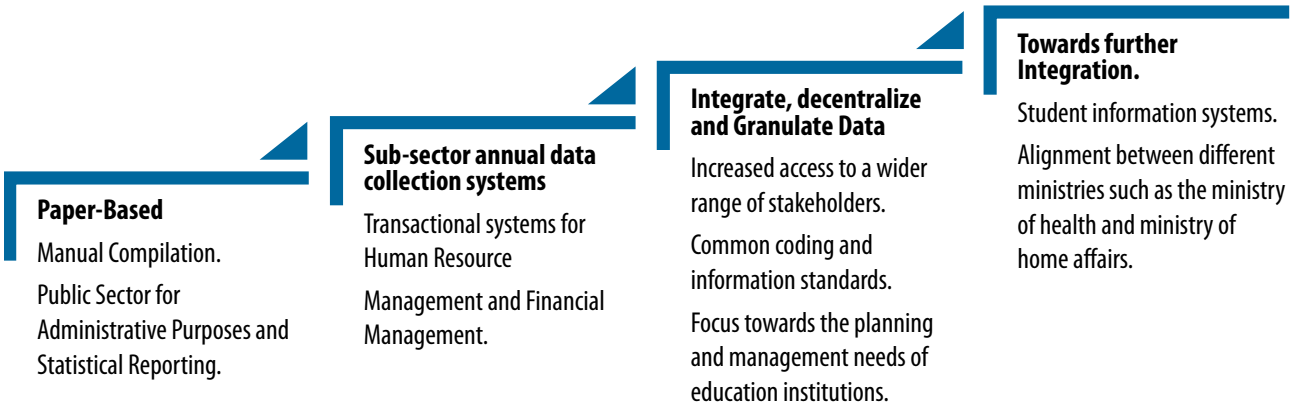
[9] Abdul-Hamid, H. (2017b). Data for Learning: Building a Smart Education Data System. Directions in Development-Human Development; Washington, DC: World Bank. © World Bank, access: https://openknowledge.worldbank.org/handle/10986/28336 License: CC BY 3.0 IGO.

[10] UNESCO. (2018). Re-orienting Education Management Information Systems (EMIS) towards inclusive and equitable quality education and lifelong learning Subosa M, West M., Document code:ED-2018/WS/11.

- Increased need to engage stakeholders at the school-level, such as parents and teachers.

Countries surveyed reported that these factors have all been instrumental in propelling systems towards increasing granularity of data[11], complexity of systems and towards various forms of integration and decentralization. Experiences of EMIS from a number of countries receive further elaboration in **Annex 1**.

Figure 5: General path towards the evolution of EMIS in Surveyed Countries



1.6 Challenges of EMIS Development

Even though most countries in the Asia-Pacific region have set up EMIS to collect, store, analyse and disseminate education data as a pillar of their decision-making processes, various challenges exist to monitor progress with SDG 4. Before we discuss how to ensure the development of an effective EMIS, we will look at the common challenges we will encounter so we are better prepared to deal with these challenges when they arise.

i. *Lack of political commitment*

The main limitation relates to lack of recognition on the need to establish an effective EMIS system that focuses on all aspects of collection and dissemination of reliable and quality data to meet the requirements of both good governance and the needs of monitoring all the targets and indicators of SDG 4.

ii. *Qualified personnel*

[11] Individual student and teacher data.

Hiring highly competent professional staff to work with an EMIS can be an issue because of government service rules. Deciding upon a high pay scale to attract competent professionals does not necessarily result in actually hiring personnel with such a competence due to promotion rules in ministries. Senior positions are too often filled according to seniority of service and not competence.

iii. *Obfuscation in roles and responsibilities*

Data duplication and multiple data producers in the education sector without proper coordination is another challenge. In many countries, there is a lack of clarity in collecting, processing, disseminating and the sharing of data among different data producers.

iv. *Limited data coverage*

Basic education is the only area where almost all Asia-Pacific countries have a decent system to collect data through EMIS. In many countries, higher education, NFE and Early Childhood Education (ECE) are not part of EMIS. The lack of holistic data collection systems in education sub-sectors and challenges in some phases of the data production cycle hampers countries from generating the necessary indicators.

v. *Dearth of disaggregation to measure equity*

EMIS does not include all the needed equity disaggregation required for SDG 4 planning and monitoring. In order to better identify the dimensions of disadvantage in education and measure inclusion, efforts should be made to increase the capacity of EMIS to disaggregate data where relevant by sex, age, location, ethnicity and disabilities.

vi. *No culture of data sharing and cooperation*

Although many types of data and indictors are collected by different departments and ministries, it has been determined they are not shared, or access is barricaded. A culture of data sharing and establishing cooperation among data producers is crucial for effective monitoring of Education 2030 and the world development agenda. Information from national statistical offices and other non-traditional education providers, who might collect data on aspects of education not covered by the traditional education providers, should be taken into consideration to fill the data gaps.

vii. *Lack of resources*

Due to heavy budget constraints, countries may prioritise scarce resource areas such as teacher training and direct allocation to facilities in educational institutions. It may be difficult to find adequate resources to meet the requirements of establishing an effective EMIS, which will not only require the hiring of well-paid professional staff, but also the purchase of expensive digital hardware and software.

viii. *Inefficiency in data collection, processing and dissemination*

The collection, processing and dissemination of data is still very inefficient in many countries. Many countries still use paper-based data collection methods and verification and validation processes and manuals. Many countries are still not able to exploit the benefits of technologies in data management due to a lack of funds, or due to a lack of skills and capacity.

ix. *Lack of capacity in analysis and use of data*

Though data is collected through EMIS, many data is not analysed, or used for planning, management and monitoring – mainly due to a lack of capacity in the staff tasked with proper analysis and the use of data.

x. *Staff turnover*

In many countries, EMIS staff are scarce and their high turnover can negatively impact on institution memory. This means that each time an EMIS staff member leaves, the acquired knowledge and skills also leave with the departing person. An added issue is that a new recruit needs to be trained and this requires a trainer with EMIS knowledge and skills.

2 A good Education Management Information System

In this chapter we will discuss some of the principals behind establishing a good and effective EMIS. Before going into EMIS specific considerations, this section describes the central elements we need to keep in mind when establishing any Management Information System (MIS). We also explore aspects of a strong enabling environment required for an effective EMIS, such as the policy and legislation required for EMIS.

2.1 Preparing a good Management Information System

Every MIS requires an enabling environment as its very basis. This includes political commitment and monitoring at all levels so staff are equipped with the necessary technical capacities. Disaggregated data must flow without any loss to the decision-making levels. Data entry needs to follow logic, fixed and comparable methodology and have a well-defined purpose. For each country context, the existing situation relating to data quality; its architecture relating to collection, analysis, interpretation and dissemination; the availability of adequate resources; and the needed infrastructure needs to be analysed to identify obstacles in paving the ground for establishing and/or improving an MIS.

2.2 Central elements for a good MIS

The central elements for an effective MIS are detailed below:

RELEVANT: The data and information produced by MIS should be relevant for different stakeholders and partners within the country. A broader consultation on the data requirement at various levels and different sub-sectors and aspects of education is needed to ensure that the data generated from MIS is relevant and useful for various stakeholders and for different purposes.

ACCURATE: The data produced should be accurate and reliable to be used for various purposes. The data collection and generation through MIS should follow standard national and international principles, standard methodologies and use standard classification systems. Such methodologies, standards and metadata should be well documented and made accessible to users in a transparent manner.

USEFUL: Information generated from MIS should be useful for taking decisions regarding education development at the different levels. The information should be generated in various formats and structures based on the users' needs.

TIMELY: MIS should be able to produce timely data and information for timely decisions. Time lagged data and information might not be that useful for education planning and management. How timely the MIS can produce data/information should depend on how efficiently it collects, processes, analyses and disseminates the data. Using new technologies in collecting, compiling and processing data can help MIS to produce more timely data.

COMPLETE: The data collected and produced by MIS should be complete. It should cover all the sub-sectors including higher education, NFE and ECE. It should cover all types of institutions such as public, private and community.

ACCESSIBLE: A good MIS should not only collect and disseminate the data on a regular basis, it should also provide clients with access to its data and information. A good MIS should use appropriate technologies to store all historical data and information and provide appropriate tools and techniques to access them. It should also use security features to avoid unwanted access to respondents' personal and sensitive data.

SECURE: A good MIS should be secure and protect the rights of individuals whose data is stored within, as well as protect sensitive government data such as financial data. The MIS should be secure from unauthorized access and data corruption and users should have secure access to data relevant to their job functions and research purposes.

GRANULAR: A good MIS will have data on individual students and teachers. This information should be available at the school and administrative levels.

2.3 Data and information flow in EMIS

A good EMIS should have a smooth data and information flow, including sharing and exchanges (both vertical and horizontal cross-section flow) from educational institutes to different levels of education and among various data producers. Education institutes, as the main data sources for EMIS, should have the required data and a full understanding of the process and channel of data submission.

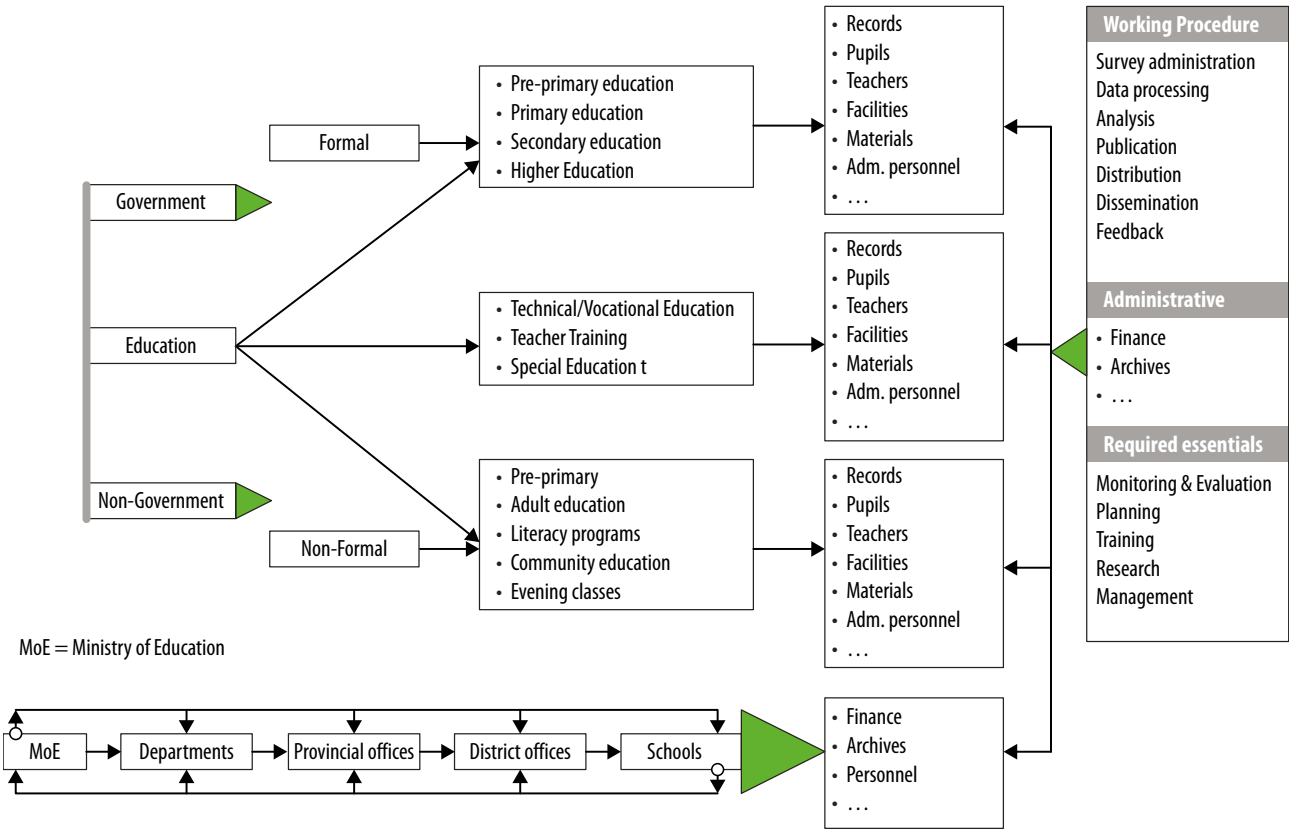
- Similarly, district education offices and provincial education offices should also have clear guidance and responsibilities in making data flow smooth.
- A well-developed data management mechanism is needed with clear roles and responsibilities assigned for the different levels (please refer to the diagram under Streamlining the Organizational Structure).
- There is a need to empower local planners; the system needs to accommodate simple functions which have relevance at the local levels.
- Verification of data should also be undertaken at the local level, therefore, there is a need at the local level to have access to the systems through secure interfaces. For this purpose, web-based deployments are best as high-speed Internet networks are now pervasive in most countries.

Information also flows in accordance with information approval processes. Whatever may be the case, suitable support legislation and policy commitments may be necessary to complete this process. The needed vertical and horizontal information flows may have to be clearly spelled out, assigning responsibilities to the various departments and organizations concerned. A manual of procedures may also be needed to be produced to give effect to this arrangement.

Box 1: Ideal composition of the NEIF

- All the records and information should be stored safely with proper classification, labelling and filing so this can be accessed when needed.
- There should be clear identification of the personnel who have accessed to various information based on information types.
- Data and information can also be entered into computerized storage in the school database to facilitate tracking, updates, search, retrieval and use.
- There should also be clear policy on retrieval, disposal and access to the records to ensure the safety of the data and information.

Figure 6: Flow of information within ministry of education



Source: NESIS and UNESCO. (2003). EMIS – A Guide for Young Managers,.

The diagram above indicates that EMIS should address all areas of education and should store detailed information on pupils, teachers, facilities, materials and finances. This information should be available at every level of government and should be comparable between education sectors.

Information systems enable countries to be cost-efficient and effective in their education planning. When institutionalized and guided by a clear policy and strategy, an EMIS helps policy makers manage an education system to produce quality outputs and outcomes. However, many countries have invested resources in building education management information systems, but these systems are often not institutionalized, that is, lack in guiding vision and are not incorporated into strategic planning processes. EMIS are intended to help planners and decision-makers to design and implement policies. However, as we have already noted, most countries do not have clear formulated policies on how to use EMIS data in planning and decision-making.

- The way in which EMIS will be involved in processes for each user and function should be mapped for each module, or component of EMIS. This will help ensure that EMIS systems and data become integral to education management functions and in day-to-day operations.

2.4 Establishing a good EMIS

Establishing a good management information system for education starts with a quality diagnosis of the system's structural elements. This includes a preparatory assessment and evaluation of the data and information, or the absence of such data and information; the institutionalization of legislative policy frameworks; an organizational structure with streamlined clear roles and responsibilities; and a clear plan not only for the initial establishment but also for the continued maintenance of the system.

2.4.1 Assessing and evaluating the quality of an EMIS

An EMIS should be understood as a dynamic, shifting and evolving system that needs to be adjusted when new demands on information are needed. It is now common practice to evaluate EMIS according to established benchmarks and in relation to established best practices. Evaluation can help inform EMIS development plans and inform about reforms needed to help improve systems.

There are several methods for a quality assessment of EMIS, which are routinely conducted by international development partners to help assess the quality of EMIS systems and make recommendations for further development, such as:

Remember!

Each methodology relies heavily on the skills of the assessor. A good assessor can help provide information as to how a national EMIS compares with global standards and best practices and it can help ask questions which may be challenging for persons working daily with systems.

- **Light Ed-Data Quality Assessment Framework** (DQAF) developed by the UNESCO Institute of Statistics (UIS).
- EMIS **Systems Approach for Better Education** (SABER) developed by the World Bank.

In general, each of these methods helps evaluate an EMIS along thematic dimensions which are generally aligned to:

- Policy and institutional environment;
- Statistical processes;
- Statistical data output and use;
- Information use.

Light Ed-DQAF

UIS has developed and implement evaluation methodologies that assess the quality of data produced by national statistical systems within the UNESCO domain of competence, including standards and tools for assessing education data quality produced by member states. The DQAF assesses the strengths and weaknesses of the education statistical system by reviewing parameters based on the following eight principals:

1. Policy and legal framework.
2. Adequacy of resources.
3. Relevance.
4. Sound methodology.
5. Accuracy and reliability.
6. Periodicity and timeliness.
7. Consistency.
8. Accessibility and clarity.

UNESCO and UIS are undertaking holistic assessments of education information systems using DQAF. The DQAF is designed to evaluate whole education information systems in relation to national education monitoring frameworks and SDG 4 indicators. The final product of the evaluation should be a National Strategy for the Development of Education Statistics (NSDES) which details recommendations for improvements of all education data sources. Ed-DQAF is based on DQAF methodology and is specific to just administrative systems. Over 140 quality parameters are assessed against the six core DQAF principals. The detailed findings from Ed-DQAF and recommendations can be used to develop strategies for strengthening EMIS in the country.

For more information see:

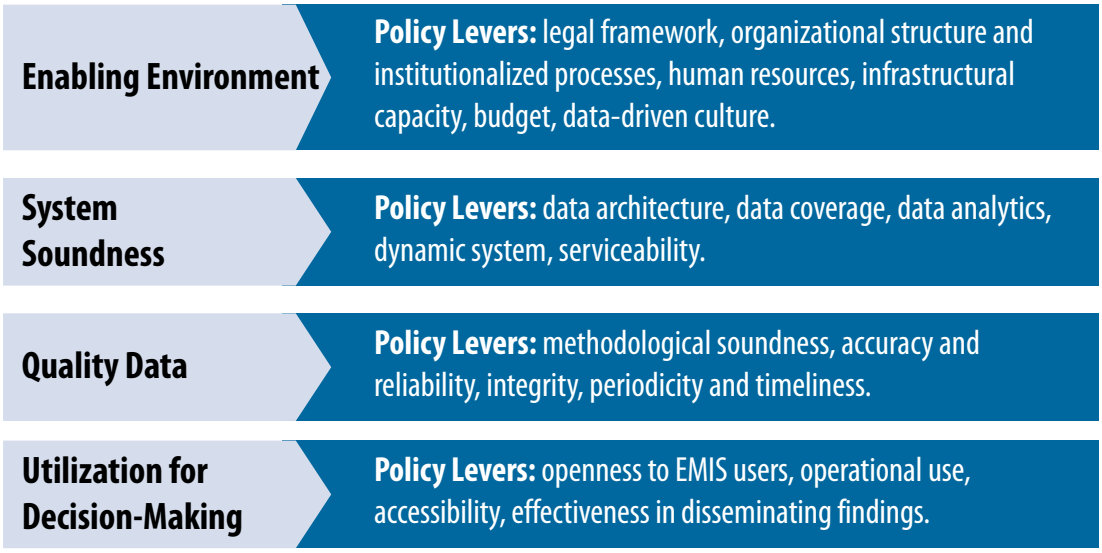
Ed-Data Quality Assessment Framework (Ed-DQAF) to Evaluate Administrative Routine Data Systems: Manual for the Conduct of an Evaluation by a National Technical Team[12]

[12] Ed-Data Quality Assessment Framework (Ed-DQAF) to Evaluate Administrative Routine Data Systems, access: http://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

SABER-EMIS

The SABER-EMIS assessment methodology is built on four key policy areas that are essential to EMIS and must be assessed to understand and ultimately strengthen the system. Each policy goal is defined by a set of policy levers (actions that help governments reach the policy goal) and indicators (measuring the extent to which the policy levers are achieved). (Please see the figure below). Policy areas key to the successful implementation of EMIS are shown in Figure 7 below. Each policy goal is defined by a set of policy levers (actions that help governments reach the policy goal) and indicators that measure the extent to which the policy levers are achieved[13].

Figure 7: Policy Goals



Source: Abdul-Hamid, H. (2014) SABER EMIS Framework Paper, World Bank.

Similarly, there are other tools such as the ADEA[14] Evaluation Framework to assess the quality of EMIS.

For more information, see:

SABER Education Management Information Systems Data Collection Instrument[15]

[13] For more information on SABER, access: http://saber.worldbank.org/index.cfm

[14] ADEA. (2017). EMIS Norms and Standards and EMIS Norms and Standards Assessment Framework for North Africa, Association for the Development of Education in Africa (ADEA).

[15] SABER Education Management Information Systems Data Collection Instrument, access: http://wbgfiles.worldbank.org/documents/hdn/ed/saber/supporting_doc/Background/EMIS/SABER_EMIS_Questionnaire_092414.pdf

2.4.2 Factors affecting EMIS data quality

Many factors affect the quality of education data. Some of these factors are directly related to an EMIS, such as verification procedures, the data capture forms and tools and staff capacity. Other factors which influence data quality are often more difficult to measure, such as governance, or perceptions on data and attitudes. The following table presents an overview of some of the critical factors that affect data quality as they originate from an EMIS and possible remedies to mitigate these problematic factors.

Table 2: Factors affecting EMIS data quality and possible actions

Factor	Description	Remedies for mitigation
Perception	The perception of education ministry staff regarding the quality of data used can play a critical role in determining the level of attention given to education data. A poor perception of data may impact negatively on the level of investment needed to build and maintain effective information systems.	1. Create feedback loops to allow staff to identify and note poor data. 2. Provide clear information and guidance on the process for improving data quality and accuracy. 3. Provide clear information as to the gradual nature of data improvement through information systems.
Verification	In a study of EMIS projects implemented between 1997 and 2014, it was found that poor data quality and completeness was a widespread problem for EMIS due to a lack of measures adopted to verify the accuracy of data provided by schools.	1. Appoint government officers at each level of the education system (schools, local, regional, and central). 2. Developing automated validation mechanisms for quality assurance purposes to help improve data quality. 3. Provide easy access for supervisors and inspectors to assess the quality of EMIS data when they visit schools. 4. Migrate to granular systems with individual student/teacher data and each individual should have a unique identifier. 5. Incentivize private schools to supply accurate data for reporting.
Systems	Well-designed systems with appropriate validation, coding standards and integrity can reduce the likelihood of poor data.	1. Have systems reviewed by professional agencies. 2. Use proper development standards, such as the ISO 12207:2017, which enforces integrity and coding standards. 3. Develop national coding standards for all entities including schools and individuals such as teachers and students and other

Policy and Legislation	Good quality data should be supported by appropriate legislation and policy. Linking EMIS data to key decision-making can reward individuals who submit timely and accurate EMIS data. An example is in Fiji where submission of all individual student data ensures schools receive timely distribution of grants. Policy in general must be carefully considered, as policy decisions can also influence data in environments where verification of data is weak, such as having per capita funding where there is no verification of student numbers. In such a case, schools may be encouraged to inflate figures[16].	1. Ensure one government agency is responsible for statistical and data standards. 2. Ensure policies or legislation that penalize individuals for submitting false, or misleading data. 3. Ensure data is linked to key decisions, ideally involving funding releases. 4. Review policies for elements which may lead to distortion of data and ensure proper verification mechanisms are in place.
Data Use	Data providers must have motivation and ability to complete and submit data which needs to be aligned with the concepts of the respondent. Also, tools need to be provided with adequate instructions. Data quality is related to the provision of proper training and regular discussion should occur with school staff to help inculcate a culture of data-driven decision-making. This will lead to improved data quality by helping to ensure the producers of the data understand the meaning and relevance of the data.	1. Ensure adequate pre and in-service training is given to school level staff to both submit and to use data. 2. Ensure policies encourage proper use of EMIS data at all levels of government and are linked closely to decision making.

2.4.3 Building a legislative and policy framework

For the purpose of reforming EMIS in preparation for the requirements of monitoring progress towards the achievement of SDG 4, legislative and policy measures may be required to facilitate such a revamping. The aim of doing this would be that the existing legal framework should be supportive of a fully functioning EMIS.

INSTITUTIONALIZATION OF THE SYSTEM: An EMIS is institutionalized as an integral part of the education system and, by extension, the government. The existence of the education system presupposes the need for an EMIS. The legal institutionalization of the EMIS codifies its activities.

RESPONSIBILITY: The responsibility for collecting, processing and disseminating education statistics is clearly assigned to an institution or entity. This responsibility needs to be well defined and well communicated to other agencies.

[16] Peter W.M., van Nederpelt and Piet J.H. Daas. (2012). 49 Factors that Influence the Quality of Secondary Data Sources, Paper Quality and Risk Management (2012020. Statistics Netherlands.

DYNAMIC FRAMEWORK: The legal framework should be dynamic and elastic so that it can adapt to advancements in technology[17]. This means that the framework is not driven by technology or a particular product and/or tool. The legal framework also needs to be broad enough so that it can be applied to different types of EMIS tools on an ad-hoc basis, such that ICT can be utilized to its fullest potential. The legal framework should also mandate that the EMIS undergoes external and internal reviews.

DATA SUPPLY: The legal framework mandates that schools participate in the EMIS by providing educational data. This data will create the data supply for the EMIS and will be supplemented by data from the broader education community. The legal framework aims to hold schools accountable for supplying data and thus ensuring the sustainability of the EMIS, as well as for increasing school efficiency.

COMPREHENSIVE DATA AND QUALITY DATA: The requirement of comprehensive, quality data is clearly specified in the legal framework for the EMIS. There is an established and known process for monitoring data collection, data processing and data dissemination of education statistics. Different data are comprehensive, meaning that they portray a complete picture of the education system and are of a high quality.

DATA SHARING AND COORDINATION: There is a legal framework allowing adequate data sharing and coordination between the education ministry (or other ministries, depending upon where the EMIS is housed) and agencies and/or institutions that require the data (e.g., universities). The framework mandates that data be shared on a timely basis with other stakeholders.

UTILIZATION: The legal framework emphasizes data-driven decisions for education policy-making.

BUDGET: The education system budget includes a line item for the EMIS budget. The existence of a budget for the EMIS is mandated by the legal framework.

CONFIDENTIALITY: The legal framework guarantees that respondents' private data is kept confidential and used for the sole purpose of statistics. The data should be kept secure and protected from inappropriate access, as well as from unauthorized use and disclosure. This confidentiality is widely understood by EMIS clients and users. Additionally, the framework specifies that data collection, maintenance and dissemination infrastructure be kept secure according to current multilevel security classifications. In addition, the framework is consistent with existing freedom of information laws: 'The very existence of these laws has legal implications for education leaders and managers at all levels,' since they can lead to greater access to education related information[18].

[17] Bodo, Shaem. (2011). EMIS opportunities and challenges for mobile data collection and dissemination.

[18] Cassidy, Thomas. (2006). 'Education Management Information System (EMIS) Development in Latin America and the Caribbean: Lessons and Challenges.' Work document. Inter-American Development Bank, Washington, DC.

2.4.4 Streamlining the organizational structure

The organizational structure should be designed in a way that it assigns clear roles and responsibilities for obtaining and reporting SDG 4 indicators. An efficient organization is responsible for ensuring equitable distribution of resources based on its assessment of education performance by the different units of programme implementation.

Since statistics are a part of EMIS, the statistical capacity of concerned staff and other staff in the MoE should be reviewed and developed on a regular basis. Countries should be encouraged to assess and develop a plan for streamlining the organizational structure of EMIS. The following figure shows the conceptual framework of EMIS placement in the context of data producer and data user. In order to understand streamlining the organizational structure, Figure 8 provides a comprehensive overview and an explanation of its components are below:

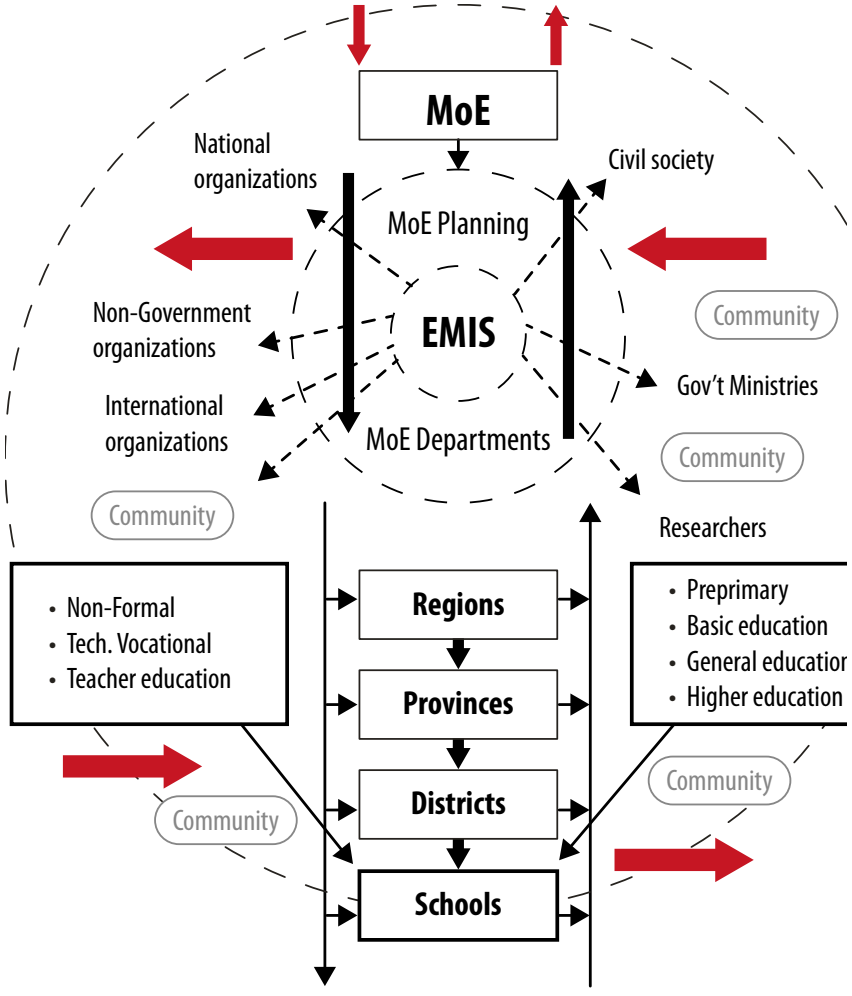
- We notice the EMIS centre is within the ministry of education (the inner circle) giving information services to all users around it.
- Directives, guidelines, demand for information and other administrative information are sent down the administrative channel to schools.
- Reports demand for support and other necessary information flows up from the school through the same channel up to the top decision-making body.
- The top grey arrows show the information that comes from higher body – higher than the education ministry (perhaps the council of ministers, or higher) and responses are sent back to them.
- The three bold rectangles at the lower end of the figure indicate major sources of information that need attention.

Box 2: Quick advice to improve EMIS

- Improve capacities in collecting, processing, storing, analysing and disseminating data in order for decision-makers, managers and educators to base their judgement on timely and reliable data;
- Coordinate the dispersed efforts in acquiring, processing, analysing and disseminating education data and information;
- Rationalize the nature and flow of information necessary for decision-making by reducing and eliminating duplications;
- Link and assemble different existing data and information systems;
- Work towards integrating in one single system the quantitative and qualitative data;
- Adapt data collection and the use and dissemination of information to constantly evolving needs for information;

- At each point of the administrative channel; region, province and districts and schools, they not only receive and pass information accordingly, but also process and use information at each stage. This is due to increasing awareness and appreciation for information and hence leads to better quality information. In all directions, there are arrows pointing inwards and outwards, both in inner circles and outer circles. These signify information exchange and feedback information at all levels of administrative channels and beyond. Hence, users at different stages have to get access to information and feedback information has to be collected, processed and incorporated for future enhancement.

Figure 8: MIS: Producers–Users Conceptual Relationships



MoE = Ministry of Education
EMIS: Producer – Users Conceptual Relation

Source: NESIS and UNESCO. (2003). EMIS – A Guide for Young Managers,.

2.4.5 Planning EMIS development

Failure to have proper data on the education system will ultimately cost far more than good data systems will cost. In the long run, the unnecessary costs caused by a lack of data to guide expenditure surpasses the cost of improving data quality through EMIS development[19].

However, developing and maintaining effective EMIS systems comes with their own costs. UIS estimated in 2018 that while the average country would have to allocate around USD1.4 million per year to generate the data required by SDG 4, this would be offset by the USD143 million that would be saved by having such data on-hand[20].

An effectively operated EMIS will usually have:

a. A strategy for education data that clearly defines all components, standards, methodologies, required technical assistance and capacity development and all involved stakeholders;

b. A funding strategy that accounts for technical responses, data collection and capacity development;

c. Coordination between national and international education stakeholders.

Taking from these findings, governments have recently been encouraged to develop longer-term development plans for EMIS which also specify operational costs, to incremental changes to their respective systems.

Such plans typically result from the recommendations produced by EMIS evaluations using one of the methodologies noted in this section. EMIS development plans will often articulate where the government envisions its EMIS to be in three-to-five years which is called the '**Target State**'. The **Target State** is a more developed EMIS which will address the shortcomings identified in the evaluation. The plan will then articulate a costed stepwise strategy for achieving the **Target State**.

Plans usually have the following elements:

a. A system development component to improve systems and push them towards the target state.

b. A capacity development component for both users of data and operators of the systems who may be one and the same.

c. An infrastructure component which specifies the hardware, facilities and Internet connectivity required.

d. Increments to operational budgets and other requirements (for example staff skills) which result from improvements to the systems.

[19] Abdul-Hamid, H. (2014). SABER EMIS Framework Paper, World Bank.

[20] UIS. (2018). The Investment Case for SDG 4 Data Concept Note Technical Cooperation Group on SDG 4–Education 2030 Indicators Dubai, United Arab Emirates, UNESCO Institute for Statistics (UIS).

Such plans help articulate the vision for EMIS, define the costs and identify the path towards the development of EMIS. EMIS strategic development and operational plans can help guide and steer partnerships, particularly where multiple partners and funding sources are evident.

Case Study: Fiji FEMIS/LANA – Example of a developed and effective integrated and decentralized EMIS

The Fiji Ministry of Education developed an integrated system of administration called the Fiji Education Management Information System (FEMIS). FEMIS enables evidence-based policy planning and resource allocation. FEMIS is a web-based application whereby data is almost exclusively managed through schools. FEMIS facilitates the collection and analysis of all routinely used data on the education system. FEMIS includes data on individual students from kindergarten through the basic education system and is being expanded to include higher education and TVET. Data on every student is available through the system including biodata, families, daily attendance, learning outcomes and school grades, subsidy programmes, such as transport allowances and emergency relief and disciplinary action.

The national formative standardized assessment for literacy and numeracy is undertaken on all students in years four, six and eight to the completion of basic education (changed in 2016 to years five and seven). The ministry's examination and assessment unit designs, manages and reports on Literacy And Numeracy Assessment (LANA) data annually. Reports are sent back via FEMIS directly to teachers and head teachers in the same year so that corrective action can be taken to improve learning outcomes. This rich source of data enables the monitoring and evaluation of each individual's student performance throughout their entire academic career.

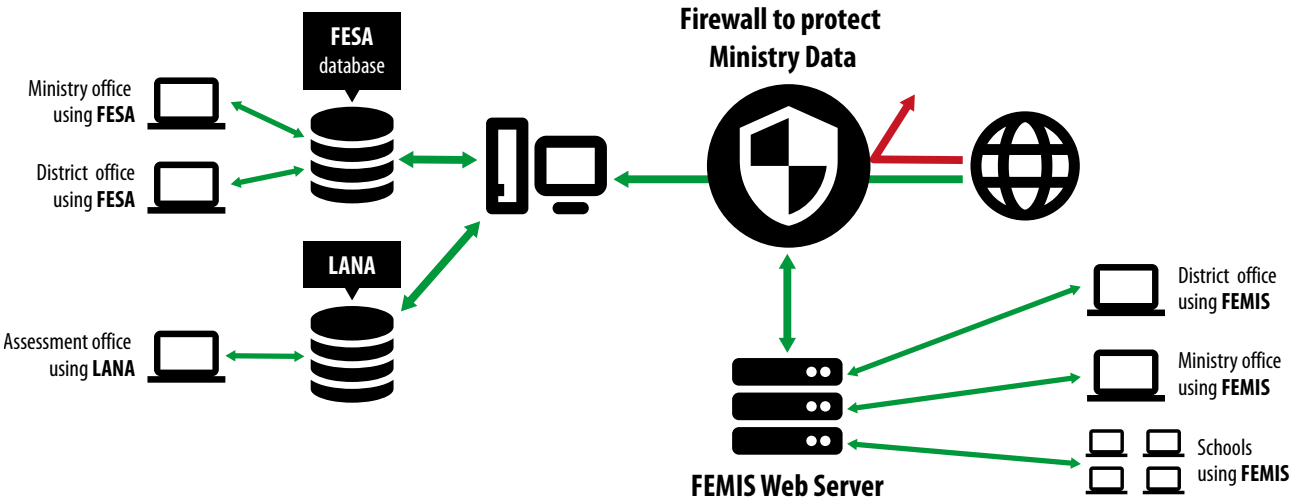
LANA analysis is used as a diagnostic tool to provide feedback to students, teachers and parents on student learning progress. Almost real time data provides planners and policy-makers with a large amount of data on which to evaluate the success, or failure of education policies. The system provides intervention (at individual, school and national levels) to improve students' learning in literacy and numeracy. For example, if support or subsidy is offered to particular students such as those from low-income houses, the immediate impact on attendance and learning outcomes can be assessed:

- To identify what students have learned;
- To identify students' strengths and weaknesses;
- To provide a way to measure a teacher and/or school's effectiveness;
- To lead to pedagogical improvement;

- To measure specific elements of learning;
- To identify academic weaknesses and strengths so that educators can define a pathway for improvement that takes many forms and requires an assortment of refined strategies and techniques.

The system is fully integrated and can correlate inputs such as financial contributions to individual students, teacher training and qualifications and facilities and supply of pedagogical materials with student attendance and learning outcomes. The system is presently being expanded to include the TVET and HE sub-sectors. Fiji FEMIS/LANA provides a good example of a comprehensive system that is able to track learners and their learning outcomes throughout their career.

Figure 9: High Level Conceptual Diagram of Fiji EMIS



Sources: DFAT. (2017). Analysis of Fiji Learning Literacy and Numeracy Assessment (LANA) results for AQEP-supported Schools 2012-2016, Department for Foreign Affairs and Trade (DFAT),; DFAT. (2017b). FEMIS Analysis of Attendance at Access to Quality Education Programme (AQEP) Supported Schools 2016, Department for Foreign Affairs and Trade (DFAT); World Bank. (2017). SABER Evaluation of Fiji.

3 Monitoring SDG 4 -Education 2030 with EMIS

The three main focus areas for the education sector under the SDGs are measurement of learning outcomes, improved measurement of equity in education and a focus on lifelong and alternative means of learning[21].

The explicit focus on equity in education implies that in addition to reporting national averages, the selected education indicators should also be reported across different sections of the population, such as wealth, religion, gender and ethnicity, among others.

Under an expanded vision of EMIS for lifelong learning, it is important that EMIS manages information on all sub-sectors of education, ranging from ECE, vocational education and NFE. This places an increasing requirement on EMIS to be able to track an individual's progress through the whole education system and emphasizes the need for systems to be able to report on data longitudinally. The resulting design of EMIS is likely to be more complex and more integrated in terms of sub-sector data.

There is also greater recognition that a complex interplay of socio-economic factors influences learning outcomes. This means EMIS must respond to information needs concerning the child and the environment. This means EMIS systems should 'talk' with other government administrative systems to ensure all aspects of child wellbeing are addressed.

These requirements are placing increasing demands on systems to track individual children as they progress through the education system. Systems should enable disaggregation of data to allow for analysis of complex socio-economic factors affecting a child's progress through the education system, or exclusion from it.

[21] Such as NFE and technical and vocational education.

3.1 SDG 4 Indicators obtainable from EMIS

As discussed, monitoring SDG4 needs various data sources including EMIS. EMIS plays a role in monitoring SDG4 at the country level as over 60 per cent of the thematic indicators need to be populated from EMIS. Table 3 provides the list of indicators that can be produced using administrative data sources.

Table 3: Indicators that can be calculated from administrative data sources

4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes		
Completion	4.1.3	Gross intake ratio to the last grade (primary, lower secondary).
Participation	4.1.5	Out-of-school rate (primary, lower secondary, upper secondary).
	4.1.6	Percentage of overage children (primary, lower secondary).
4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education		
Participation	4.2.2	Participation rate in early childhood care and education in a given period prior to entry into primary education.
	4.2.4	Gross early childhood education enrolment ratio in (a) pre-primary education; and (b) early childhood educational development.
4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university		
Participation	4.3.2	Gross enrolment ratio for tertiary education.
	4..3.3	Participation rate in technical-vocational education programmes (15- to 24-year-olds).
	4.3.1	The percentage of people in a given age-range participating in education and training in the last 12 months, by type of programme.
4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous people and children in vulnerable situations		
***Equity cross-target**	…	Parity indices (female/male, rural/ urban, bottom/top wealth quintile and others such as disability status and conflict-affected as data become available).
	…	Where possible, other indicators should be presented in relation to their distribution across the study population.

Policy	4.5.2	Percentage of students in primary education whose first or home language is the language of instruction.
	4.5.4	Education expenditure per student by level of education and source.
	4.5.5	Percentage of total aid to education allocated to low-income countries.
4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy		
Provision	4.6.3	Participation rate of youth/adults in literacy programmes.
4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development		
Knowledge	4.7.2	Percentage of schools that provide life skills-based HIV and sexuality education.
4.a Build and upgrade education facilities that are child, disability and gender-sensitive and provide safe, non-violent, inclusive and effective learning environments for all		
Resources	4.a.1	Percentage of schools with access to basic drinking water, basic sanitation facilities; and basic handwashing facilities.
	4.a.1	Percentage of schools with access to electricity, Internet access for pedagogical purposes and computers for pedagogical purposes.
	4.a.1	Percentage of schools with adapted infrastructure and materials for students with disabilities.
Environment	4.a.2	Percentage of students experiencing bullying, corporal punishment, harassment, violence, sexual discrimination and abuse.
	4.a.3	Number of attacks on students, personnel and institutions.
4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing states and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes in developed countries and other developing countries		
Number	4.b.2	Number of higher education scholarships awarded by beneficiary country.

4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states		
Qualified	4.c.3	Percentage of teachers qualified according to national standards by education level and type of institution.
	4.c.4	Pupil-qualified teacher ratio by education level.
Trained	4.c.1	Percentage of teachers in pre-primary, primary, lower secondary and upper secondary who have received at least the minimum organized and recognized teacher training pre-service and in-service required for teaching at the relevant level in a given country, by type of institution.
	4.c.2	Pupil-trained teacher ratio by education level.
Motivated	4.c.5	Average teacher salary relative to other professions requiring a comparable level of education qualification.
	4.c.6	Teacher attrition rate by education level.
Supported	4.c.7	Percentage of teachers who received in-service training in the last 12 months by type of training.

In most of the countries, all indicators stated in Table 3 can already be produced; for some countries, adjustments in their EMIS are needed. From the monitoring of the EFA indicators to the SDG 4 indicators, some new areas appeared such as teachers' motivation; the support they receive; the school environment and resources; and the language of instruction.

3.2 Critical issues of EMIS data production for SDG 4

Looking at the current situation of EMIS in countries, there are three issues related to EMIS that can be identified as critical for the production of data for monitoring SDG4.

I. **DATA UNAVAILABILITY:** Careful analysis of data availability for the various indicators of SDG4 has revealed most of the data is available to monitor access and participation, such as enrolment ratios, the out-of-school population, percentage of coverage etc. However, data for monitoring TVET, areas such as vocational education, NFE and ECE are missing. Appropriate strategies should be developed to strengthen the system to collect adequate data for TVET, ECE and NFE institutes.

II. **LACK OF DISAGGREGATION:** In many countries EMIS still does not collect data by all the disaggregation suggested by SDG4. A significant level of work is needed to make EMIS collect data at all the levels of disaggregation. Most countries collect

aggregated data from schools. In the process of aggregation, important data on ethnicity, disabilities, language, wealth and other data on characteristics of students and teachers tends to get lost. The school census questionnaire also does not capture a lot of important data on student and teacher characteristics.

III. **DATA INTEGRATION AND EXCHANGES:** Data sharing and integration has to promote the effective collection and processing of administrative data from different data sources. It is important to map out who are the main data providers for the different types of data. There is a lack of coordination among different data producers at the national level. There are also organizational, as well as technical issues in sharing and exchanging data among educational data producers.

3.3 Strengthening Non-formal education data systems to capture literacy and NFE data

SDG 4 is not only about formal education. It is also about creating educational opportunities through NFE to provide learning and training to children, youth and adults – opportunities they would otherwise not get.

NFE can be organized in the form of adult literacy programmes, second chance education programmes, or equivalency education programmes at different levels.

To produce indicators such as: i) The participation rate of youth/adults in literacy programmes; and ii) The percentage of people in a given age-range participating in education and training in the last 12 months, by type of programme, the data producers need data from NFE programmes.

In order to decide how NFE data will be part of EMIS, it is important for us to understand what policy makers would like to know about NFE.

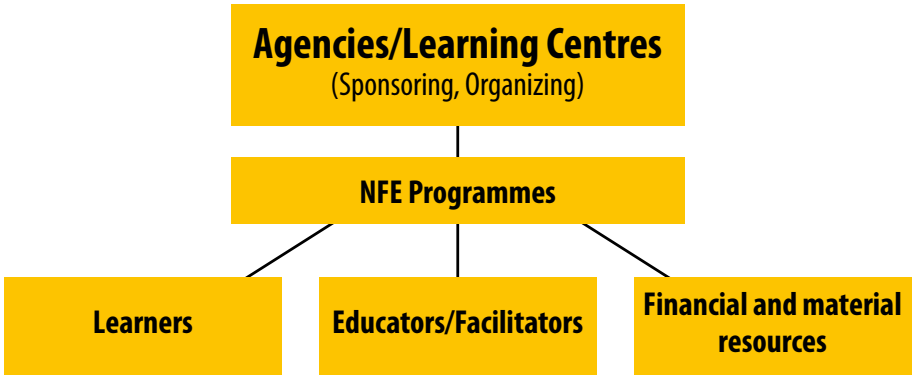
We generally encounter questions like the following, which policy makers would like to find the answers to:

- Who wants to learn? What do they want to learn?
- Where and how are NFE centres and programmes operational?
- Who sponsors them? How are resource inputs sourced?
- Does supply match demand?
- Who actually participates? In which NFE programmes?
- Who completed NFE programmes? Who didn't?
- What have they learned?
- What benefits have they derived?

We can see that these questions require thoughtful and therefore a systematic approach, especially when we consider that various agencies and private sector institutions, as well as NGOs, also provide NFE programmes in various areas and in consequence create data on their own.

The scope of monitoring NFE includes all intentional and organized learning activities (with clearly defined location, target population, teaching-learning contents and methods, schedule and duration) that take place beyond the regular formal educational programmes in schools, universities and other educational institutions.

Figure 10: Illustration of NFE data areas



Sources: DFAT. (2017). Analysis of Fiji Learning Literacy and Numeracy Assessment (LANA) results for AQEP-supported Schools 2012-2016, Department for Foreign Affairs and Trade (DFAT),; DFAT. (2017b). FEMIS Analysis of Attendance at Access to Quality Education Programme (AQEP) Supported Schools 2016, Department for Foreign Affairs and Trade (DFAT); World Bank. (2017). SABER Evaluation of Fiji.

Steps towards developing an information management system for NFE

The following are the steps involved in developing an information management system for monitoring NFE activities.

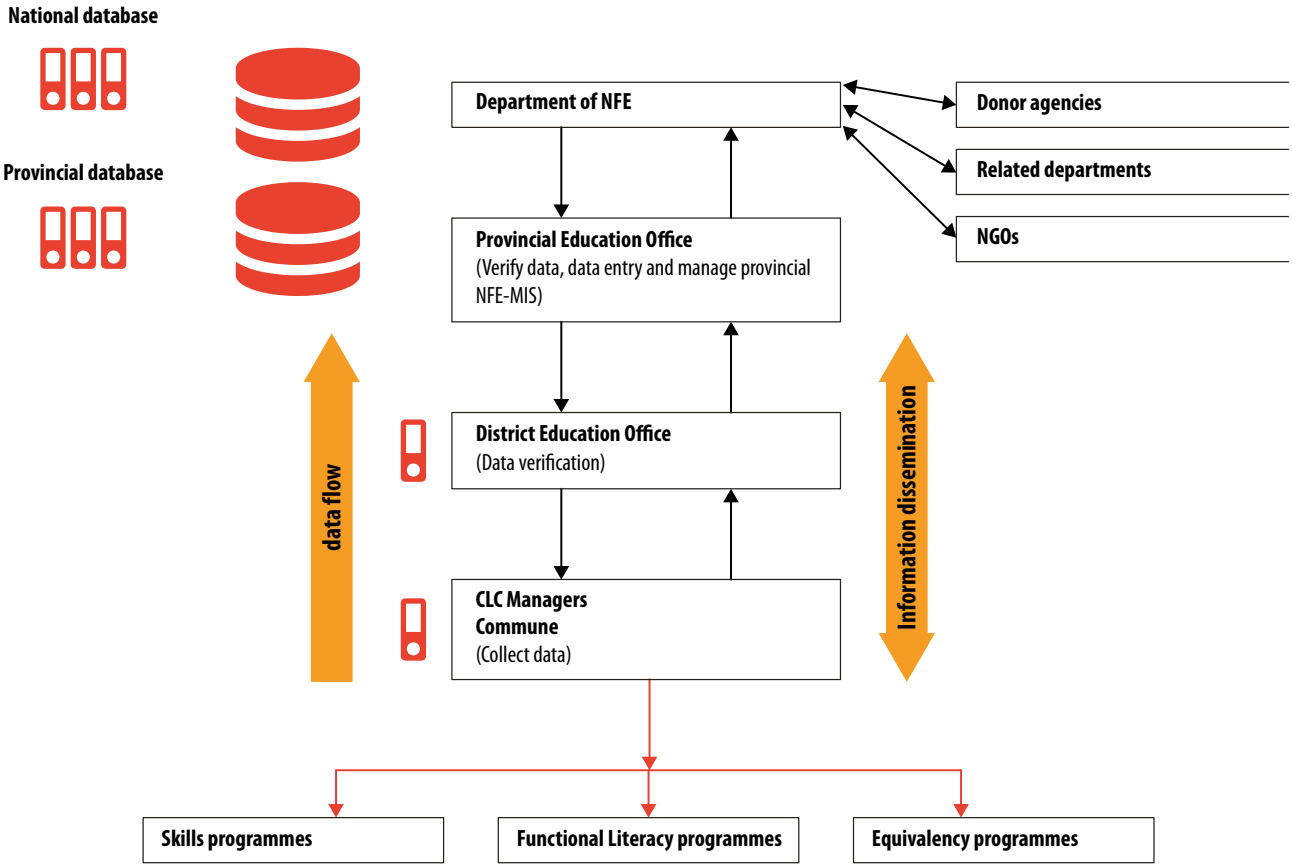
- **STEP 1:** Identify government ministries, departments, agencies, NGOs, communities and private bodies that support and/or organize NFE (Mapping study – Directory of NFE Programmes);
- **STEP 2:** Determine the coverage, scope and outputs of the NFE component of EMIS and development phases (Diagnostic study/report on NFE);
- **STEP 3:** Develop an appropriate model for the NFE component of EMIS (Pilot phase);
- **STEP 4:** Expansion of the suitable model;
- **STEP 5:** Continuously upgrading the NFE component of EMIS and operations to meet changing needs.

The following figure outlines the monitoring structure of NFE programmes in Cambodia.

We can see that data and information flows over local communal managers, to the district offices, where the NFE data is processed for verification and then handed to the provincial education offices where it is consolidated in provincial level databases.

The Department of NFE in Cambodia compiles the national database from provincial level data before reporting it to donors, education departments and NGOs where applicable.

Figure 11: NFE-MIS structure in Cambodia



Source: Author

For more information on developing an NFE-specific EMIS, see:

NFE-MIS Handbook: Developing a Sub National Non Formal Education Management Information system[22]

[22] NFE-MIS Handbook: Developing a Sub National Non Formal Education Management Information system, access: http://unesdoc.unesco.org/images/0014/001457/145791e.pdf

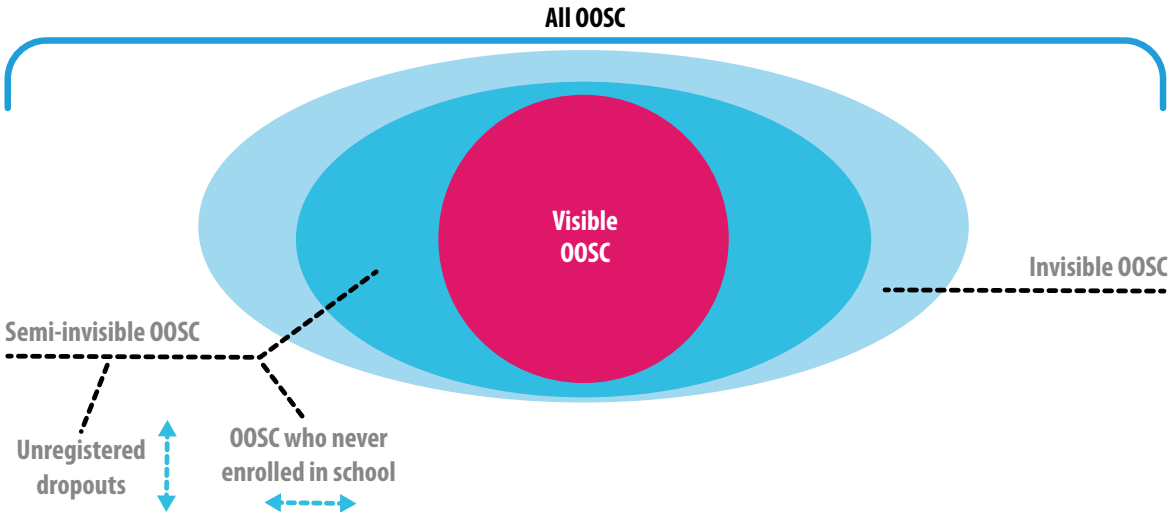
3.4 Capturing out-of-school children with EMIS

Out-of-school-children (OOSC) are those not enrolled in schools. They often belong to socially marginalized groups, such as ethnic minority groups, children excluded because of gender barriers and children living in extreme poverty. It is of critical importance to note that all of these children have the right to an education and they are currently being deprived of this fundamental right.

The main challenges to OOSC data availability

1. A lack of adequate tools and methodologies to identify OOSC in order to measure the scope and describe the complexity of exclusion and disparities and to assess the reasons for exclusion and to inform policy and planning . National governments may not cover all schools, such as private schools, that are not managed by the education ministry.
2. Many children are 'invisible' to administrative data systems, such as street children and migrant children. OOSC have three main levels of visibility (see figure below). These levels create methodological challenges for capturing OOSC. A range of data sources must be used, including administrative records, household surveys and other means such as surveys of street children.

Figure 12: Visible, semi-visible and invisible OOSC



Source: UNICEF and UIS. (2016.) Monitoring Education Participation, Framework for Monitoring Children and Adolescents who are Out-of -School or at Risk of Dropping Out, Volume 1, UNICEF and UIS.

Please note: The size of the ovals in this figure is for illustration purposes only and it does not represent the actual number of children in each group, in any particular country. In reality, the actual size of each area would vary from country-to-country.

Box 3: Types of out-of-school children

Visible OOSC: Visible OOSC are can be identified using the ministry of education database, or EMIS. Visible OOSC typically are school leavers (dropouts), as they have come into contact with the schooling system and are thus recorded. In the previous figure they are represented by the red oval.

Semi-invisible OOSC: These are OOSC who currently cannot be identified using EMIS but could be made visible through improved vertical or horizontal information flows. In the previous figure they are represented by the dark blue oval. They consist of the following two groups:

Unregistered dropouts: Children who dropped out but were never recorded as such in EMIS because schools, or educational institutions, did not record, or report the dropouts. These OOSC could be identified using improved vertical information flows from schools and educational institutions to the national level.

OOSC who never enrolled in school: Children who never enrolled but for whom information can be collected through national citizen registries. Records on children can be linked through a unique ID, such as a birth certificate number, to identify those who are not recorded in the ministry of education database but are recorded in other databases, such as civil or local registries, whether electronic or paper-based. Compulsory school-age children who are not enrolled in school, but exist in other databases or registers, may be out-of-school

Invisible OOSC: These are children who are not visible in any government administrative data, or records from schools, or education institutions. They are thus completely invisible in terms of their absence from electronic databases, or registers. They generally represent the most vulnerable and disadvantaged children. In the previous figure, above, they are represented by the light-blue oval.

Visible children at risk of dropping out: Children attending school but at risk of dropping out who are identified as such within schools and the data is also monitored at the national or sub-national levels.

Invisible children at risk of dropping out: Children attending school but at risk of dropping out who are either not identified as such within schools, or are identified but not included within school-level data monitored at national, or sub-national levels.

Strengthen EMIS to monitor OOSC

Administrative data, as in the case of EMIS data, has its limitations. Enrolment records include only those children in school; but not direct information on those out-of-school.

An EMIS can, however, provide an early warning system on children at risk of dropping out. The most effective means of ensuring OOSC are effectively tracked is through individual child tracking by means of a national identifier, or the citizen registry to populate the EMIS database with registered children who should be in school at a certain level, according to their age and time of enrolment.

In order to strengthen EMIS to monitor children at risk of dropping out, EMIS can build upon the following information:

3. Information on enrolment by single year of age.
4. Absenteeism data with distinction between excused and unexcused reasons for absenteeism.
5. Data on children who have never been to school.
6. Distinction between different reasons for the drop out.

For more information on statistical methods to capture the various types of OOSC, see:

Global Out-of-School Children Initiative – Operational Manual[23]

[23] Global Out-of-School Children Initiative – Operational Manual, access: https://unesdoc.unesco.org/ark:/48223/pf0000247531

Case Study: Case study: Including invisible children in Malaysia's Sabah region[24]

The issue of children without access to basic education is a major cause of concern in Malaysia. Displacement and the undocumented status of children are among the major barriers to securing access to quality education for many young children worldwide. In the context of Sabah, 'invisible children' are categorised as: (1) Stateless children; (2) Dependent children of foreign workers; (3) Children of foreigners staying illegally in Sabah; (4) Children born from mixed marriages; (5) Children born from traditional and not legally registered marriages; (6) Children born soon after marriage; (7) Children borne by single mothers; (8) Children from indigenous groups. Due to their absence, or omission from any official government databases, such as EMIS, these children officially do not exist; no provision is or could be made for their education, health, safety and welfare. With an indication of an estimated 50,000 children in Sabah being stateless and thus without access to health and education services, a study on the issues was commissioned on undocumented children living in Sabah.

The study referenced information on alternative means of access to education with a focus on children not enrolled in the formal education system, specifically those side-lined or excluded due to factors such as age, gender, ethnicity or geographical location. The study also focused on those children receiving an alternative curriculum which emphasizes more on non-traditional, or contextualized subjects either within, or in parallel with the formal education system for a specific duration with learners of different ages.

The Sabah study addressed the gap in data through conducting fieldwork in refugee, stateless and undocumented communities to obtain data in the absence of any concrete or official records on the children, parents and households in these 'invisible' enclaves. Data was procured from alternative learning centres sited in communities or plantations.

The study has helped inform the Malaysian government about the extent of invisible children throughout the Sabah region. The government has since taken concrete steps to ensure invisible children are identified and included in the national EMIS and that institutions practicing alternative forms of education are also monitored through EMIS.

Source: Taken from the Sabah OOSC study commissioned by UNICEF and the Government of Malaysia between 2016 and 2018.

[24] The Sabah Study into Out of School Children is unpublished owing to the sensitive nature of the material in the Malaysian national context. Findings from the study are noted in: UNESCO (2017) Situation Analysis of Out-of-School Children in Nine Southeast Asian Countries, United Nations Educational, Scientific and Cultural Organization (UNESCO)

3.5 Disability and EMIS

A lack of reliable data is consistently one of the major weaknesses in providing evidence to governments for the need to increase their educational provision for children with disabilities. The intent is to promote the participation of persons with disabilities in all aspects of life. Tracking persons with a disability nationally can help ensure these people have access to the assistance they need in all sectors, not just education. Measuring disability also entails understanding which institutions are disability-friendly; for what types of disability; and if staff have disability training.

Four main purposes can be attributed to tracking children with disability through an EMIS:

1. Provision of services for children with disabilities, including the development of programmes and policies for service provision and the evaluation of these programmes and services.
2. To monitor the level of functioning in the population.
3. To assess equalization of opportunities.
4. To track, help and address individual children with disabilities.

There are also some issues to consider when addressing disability with EMIS:

- **SKEWED RESULTS:** Measuring disability can vary between sources/methods and can produce skewed results[25][26]. The training of enumerators and the unwillingness of parents to admit to having a child with disabilities, due to social stigma, are important factors to overcome.
- **POCKETS OF CHILDREN WITH DISABILITIES:** It is important not to rely on national averages to portray the situation, as there may be geographical pockets of increased numbers of children with disabilities. This situation could include hearing problems caused by rubella outbreaks during pregnancy, or visual impairments due to a measles epidemic in areas where access to vaccinations is restricted.
- **OOSC CHILDREN WITH DISABILITIES:** Many children with disabilities may not be in school and are difficult to locate. These children pertain to the invisible population of OOSC.
- **INADEQUATE TOOLS:** Many school questionnaires do not ask adequate questions concerning children with disabilities, or about support facilities or teachers for children with disabilities. For example it is important to identify whether teacher support and facilities are available for children with disabilities attending school.

[25] Mont, Daniel. (2007). Measuring Disability Prevalence, World Bank, Washington DC.

[26] Singal, N. (2007). Conceptualising Disability and Education in the South: Challenges for research. RECOUP Working Paper 10, Research Consortium on Educational Outcomes and Poverty, University of Cambridge.

What Data on disability should an EMIS contain?

Successful implementation of Article 24 of the CRPD (Convention on the Rights of Persons with Disabilities) requires high-quality data which is useful for developing policies and then monitoring and evaluating their implementation. These data fall into several categories:

1. **IDENTIFICATION OF CHILDREN WITH DISABILITIES:** According to Article 1 of the CRPD, these include 'those who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.'
2. **PHYSICAL AND MATERIAL BARRIERS TO LEARNING:** These barriers include not only physical access to school buildings, but also the use of furniture, equipment, learning materials and communication support (e.g., Braille and audio books, etc.) for delivering information.
3. **HUMAN RESOURCES AND SERVICES:** These include the training of teachers, their access to support services to assist their teaching and support services designed to assist students. These services include speech, physical and occupational therapy, or the presence of classroom aids.
4. **MEASURES OF STUDENT SUCCESS:** These include standard educational outcome measures used in monitoring.

Classifying and tracking every child with a disability

UNICEF has developed a technical guide for the inclusion of disability in EMIS. The guide provides details on how to include questions on disability in EMIS, with example tables for data capture. It should be noted that the tables presented on the next page only allow for very limited analysis of disability data. In order to properly record children with disabilities, it is important to have:

a. Individual records of all children with a disability in the database so they can be properly identified, registered and tracked for services.

b. A proper and robust methodology for identifying and classifying children with disabilities. This can either be by registered physicians, or by using a robust methodology such as the Washington Methodology (For more information on integrating disability see Module 6)[27].

[27] Access: http://www.washingtongroup-disability.com/methodology-and-research/

Figure 13: Sample EMIS form for children with disabilities by grade level

Compared with children of the same age, how many children enrolled in school have difficulties in the following areas (a child can be counted in more than one area)?:

	Vision		Hearing		Gross Motor (e.g., walking or climbing steps)		Fine Motor (e.g., writing or fastening clothes)		Intellectual		Communication (understanding and being understood by others)		Behaviour and socialization	
	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty
Boys														
Girls														
TOTAL														

How many children enrolled in school have difficulties in the following number of areas, as recorded above?

	1 area	2 areas	3 areas	4 areas	5 areas	6 areas	All 7 areas	**TOTAL**
Boys								
Girls								
TOTAL								

Source: UNICEF. (2014). Education Management Information Systems and Children with Disabilities. Webinar 6 - Companion Technical Booklet, **access:** http://www.inclusive-education.org/sites/default/files/uploads/booklets/IE_Webinar_Booklet_6.pdf

For more information on generating data on disability, see:

UNICEF's Education Management Information Systems and Children with Disabilities[28]

UNESCAP and WHO Training manual on disability statistics[29]

[28] UNICEF. (2014). Education Management Information Systems and Children with Disabilities. Webinar 6 - Companion Technical Booklet, access: http://www.inclusive-education.org/sites/default/files/uploads/booklets/IE_Webinar_Booklet_6.pdf

[29] UN ESCAP. (2009). Training Manual on Disability Statistics. Access: https://www.unescap.org/resources/training-manual-disability-statistics

Remember!

Mainstreaming the topic of gender equality goes beyond just allowing both boys and girls access to school. Gender equality is as important a subject to learn as other more conventional disciplines such as history or geography.

Box 4: Gender parity in education

Gender parity is reached when there is equal representation and participation of both male and female learners in education. It is a useful indicator, but on its own does not measure gender equality. Gender parity can be calculated for any data or indicator. For example, the net enrolment rate can have gender parity calculated. A value of higher than one indicates more girls than boys, a figure of less than one indicates more boys than girls.

3.6 Gender and EMIS

An effective EMIS should be able to monitor gender issues equally well so it informs policy-making, planning and implementation of programmes aimed at the gender mainstreaming of education. All data produced through EMIS should be able to be gender disaggregated and should be reported as such.

EMIS should help promote gender equality by ensuring all data is gender disaggregated and analyses highlighted gender issues in which one gender may have improved access, performance, participation, or another quality over the other. This accounts for both genders and this ensures that female and male learners are treated equally, have equal access to learning opportunities and benefit from education equally.

GENDER-BASED STEREOTYPES: These are generalized traits and qualities attributed to specific ethnic, national, cultural, or racial groups that are then expected to exhibit these traits, regardless of their individual inclinations and qualities. Gender stereotypes are often mobilized to justify the exploitation, disadvantage and discrimination of specific groups such as women, minorities and people with disabilities.

- **GENDER-SENSITIVE:** Acknowledging that differences and inequalities between women and men require attention, a gender-sensitive policy incorporates and translates actions into programmes, strategies and activities in order to improve gender relations and reduce gender inequalities.
- **GENDER-RESPONSIVE:** This refers to articulate policies and initiatives that address the different needs, aspirations, capacities and contributions of women and men. This is the translation of awareness into change in perception and desired actions that ensure equality and equity, which is often achieved through gender mainstreaming. Gender-responsive policies respond to the needs, requests and requirements articulated by men and women for policies that benefit one, or both genders.

A proper understanding of the above concepts will help countries develop indicators to monitor gender mainstreaming according to the individual country contexts.

3.7 Good practices in data collection

Listed below are some issues which can help improve data collection. For further information, consider looking into the provided references on the source material.

1. The right education data: Data must have meaning to those at each level of government. If the right data is not captured, then EMIS may be neglected[30].
2. Data that would fill in gaps: In the USA, the Elementary and Secondary Education Act (ESEA) (1965 and again in 2002) legislation was reauthorized as the No Child Left Behind Act (NCLB). Both policies prioritize and incentivize – through funding – the utilization of data and integrated data systems. While ESEA was more compliance-focused, NCLB is part of a new wave of legislation that promotes the use of data in decision making and more innovative uses such as state longitudinal data systems, which track student data over time and into the workforce.
3. Data that would trigger decision making: Based on data from yearly school censuses, researchers found that classes taught by female teachers had one more girl for every 10 boys than the same classes taught by male teachers. This finding, in conjunction with evidence from other sources, could guide education policy formulation in Senegal with an eye to further promoting gender equality in the education system[31].
4. Data on 'ghost students': Another example is the issue of 'ghost students' which occurs in different contexts and leads to wastage in an education budget. The 'ghost student' problem is not unique to developing countries. In the U.S. state of Arizona, where education funding is allocated on a per student basis, it has been estimated that eliminating ghost students would save US$125 million per year in the state education budget[32].
5. Data on inequities: Data can highlight differences between specific groups and allow decision- makers to design policies that ensure equity (e.g., equitable division of resources, gender equity, etc.). The data collection tools should be developed to get disaggregated data as much as possible.

[30] Bernbaum, Marcia, and Kurt Moses. (2011). 'A Guide to Education Project Design, Evaluation, and Implementation Based on Experiences from EQUIP2 Projects in Malawi, Uganda, and Zambia.' USAID (EQUIP2) and FHI 360, Washington, DC.

[31] Makwati G., Audinos B., Lairez T. (2003). The role of Statistics in Improving the Quality of Basic Education in Sub-Saharan Africa, ADEA Biennial Meeting, Grande Baie, Mauritius.

[32] Butcher, Jonathan. 2012. 'Ghost Busters: How to Save $125 Million a Year in Arizona's Education Budget.' Policy Report 246 (May). Goldwater Institute, Phoenix, Arizona.

Box 5: Target 4.5 - Eliminate all discrimination in education

By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous people and children in vulnerable situations.

Indicator: Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous people and conflict-affected, as data becomes available) for all education indicators on this list that can be disaggregated.

This requires all other indicators relying on people – students and teachers – to be reported in a disaggregated format to identify disparities in access and participation. For many countries this has proven to be a challenge. One way to help address this is to employ granular systems which track individual teachers and students and provide background data related to outcome data on both.

For general and further information on making an EMIS more inclusive and equitable for lifelong learning, see:

Re-orienting Education Management Information Systems (EMIS) towards inclusive and equitable quality education and lifelong learning[33]

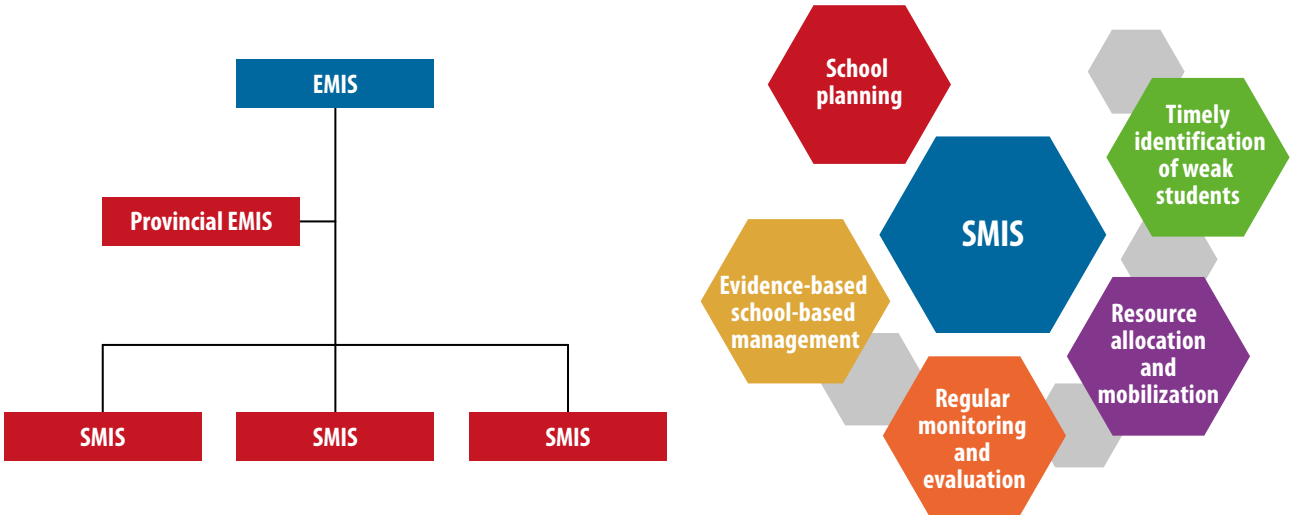
[33] Re-orienting Education Management Information Systems (EMIS) towards inclusive and equitable quality education and lifelong learning, access: https://millenniumedu.files.wordpress.com/2018/04/unesco-emis-policy-paper-2018.pdf

4 Strengthening EMIS for SDG 4 with School Management Information Systems

One trend in the development of EMIS in recent years has been the advent of Internet-deployed national institution systems such as a School Management Information System (SMIS) and university information systems and associated student tracking, or student information systems.

As much of the SDG 4-Education 2030 Agenda is concerned with tracking individuals – as in students and teachers – developing and integrating an SMIS as part of EMIS is indispensable. In fact, SMIS fulfils a dual purpose in Education, as illustrated in Figure 14. Therefore, the following chapter will introduce the management information system for schools.

Figure 14: Illustration of the dual purposes of an SMIS system



A strong and effective SMIS will help schools to collect and compile the required data for effective planning and management of the school.

Such a system allows schools to identify the issues and challenges affecting them; it helps

to design effective strategies regarding teaching learning design; it identifies students who need support to achieve the desired academic achievements; and it helps formulate strategies, together with parents and the community, to reduce the risk of children dropping out of school.

It is very important that an SMIS meets information needs at school and at the local level, so that the data/information produced is meaningful and useful to the school.

However, authorities at higher levels, such as at district, provincial and national levels also expect some data and information from schools for their district/provincial and national education monitoring. Therefore, the SMIS should also include the data and information required at the higher levels.

4.1 What is a School Management Information System?

SMIS is a management information system designed to match the structure, management task, instructional processes and special needs of the school[34]. Thus, SMIS will include data on schools, students and their background, teachers and their teaching subjects, attendance rate, participation, school resources, finance etc. An SMIS will almost always contain a **Student Information System** (SIS), too.

SIS is a student management system, school administration software, or a student administration system. It is a management information system for education establishments to manage student data. SIS provide capabilities for registering students in courses; documenting grading, transcripts, results of student tests and other assessment scores; building student schedules; tracking student attendance; and managing many other student-related data needs in school.

The primary objectives of an SMIS

a. Generate the required data and information for school planning and management.

b. Facilitate operation of the school by managing financial, student, teacher and other information.

c. Enable electronic storage and retrieval of school records.

[34] Telem, M. (1999). A case of the impact of school administration computerization on the department head's role. Journal of Research on Computing in Education, 31(4), 385-401. Access: https://outshinesolutions.com/development/school-management-software.html

4.1.1 Advantages of SMIS

When we look at the documented advantages of an SMIS, we can understand quickly why SMIS has gained much attention. This includes the following reasons:

- To manage a school or learning centre and to provide a better interaction between teachers, students and parents[35].
- To permit users access to relevant school information.
- To enable teachers to exchange their experiences in a systematic way, to work in teams and to determine the needs of students[36].
- To facilitate EMIS data being accessible to administrators and planners. This can be part of national and provincial EMIS data entered in SMIS. It can be made accessible automatically by a district/provincial SMIS and the central EMIS.
- To assist the producers of school statistical information to improve timeliness, accuracy and completeness of education information[37].
- To produce information for school leaders, managers and stakeholders to take necessary decisions about school improvement, school planning and improving teaching practices[38].
- To enable a country to undertake full tracking of individual pupils and ensure a national registry of each student's academic record and performance aligned with background data such as the student's biodata and socio-economic factors.
- To facilitate more effective operation of the school and reduce workloads[39].
- To enrich an ICT culture in schools, better accessibility to information and more efficient administration[40].
- To provide documented evidence that future school managers can use to continuously improve the management of the school.

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[35] Telem, M.; Buvitski, T. (1995).The potential impact of information technology on the high school principal: a preliminary exploration, Journal of Research on Computing in Education, 27 (3). 281-297.

[36] Gurr, D. (2000) How Information and Communication Technology is changing the Work of Principals. International Congress of School Effectiveness and Improvement, Hong Kong; Pegler, G. (1992). Perspectives for school information systems. Australian Journal of Educational Technology, 8(2), 161-171, access: http://www.ascilite.org.au/ajet/ajet8/pegler.html

[37] EU (2010) Supporting the Dialogue between the Users and Producers of Statistics with a special focus on social statistics in the Southern & Eastern Mediterranean Countries, European Union.

[38] Ibid.; Telem, M. (1991). A knowledge base for information technology in educational administration. Journal of Research on Computing in Education, 23 (4), 594-611.

[39] Condie, R., Munro, B., Seagraves, L., & Kenesson, S. (2007). The impact of ICT in schools – a landscape review. Coventry: Becta. Access: http://webarchive.nationalarchives.gov.uk/20101102103654/publications.becta.org.uk/download.cfm?resID=28221; Cunningham, M., Kerr, K., McEune, R., Smith, P., & Harris, S. (2004). Laptops for teachers: An evaluation of the first year of the initiative. ICT in Schools Research and Evaluation, 19. Coventry/London: Becta/DfES. Access: http://www.becta.org.uk/page_documents/research/lft_evaluation.pdf; Granville, S., Russell, K., & Bell, J. (2005). Evaluation of the Masterclass Initiative. Edinburgh: Scottish Executive. Access: http://www.scotland.gov.uk/Publications/2005/12/13133428/34291

[40] Zain, M. Z., Atan, H., & Idrus, R. M. (2004). The impact of information and communication technology (ICT) on the management practices of Malaysian Smart Schools. International Journal of Educational Development, 24 (2), 201–211.

4.1.2 Challenges of SMIS

Despite the advantages, like every system, there are challenges that need consideration. These include:

- Low capacity within national EMIS units to manage complex and large education data collections.
- Low capacity of schools to operate, or access SMIS when Internet connectivity is insufficient, requiring individual data to be collected through an annual school census[41].
- Ensuring protection of confidential information on individual students and teachers to prevent misuse of personal data.
- Aligning the systems with the needs of decision makers at the school level.
- Time constraints, higher administrative costs, negative acceptance/support from untrained staff, abuse of ICT facilities and problems related to the imposed rigid procedural requirements.

4.2 The process of SMIS

SMIS should be established through a participatory process to include stakeholders from all levels, including the parents and the local community so that the school management and teachers will take ownership of the system and use it properly[42].

The SMIS should be able respond to the data required for the school to make timely and effective decisions about school management. Therefore, data collection and recording in an effective SMIS would carefully look into the data requirements at the school and local levels. Such a decision on what needs to be collected and recorded can be made through thorough discussions with teachers, students and other stakeholders reviewing the national and provincial/district education policies, school policies and vision and decision-making processes at the school level.

The SMIS has to involve various school staff to systematically collect and record data and information about different aspects of the school's operations. They use specific, pre-designed school record forms and follow procedures that are defined by school regulations and requirements. Different staff can be responsible for different school records and procedures in recording, storing, updating and retrieving information.

[41] In this case, schools upload their SMIS data annually (two to three times a year as agreed). Once the SMIS data is uploaded, it becomes accessible to a district/provincial and central EMIS for compilation, processing and analysing district, provincial and national education statistics.

[42] Fulmer, C. (1995). Maximizing the potential of information technology for management: Strategies for interfacing the technical core of education. In B. Barta, M. Telem, and Y. Gev (Eds.), Information Technology in Educational Management (pp. 1–8). London: Chapman and Hall.

A good SMIS is characterized by organized classification and filing of the school records in a way that makes it easy to search, access, retrieve and use the recorded data and information[43]. Records about the same topic, or issue are grouped and arranged in a logical order, such as by alphabetical order, chronological order, or sorted by other criteria. For example, individual student records can be classified and filed by grade, class or subject. Teacher records can be sorted according to years of service and school facilities by type of facilities, etc.

Computers can help to manage school records by storing information in a way that allows for rapid sorting, searching and retrieval of data. Besides reducing the use and handling of papers, an additional advantage of a computerized system is that it can help to analyse the recorded data and quickly generate various summary statistics, performance indicators, tables and graphs and even detailed school management information such as lists of students and teachers who were absent on a specific day, or a list of equipment needing repair, etc. Computers can also be used to archive inactive school records in an electronic form such as on CD-ROMs, DVDs, Sold State Disks (SSDs), or other forms of backup media, for efficient storage and retrieval.

[43] Information and Records Management Society. (2012). Records Management Toolkit for School, access: http://www.thomasmills.suffolk.sch.uk/files/Retention%20of%20Records.pdf

4.3 What does SMIS collect and record?

Based on a review of school management practices in many countries, school data collection and recording can be focused on the following eight aspects[44] (Chifwepa, V,n.d.):

1. Students – Personal and family characteristics, previous educational experience, current grade, attendance, academic performance, behaviour, achievements/faults, outcomes (e.g. promotion to next grade, repeating grade, drop-out, transfer, or graduation).
2. Teachers – Personal characteristics, past education, qualification, pre-service and in-service teacher training received, years of service, employment status, subject specialization, class/subject taught, teaching load, special skills, attendance, performance, behaviour, achievements/faults.
3. Finance – School budget and income by source, expenditure by type, financial balance.
4. Physical facilities – Quantity and conditions of school buildings, classrooms, furniture, equipment and other physical facilities; maintenance, repairs and new construction; rate of utilization.
5. Teaching/learning materials – Quantity and conditions by type of material, new acquisitions, rate of utilization.
6. Learning achievement and outcomes – Results of tests, examinations and assessments (regarding academic, behavioural and other student attributes).
7. Extra-curricular and co-curricular activities – Type of activities, schedules, staff involved, number of participants, results, impact.
8. School and community interactions – School management board meetings, parent-teacher association activities, school-and-community activities.

Box 6: Creation of unique IDs to track students and teachers

Gender parity is reached when there is equal representation and participation of both male and female learners in education. It is a useful indicator, but on its own does not measure gender equality. Gender parity can be calculated for any data or indicator. For example, the net enrolment rate can have gender parity calculated. A value of higher than one indicates more girls than boys, a figure of less than one indicates more boys than girls.

[44] Chifwepa,V. neSiS module on Managing Records at School Level, access: http://www.adeanet.org/adeaPortal/adea/downloadcenter/neSiS/e-records-021065.pdf

Case Study: SMIS in Nepal using the Flash Report System

Under EMIS, Nepal has been using its flash report system to monitor and manage its school sector since 2004. The Flash Report System was designed specifically for 'just-on-time' delivery of tailor-made reports produced for planning at the local to central levels, resource management, support to schools, M&E and targeted priority users. The system serves three major functions: i) National policy formulation; ii) Performance review; and iii) Donors' investment decision-making. Subsequently, it has been facilitating targeted interventions, such as per capita funds, incentive grants and scholarships.

The system includes school records management and district data entry; Resource Centre (RC) data collection and local application; ministry national database management, early planning and resource management, monitoring and evaluation; and national and district policy analysis and reporting.

The system proved to be crucial for policy development and the management of resources. However, accuracy and reliability issues of the data were observed due to a lack of capacity at the school level to keep good records of all the information needed.

The Department of Education upgraded the Flash Reporting System to an electronic EMIS system by developing the individual school's EMIS (IEMIS). The IEMIS captures the original individual records of students, teachers, infrastructure, exams and other school activities to analyse the data immediately at the school-level and use the data for their own management, planning and resource generation. The outcome of the IEMIS in Nepal has been a culture of evidence-based decision-making at the school level.

Data collected in IEMIS

- Individual student's detailed records by age, sex, cast/ethnicity, grade, exam achievements etc. by tracking their history over the year;
- Individual teacher's records by age, sex, ethnicity, training, qualification, subject, grades, salary, subject teaching by grade and others by tracking their history over the year;
- Students learning achievements by tracking their history over the year;
- School facilities (building, WASH, library, playground, health etc.);
- Others (child clubs, audits – both financial and social, local contributions etc.);
- School Management Committee (SMC) and Parent Teachers Association (PTA) and their composition and functions.

The data reporting process

Each school applies a simple spreadsheet software and processes user-friendly summary tables and reports. Schools upload these spreadsheet-based reports into the web-portal, where they are reviewed at the local, provincial and central levels, as well as by other stakeholders who can further utilize the data (confidentiality protection applies). The data is obtained more efficiently, with greater reliability and timeliness compared to school questionnaire surveys

4.4 Tools to collect data for SMIS

Different types of tools should be developed and used for the SMIS. Such tools should be developed objectively and should respond to information needed for the school and authorities at the district, provincial and national levels.

For school managers, administrative staff and teachers to better plan, organize, conduct, monitor and evaluate their daily school activities, additional school records may be created and used such as detailed financial ledgers, records of presence of school staff, records of use of school facilities and teaching-learning materials, school meals and scholarships, etc.

Separate school records can be created and updated about extra-curricular and co-curricular activities organized, village education committee meetings, school management board meetings, PTA activities and other school-and-community activities, after each such activity has taken place. Those additional records that are found to be most useful can become regular components of the school's SMIS.

Based on good practices in school management and the need to monitor progress towards education progress, the following tools can help capture and manage data in SMIS:

1. Student's record card.
2. Class attendance sheet.
3. Textbook record sheet.
4. Student's performance summary.
5. Teacher's record.
6. Teacher's performance evaluation report.
7. Inventory of physical facilities.
8. Inventory of furniture/equipment.
9. Inventory of teaching/learning resource materials.
10. Financial summary.

4.4.1 Types of school records, tools and reports

The SMIS can include four major forms to generate information at the school level:

1. **Records of individual persons** (e.g. students, teachers or school staff), or of physical items (e.g. classrooms, furniture, equipment, teaching/learning materials, ledger of financial transactions).
2. **Summary lists** (e.g. of students, teachers, equipment).
3. **Tally sheets** to count the number of persons, school facilities or occurrences.
4. **Summary tables**.

Table 4 on the next page describes the examples of different types of school records, together with their purpose, contents and presentation, use and storage and access to information. The example forms are provided and can be adapted to suit the needs of individual countries and school systems.

Table 4: Examples of school records

Tools	Purpose	Contents and presentation	Use of the tool
Student Record Card	To record and manage information about individual students, including personal and family details. To track and manage the students, to help teachers manage their classes and to identify students who need counselling, or extra teaching.	Information on the personal and family characteristics of each student. Additional information about individual students' academic performance, examination results, participation in school activities, behaviour etc. School meals, scholarship, free uniform, transportation, boarding and/or other incentives.	Each record is used for one school year at the time of new enrolment and continues to be updated during the school year when there are changes. If a student transfers, or drops out, other information should be recorded properly.
Class attendance sheet	To record the presence and absence of individual students. To monitor the regularity and patterns of students attending class and to generate lists of students with frequent absence from class so that action can be taken by the school and teachers.	A daily, or monthly class attendance sheet contains essentially a list of names of students enrolled in a specific class, together with corresponding cells for each day of the month to record the presence and absence of individual students.	Teachers use these sheets to record the presence, or absence of each student on each school day. School managers are responsible for defining the methods and the rules for recording class. Class teachers and school managers use the completed class attendance sheets to count the number of days each student was absent and to calculate average student attendance rates.
Textbook record sheet	To monitor whether all the students in a class have all the textbooks required for all subjects.	Lists the names of all the students in each class in a school and records the number of copies each student possesses of textbooks required for each subject.	Teachers use these sheets to verify and record, in each class, whether every student has the textbook(s) required for the respective grade and subject. Teachers can then determine reasons why and help these students to acquire the missing textbook(s). Data should be updated during each school term to monitor any loss or damage to textbooks.

Student performance summary	Monitors the academic and behavioural performance of students.	Records the scores obtained by individual students in a class in different subject examinations, or assessments. This summary may also include the observations teachers make about each individual student's behaviour.	The teacher who is in charge of each class creates a student performance summary by recording each student's score by subject for each term/year. Both class and subject teachers use such student performance summaries to monitor and compare their students' performance, and to identify students with learning problems who need remedial support.
Teacher record card	To record each teacher's personal, educational and employment characteristics and information about the teacher's role and responsibilities at the school.	Includes information about the personal and academic details of teachers in a school and particulars about their previous work experience and current responsibilities, pre-service and in-service teacher training.	Teacher records are created when a new teacher joins a school. They are used by school managers and education administrators at district/provincial levels and/or the MoE to manage the assignments, working conditions, transfers, promotions, in-service training, discipline etc.
Teacher performance evaluation report	To improve teaching and learning at a school. A teacher performance evaluation can be organized on a periodic basis for each teacher, and the results can be summarised in individual reports.	A teacher performance evaluation report presents the results of an evaluation of a teacher's aptitude and actions in various aspects of teaching and learning activities such as using teaching learning techniques, communicating with students and other stakeholders, implementing school and national policies etc.	Each teacher's performance should be evaluated at least once a year, towards the end of the school year. The evaluator(s) score each teacher's performance according to each attribute and then record the scores in an evaluation report. However, such scores should be provided in consultation with individual teachers. The reports should be stored for use in managing the employment and career development of the teacher.

Inventories of school facilities	To record the number of buildings, classrooms, furniture, equipment and other physical facilities. To monitor and assess the conditions of facilities to determine maintenance work, repairs, replacements and new construction/ acquisitions.	Contains summary tables of the quantity of different school facilities and information about their condition and use. Additional data about the materials used for the building, roof and/or floor, lighting, ventilation and noise level may be recorded.	Inventories of school facilities should be created when the school first opens and be updated whenever changes occur such as new construction, or acquisitions, damages or destruction by the staff responsible. Before the start of each school year, the school management must update these inventories.
Inventory of teaching/ learning materials	Enable the school to ensure that all students have the necessary learning materials including textbooks and to replenish teaching/ learning materials that are, or will be, in short supply.	It consists of summary tables of the quantity of various materials available at the school, such as teaching aids, textbooks, supplementary reading and learning materials and sports, music, arts, etc. Additional information about new acquisitions, distribution to students and frequency of use, damage and disposal can be included.	During the school year, these inventories are continuously updated based on new acquisitions, distributions, damage and disposal. The school management uses the inventory to monitor the quantity, distribution and/or use of various teaching and learning materials so as to identify shortages and gaps
Financial summary	To produce monthly, term and yearly financial summaries of school income and expenditure to report information about a school's financial position to higher levels of the education administration, funding agencies, local government and community stakeholders.	Information about the flow of a school's financial resources, both into the school (income or revenue) and out of the school (expenditure). One side of such financial summaries shows the school's revenue, categorized by source of funding. The other side records the school's expenditure by type.	The responsible officer should prepare financial summaries on a monthly, term and/or yearly basis, using the detailed data recorded in the school ledger. The school manager and the school management board use the financial summaries to monitor, verify and control the financial position of the school. The summaries may also be incorporated into school reports to inform local stakeholders about the school's financial position.

Source: UNESCO Bangkok. (2011). Systematic Monitoring of Education for All, Training Modules for Asia Pacific. Access: http://uis.unesco.org/sites/default/files/documents/systematic-monitoring-of-education-for-all-training-modules-for-asia-pacific-en.pdf

5 Data innovation and EMIS

Rounding up this module on EMIS, the final chapter looks at some of the current data trends. The introduction of the trends is by no means considered essential for establishing a good and functioning EMIS. However, these are topics that should be on every one's radar as the future will likely see innovative developments that might influence how we monitor education.

5.1 The data revolution

The data revolution refers to 'an explosion in the volume of data, the speed with which data is/are produced, the number of producers of data, the dissemination of data and the range of things on which there is data, coming from new technologies such as mobile phones and the Internet of Things, and from other sources, such as qualitative data, citizen-generated data and perceptions data[45].' The data revolution includes the following innovations:

- **The integration of new data with traditional data** to produce high-quality information that is more detailed, timely and relevant for many purposes and users, especially to foster and monitor sustainable development[46].
- **Data collection during service delivery** which allows for a link to be created between the provision of services and the collection and procession of data for decision making[47]. For example, education service providers can actively record data about student and teacher attendance through smartphones, thus providing opportunities to follow up more easily with the students who drop-out and target interventions to reduce drop-out rates[48].

[45] UN. (2014). Report on data gaps A world that counts: mobilising the data revolution for sustainable development, The United Nations Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development, access: http://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf

[46] Ibid.

[47] Sachs, J. (2015). Data for Development, access: https://www.project-syndicate.org/commentary/sustainable-development-data-by-jeffrey-d-sachs-2015-05?barrier=accesspaylog

[48] Ibid.

- **Data which tracks a child's detailed learning outcomes**. If sufficient information can be gathered and analysed concerning pedagogical methods and learning outcomes, then links to student outcomes can be established and better understood[49].
- **Citizen-sourced data**. Mobile phones can be used to collect administrative data by adding citizen-sourced data, for example, the use of citizen-sourced data to measure the quality of public services[50].
- **Data on individual learners**. The administrative data has to move from school-level data to include records on individual learners. This will facilitate better data-driven decision-making and research and better understanding of each child's learning needs. Ultimately, teachers will be in a better position to understand and help individual children to learn and progress. There is also potentially a need to support governments and ministries in integrating varied data sets such as costs, exams and assessments, poverty and qualifications to produce a comprehensive picture of school performance[51].

These innovations can help increase the usefulness of data and help make it more useful, open and transparent for education policy and planning.

The data revolution raises two major concerns:

- **PRIVACY RIGHTS OF THE INDIVIDUAL**. There is the need to safeguard fundamental rights such as those of minorities and the privacy of individuals. This is especially important as increasing amounts of data are passively collected from people's 'digital footprints', or from sensor-enabled algorithms. As more of such data becomes available, the risk of such data being misused also increases, with people being susceptible to being harmed in both material and non-material ways[52].
- **TOO MUCH INFORMATION**. More information is not always beneficial. Information overload is a concern for many organizations and has been for some time and this is increasingly exacerbated by the rapid advances made in information and communication technology[53]. For example, the amount of data being collected about learners is growing significantly, especially as student

[49] Hudson, P., English, L., Dawes, L., King, D., & Baker, S. (2015). Exploring Links between Pedagogical Knowledge Practices and Student Outcomes in STEM Education for Primary Schools. Australian Journal of Teacher Education, 40(6). Retrieved from: http://ro.ecu.edu.au/ajte/vol40/iss6/8

[50] Ethan M, Ash H., Gretchen R. (2010). Unpacking Twaweza's Theory of Social Change: Citizen Agency, Information, Accountability, and Basic Services (2010). Twaweza Initiative. 1, Retrieved from: https://scholarworks.umass.edu/cie_twaweza/1

[51] Crouch L., DeStefano J. (2017). Doing Reform Differently: Combining Rigor and Practicality in Implementation and Evaluation of System Reforms, RTI International, Working Paper, February 2017, No. 2017-01.

[52] UN. (2014). Report on data gaps A world that counts: mobilising the data revolution for sustainable development, The United Nations Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development, access: http://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf

[53] Ibid.

work moves into digital mediums where everything from examination scores are recorded, to individual keystrokes, response times, changed answers, pages read and information about a myriad of other inputs. In many countries, the challenge today is coming to a clear understanding about **what data is worth tracking and tabulating and how this data will complement other information in a meaningful data set.**

5.1.1 Why is EMIS data sensitive?

A central challenge facing the international effort to re-orient EMIS to SDG 4 relates to privacy concerns. While large, long and interconnected data sets are excellent for educational research, questions regarding; **who owns this information** are endless. Countries have started building regulatory frameworks that seek to safeguard sensitive digital information about individuals.

This work is unfolding with increased urgency as data sets grow deeper and wider and breaches of this information become routine. Hackers have proven capable of gaining access to highly confidential information as was illustrated in 2017 when the national identification numbers, birth dates and home addresses of up to 143 million people were stolen from Equifax, a data analytics and technology company that serves as a clearing house for credit history.

Educational data is especially sensitive because it can be used to influence hiring decisions and may have repercussions in other social realms. As an example, knowledge that a particular person failed a third grade mathematics class might look insignificant at first glance, but if, say, big data analytics powered by artificial intelligence show that problems in early-grade maths strongly correlate with poor professional performance and perhaps even increased instances of divorce, or substance abuse, this information, if widely known or accessible, could be highly damaging.

Box 7: Data Privacy Concerns shutting down data collection

Gender parity is reached when there is equal representation and participation of both male and female learners in education. It is a useful indicator, but on its own does not measure gender equality. Gender parity can be calculated for any data or indicator. For example, the net enrolment rate can have gender parity calculated. A value of higher than one indicates more girls than boys, a figure of less than one indicates more boys than girls.

EMIS data involves our children and thus the stakes are high and thus regulations to protect privacy are important. For example, in Europe the General Data Protection Regulation (GDPR) has enforced data privacy laws when enforcement began in May 2018. Although GDPR is not unique to education, it is expected to cover the collection and use of EMIS data. GDPR requires, among other stipulations:

- Consent of subjects for data processing, anonymization of collected data, public notifications of data breaches, and safe handling of data transfer across borders.

Creating Privacy Regulatory Frameworks

Some countries have seen the rise of principles and regulatory frameworks to guide privacy concerns connected to the collection and use of educational data.

Countries will need to carefully consider the privacy implications as they move to align EMIS with SDG 4. SDG 4 itself says nothing about data protection as it relates to education. Solutions are not just regulatory but extend to technology itself.

Block-chain solutions are often cited as a possible technological 'fix' for privacy and security concerns surrounding learning credentials and other educational records[54]. This technology, because of the immutability of entries and absence of a centralized information warehouse, carries a potential to put individuals in greater control of their educational data.

Box 8: Data Privacy through regulation and assistance

The United States Department of Education established a Privacy Technical Assistance Center (PTAC) which aims to function as a one-stop resource for education stakeholders to learn about data privacy, confidentiality, legal issues and security practices related to student-level longitudinal data systems and other uses of student data.

PTAC resources are tailored to help educational institutions ensure compliance with the Family Educational Rights and Privacy Act, a federal law that protects the privacy of student education records. The private sector, sensitive to legal and societal considerations surrounding the protection of children, has also created various guidelines, frameworks and protocols. The most visible of these is probably the Student Privacy Pledge which has been signed by over 300 companies including international corporations such as Google and Facebook.

[54] Keevy, J. and Chakroun, B. (2018). Digitisation of Credentials: Implications for the Recognition of Learning. Manuscript in preparation.

5.2 Big data

New technologies allow schools, colleges and universities to analyse absolutely everything that happens. From student behaviour, testing results, career development of students, to educational needs based on societal demands.

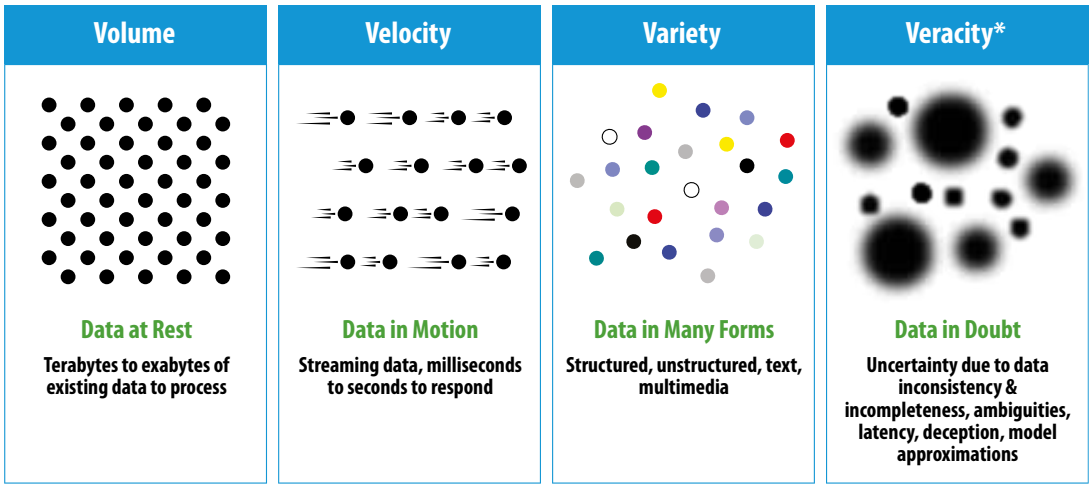
As discussed already, these types of data are collected through EMIS. However, big data allows for innovative ways of using data in the educational field that will revolutionize the way students learn and teachers teach.

What is big data?

BIG DATA REFERS TO EXTREMELY LARGE DATA SETS THAT DEFY TRADITIONAL DATA-PROCESSING APPLICATIONS. But what exactly are 'extremely large' or 'traditional data-processing applications'? Big data is often defined in terms of volume, velocity, and variety[55]. In the education context, this refers to the 'numbers of student observations, the frequency of observations and the number of types of observations, respectively[56].'

The following figure illustrates the four dimensions of big data.

Figure 15: The Four Dimensions of Big Data



Source: Lukoianova, L. and Ruben, V. (2013). Veracity Roadmap: Is Big Data Objective, Truthful and Credible? Access: https://www.researchgate.net/publication/260178341_Veracity_Roadmap_Is_Big_Data_Objective_Truthful_and_Credible

In the educational context, big data is to do with administrative data and teaching learning related data. Learning process data are 'big' data because they are:

[55] Laney, D. (2001). 3D Data Management: Controlling Data Volume, Velocity, and Variety. Stamford, CT: META Group.

[56] Ho, A. (2017). Advancing Educational Research and Student Privacy in the 'Big Data' Era. Washington, DC: National Academy of Education

- **TALL:** Include many participants;
- **WIDE:** Include a large number of variables about any one individual;
- **FINE:** Include multiple fine-grained observations taken across small-time intervals;
- **DEEP:** Theoretically coded in a meaningful way.

For example, data related to a learning process relates to data collected in online assessments and courses (for example, Mass Open Online Courses (MOOCs)).

The benefits of big data for educational research often arises when data sets are combined and merged. For example, learning outcomes data combined with administrative data, such as demographics and test scores, can provide insights into how to address educational inequities in faster feedback cycles[57].

Advantages of big data in education

If anything, big data should improve student results. Currently, the answers to assignments and exams are the only measurements on the performance of students.

- Many schools, especially in developed countries, are using learning software that generate data with which it is possible to mine and find evidence of how well students are learning.
- Large data sets, including information related to attendance patterns and academic performance of students, are also analysed to predict which students may be expected to drop out of school or become disengaged otherwise.
- It is possible to monitor every action of the students, such as, how long they take to answer a question; which sources they use; which questions they skipped; what the relation is to other questions answered; which tips work best for which student, etc. Answers to most questions can be checked instantly and automatically to give instant feedback to students.

Appropriate interventions are then designed and implemented to improve student results and perhaps reduce drop-out rates. Big data can give insights in to how each student learns at an individualized level – as each student learns differently and the way a student learns affects her/his test scores.

For more information, see:

School Management Information Systems: Challenges to Educational Decision Making in the Big Data Era[58]

[57] Perry, J. & Klopfer, E. (2014). UbiqBio: Adoptions and Outcomes of Mobile Biology Games in the Ecology of School. Computers in the Schools, Vol. 31, pp. 43-64.

[58] School Management Information Systems: Challenges to Educational Decision Making in the Big Data Era, access: https://www.academia.edu/38700223/school_management_information_systems_challenges_to_educational_decision-_making_in_the_big_data_era

5.3 Changes in technology and adapting EMIS

Changes in technology have enabled cost affordable opportunities to deploy EMIS and ensure it is accessible to a wider audience. These include the deployment of EMIS via the Internet and access to stakeholders at the school level, such as teachers and even students, via mobile devices is now feasible and cost-effective in many countries.

Accessing EMIS via mobile devices

The proliferation of mobile devices, combined with exponential uptake of highspeed internet, offers new and affordable possibilities for deployment of EMIS systems, as well as enabling a broader audience to access and engage with EMIS systems directly.

By enabling access to EMIS functions through mobile devices via the Internet, a much wider audience can be reached cost-effectively. However, there are also limitations which must be acknowledged and these include limited screen sizes and data entry facilities such as a keyboard, as well as the high cost of mobile Internet in some countries.

- An example of this approach is in Punjab India where teachers are required to log their attendance via mobile devices which also records their coordinates at the time of logging attendance. This has significantly helped to reduce teacher absenteeism[59].

[59] This fact was reported in interviews with the Punjab Ministry of Education, Director Planning in 2014.

6 Annex

EMIS experiences in selected countries

The experiences of developing and using EMIS in selected countries is diverse. The following annex captures the experiences of each country selected for this study. The specific focus of each example is derived from the country presentations conducted at the UNESCO/GPE conference conducted in April 2018.

CAMBODIA

The Ministry of Education, Youth, and Sport (MoEYS) launched EMIS in 1995. The system was initially piloted in 10 provinces and in 1996 it was rolled out to all 24 provinces. Since then, the EMIS Office under the Department of Planning has benefited from substantial international technical support. The responsibility of the EMIS office is to provide comprehensive data to technical departments within MoEYS and other related ministries to inform the development of the education sector. In recent years, MoEYS has undertaken substantial efforts to reform and improve its EMIS, particularly moving towards decentralized planning.

At present, MoEYS and the Ministry of Labour (MoL) (for TVET) oversees a large number of disparate information and data systems which together provide information on the education system throughout Cambodia. The systems are collectively referred to as Cambodia's Education Management Information System. However, they are not formally recognised as a coherent system.

The Department of EMIS located in MoEYS has received support from UNICEF, the Asian Development Bank (ADB) and more recently, from the education Capacity Development Partnership Fund (CDPF) funded by the Swedish International Development Cooperation Agency (SIDA) and the EU. EMIS was verified twice in 2006 by international consultants and in 2007 by an expert from the National University of Educational Planning and Administration, India. Over the past 16 years, data has been collected regularly and education statistics and indicators published annually for use in education sector performance reviews. In 2014, the EMIS unit was upgraded from a unit to a department and is now formally known as the Department of EMIS (DEMIS). EMIS development is guided by the five-year National EMIS Strategic and Development Plan which was first approved in 2014 for 2014-2018 and has recently been updated for the years 2017 to 2021.

MoEYS, with support from UNICEF, is working to develop the capacity of the Department of EMIS under the Directorate General for Planning and Policy within MoEYS, at national and sub-national levels for the management, use and development of EMIS. The project

focuses on developing a system to collect data regarding children's enrolment and learning outcomes in education institutions under relevant line ministries.

The project also includes:

- Implementation of a medium-term operational plan for the development of EMIS;
- Expansion of the newly integrated web-based system to include school-level indicators, as well as other cross-cutting education indicators;
- Training so EMIS staff can develop the capacity of MoEYS officials at sub-national levels.

Cambodia hopes that as its systems mature further, the country should move away from the collection of aggregate data on facilities, students and teachers and migrate to data on individual persons and facilities through systems such as Human Resource Management Information Systems (HRMIS), Student Tracking Systems and School Information Systems (SIS). Cambodia hopes that such developments will ensure that more accurate and timely data is available at all levels of the education system.

MALDIVES

MEMIS was launched nationally on July 16, 2017 by CSF with support from UNICEF under the Open EMIS initiative. MEMIS was initiated in response to the changing context and needs of the education system in the Maldives and as a means of achieving better education outcomes by taking advantage of the latest information technology. With the aim of supporting and optimizing the implementation of Open EMIS, as well as full capacity transfer, CSF has been working with the MoE of Maldives since project inception and collaborating with local education professionals, including principals, teachers, and administrative staff. Partner support of EMIS in the Maldives has focused on the building of a robust and reliable MEMIS and the strengthening of national capacities in the provision of reliable information for the planning, monitoring and evaluation of education systems.

MEMIS has developed modules for:

- Data capture on institutions, students, staff;
- Computation of standards-based education indicators in compliance with internationally recommended methodology;
- Consolidated data warehouse of all education data in the country;
- Advanced methods for data reporting, data visualization and dissemination to all stakeholders, including ministry planners, principals, teachers, parents and students.

MEMIS integrates these features into national MoE's management processes to ensure that education data are put to appropriate use in decision support at all levels of the education system.

The Maldives developed its EMIS using Open EMIS, because it's potential of being an open software and the possibility to customize modules to meet specific needs.

Challenges in developing EMIS include the training of local EMIS administrators, limited Internet for data collection purposes, lack of national capacity in computer programming/coding and dependency towards the Community Systems Foundation (CSF) in managing Open EMIS, particularly for software development and configuration.

Good practices that were identified throughout the process include:

- Implementation of EMIS should be an iterative process (piloted in 20 schools);
- Creation of a technical team on EMIS within MoE and 40 units at the school level;
- Capacity development activities and training – several training opportunities offered at national and school levels;
- Introduction of a mobile application Open EMIS Classroom to allow teachers to collect data at the classroom level from their smartphones, addressing the issue of the lack of Internet on remote islands.

Moving forward, the Maldives will seek to raise MoE capacity in computer programming in order to overcome dependency from international technical agencies.

In addition, the Maldives will be extending the use of MEMIS data beyond education management and administration into: (i) Education planning and policy formulation; (ii) Monitoring and evaluation; and (iii) Integrating MEMIS with other government information systems.

The development of EMIS contributed to strengthening the Maldives' education system and it has significantly improved learning achievement in the tenth grade (five or more 'O' Level examination passes) by 28 per cent in four years.

The presentation also touched on the importance of using data for management/leadership and cited an example of which a 30 per cent reduction in school absenteeism was witnessed within the first month of EMIS implementation.

MYANMAR

The Government of Myanmar considers EMIS reinforcement as a critical reform requirement for its education sector. Myanmar intends to use EMIS data to improve: (a) Access and quality of education services; (b) Efficiency of resource management in educational institutions; and (c) ICT planning and the professional competencies of education administrators. To ensure the attainment of these objectives, the ministry has developed a Five-year EMIS Strategic Plan and has solicited the technical support of UNESCO through a partnership with UNESCO's Capacity Development for Education Programme (CapED). CapED-UNESCO's implementation strategy emphasizes the following elements:

- Building competencies of MoE staff;
- Improving access to education data through a unified education portal;
- Improving data quality;
- Enforcing data-driven school planning.

In September 2015, MOE established the EMIS Implementation Unit (EIU). This compromised of members from the Union Minister's Office and the Department of Human Resources and Educational Planning (DHREP) and it was supported by focal points from all eight MoE departments – to manage the development and day-to-day operations of Myanmar's EMIS, with support from UNESCO's technical experts.

The unified EMIS software system will house all education data from different sectors within the education system, containing data as granular as well as individual school data, as well as data from TVET institutions and NFE platforms. Myanmar's EMIS Strategic Plan can be considered a promising framework since it is holistic and systemic. CapED-UNESCO and Myanmar's MoE shall be addressing not only the technological aspects of EMIS, but also the material, financial, human and institutional aspects of the system.

The web-based EMIS system consists of five 'software program modules':

- Basic education (BE), which is currently in the field-testing stage;
- Human resources (HR), which is currently in the field-testing stage;
- Higher education/TVET module (HE/TVET), which is under the development stage by a local software company;
- NFE module, which is under the development stage by a local software company;
- Financial Asset Procurement module (FAP), which is under the development stage by a local software company.

Since the formation of the EIU, MoE and UNESCO have been working closely through discussions, capacity building workshops and on-the-job training to enhance the knowledge base of EIU members in preparation for the roll-out of the National EMIS Programme. Myanmar has faced some challenges in piloting the web-based EMIS system, particularly challenges in achieving:

- Adequate Internet access and speed (although an off-line version has been developed to help those in townships);
- Sufficient computer and human resources;
- Strong data checking and verification processes;
- Proper communication strategy for EMIS and coordination among all stakeholders.

In terms of implementation, Myanmar has identified the key challenges that they are likely to experience and ways to mitigate the challenges, including:

- Regular update of all information and data;
- Technical capacity to be built for the long run sustainability of web-based system implementation;
- Modernize, advance, and update ICT technology and hardware.

PAKISTAN

National and Provincial EMIS were established in Pakistan in 1990s through financial assistance from the UN with functions of collection and consolidation of education data, establishing a national repository of education data through the National EMIS Database as the standard setting agency and to establish linkages and develop the capacity of provinces/regions. NEMIS computes and disseminates key education indicators, especially SDG-4 indicators and also provides data to national and international agencies, such as the Economic Survey of Pakistan, UIS, etc.

In order to fulfil the responsibility of national education data repository with ownership and involvement of provincial EMISs, NEMIS has established technical and coordination committees. Technical committees comprise of technical members of provincial/regional EMISs which consolidate/finalize the EMIS database and EFA/MDGs/SDGs indicators on an annual basis. The coordination committee comprises of provincial/regional EMIS coordinators who approve the National EMIS database consolidated by the technical committee.

Provincial/regional EMISs function under the respective education departments and conduct data collection of the respective province/region through the annual school census. Data is collected by the district EMIS and transmitted to provincial/regional EMIS. The data collection mechanism, EMIS, individual and institutional capacities and infrastructure availability varies across provinces/regions. Data analysis is carried out at different levels, as per the requirements of decision-makers, however, district EMIS cells lack this capacity. NEMIS publishes its reports, namely the Pakistan Education Statistics, the Pakistan Education Atlas and District Education Profiles on annual basis to meet the data needs of education stakeholders.

Some issues and challenges related to NEMIS include:

- Lack of data standards and harmonization on education indicators across the provinces and data gaps in respect of SDG-4 indicators. The country does not have proper standards for data at the national level. Data is not harmonized across the provinces and the data collection mechanism (and infrastructure) varies across provinces and regions. For example, some provinces/regions do not collect data from private schools, NFE, technical and vocational, tertiary education and financial data.
- Delays in collection, processing and reporting of data due to limited capacity of some of the provinces/regions. There is also a lack of coordination among various stakeholders managing education data.
- Pakistan currently places low priority on the allocation of resources to EMIS, thereby limited utilization of data/statistics for policy and decision-making at provincial and national levels.
- Furthermore, there is a lack of coordination among various stakeholders managing education data and as a result, there is limited comparability of data, which poses problems for interpreting the data.

NEMIS has taken many initiatives to overcome the challenges that includes advocacy and sensitization seminars on SDG-4; the establishment of non-formal EMIS, capacity building on the use of data for policy and planning; websites showing institution-level data; a GIS-based education atlas for cross-comparison among districts; and a real-time data regime (bio-metric attendance system for teachers in three provinces).

NEMIS is working on a mid-term plan to align its data collating and consolidation mechanism as per new global priorities in the most effective and efficient way possible. Dimensions of this plan relates to strengthening EMIS to full data requirements of SDG-4, development of data norms and standards from data collection up to dissemination, improved coordination among education data stakeholders and more active partnerships and capacity building of provincial/regional EMIS in data production, analysis, reporting and use are some of the activities.

The country is placing emphasis on capacity building on the use of data for policy and planning at the regional and national level. To improve knowledge on issues regarding SDG-4, Pakistan has been hosting advocacy and sensitization seminars on a systemic basis at the regional level.

Pakistan has also trained over a thousand educators to establish a non-formal EMIS process. In addition, the country plans on introducing a GIS-based education atlas for cross-comparison among districts. Another initiative is the development of a strategy for this process and this will involve collaboration with various education stakeholders.

Ideally, Pakistan's future strategy on EMIS will focus on:

- Strengthening EMIS to fulfil data requirements of SDG-4;
- Development of data norms and standards, from data collection to dissemination;
- Improving coordination among education data stakeholders and encourage more active partnerships;
- Capacity building of provincial/regional EMIS in data production, analysis, reporting, and use.

UZBEKISTAN

The Ministry of Pre-school Education was established in 2017 by the country's president and this aims to expand equitable access to a quality pre-school education for at least 50 per cent of children in the next five years.

The Republic of Uzbekistan received financing from the Global Partnership for Education (GPE) toward the cost of the 'Improving Pre-Primary and General Secondary Education Project', which is being implemented under supervision of the World Bank, with UNICEF as the coordinating agency.

In 2017, UNICEF supported Uzbekistan in the development of a robust EMIS for monitoring pre-school education development. In addition, UNICEF has been providing support in developing a new law on pre-school education, early learning development standards, a competency-based curriculum, alternative and innovative models for expanding pre-

school education, the development of public-private partnership models and financing mechanisms.

The ministry is currently partnering with UNICEF in developing a curriculum and it will soon have a project to improve the quality of pre-school education in the country with 50 million USD International Development Association (IDA) World Bank[60] and 10 million Global Partnership for Education (GPE) support[61]. EMIS in pre-school education is an important component for Uzbekistan because it provides: (1) Evidence-based planning of expansion and quality improvement in the country; and (2) Monitoring of results and subsequent decision making.

The current data collection system in pre-school education is not sufficient. The issues presently existing in data collection include:

- Time taken to collect, compile and the submission of data;
- No meaningful analysis possible due to the nature of data collected;
- Duplication of efforts (reporting same or similar data multiple times);
- Different data requirements for different agencies.

The challenges faced with developing EMIS include developing an indicator framework, which comprises education quality, health and safety, equity of access. Additionally, Uzbekistan has the challenge of tracking individual children level data, collecting data via a single online system and improving data quality.

For the implementation stage, Uzbekistan is using Open EMIS and has been able to define their indicator framework, installed and configured their system and has conducted two training events so far, held in January and April 2018.

Uzbekistan has set out plans for their EMIS in three phases:

- Short-term: Implementation across all pre-schools and first data collection process;
- Medium-term: Get all relevant data and indicators reflected in the EMIS; produce analytical reports; ensure relevant stakeholders at all levels are comfortable with the use of EMIS and EMIS data;
- Long-term: A self-sufficient and self-sustaining (including system support) system; EMIS adapted for general and higher education; integration with other systems (e.g. Ministry of Justice, State Tax Committee, etc.); systematically used for evidence-informed decision making.

[60] http://ida.worldbank.org/

[61] https://www.globalpartnership.org/

Module 4: Household Surveys for Monitoring SDG 4

Module overview – objectives, topics and learning outcomes

Although many education indicators are available from Education Management Information System (EMIS) data and annual school censuses, these systems are not capable of capturing all relevant data, particularly regarding populations that have never entered the formal school system, or those that have dropped out indefinitely, such as adults, children with disabilities, ethnic minorities, migrants, out-of-school children and other marginalized populations.

It is essential to take note of this circumstance because Sustainable Development Goal (SDG) 4 emphasizes paying particular attention to marginalized populations. With this in mind, household surveys have the unique reach to include these populations. Adopting household surveys enables interested parties to capture a wider spectrum – and therefore greater coverage of data for the world education agenda.

The objective of this module is to familiarize the reader with household surveys for education policies and programmes and monitoring. Understanding the usefulness of household survey data will aid in establishing better collaborations between survey designers and education specialists. The ultimate aim is to confer and decide on the

types of data which are of highest relevance in monitoring education.

After providing brief background information on the importance of household surveys, this module will present which current education indicators can be retrieved from surveys; what types of household surveys collect education data; as well as challenges in collecting education-related data through household surveys.

Finally, this module will provide an outline for the creation of institutional mechanisms – for collaboration with interested parties – so household surveys can be utilized effectively to yield the most significant SDG 4 indicator data.

The following topics are covered in this module:

- Household surveys and education monitoring;
- SDG 4 indicators from household surveys;
- Institutional mechanisms to fully utilize household surveys for SDG 4 data collection.

After completing the module, learners will have acquired the following learning outcomes:

- An understanding of the importance of household surveys in monitoring SDG 4;
- An overview of the many existing household surveys which contain education relevant data;
- Knowledge on relevant information retrievable from household surveys to monitor SDG 4;
- The ability to maximize the use of household surveys to their fullest capacity.

1 The Importance of Household Surveys

The concept of collating education related data from household surveys and censuses for use in education monitoring, planning and management is not entirely a new one.

Household surveys have been a valuable monitoring tool for a long time and they are in fact more than just a registration of the population; they are a prime societal assessment tool which national policymaking can be based on. It is significant that the global monitoring mechanism has explicitly mentioned and urged the use of household surveys for monitoring SDG 4.

Household surveys are an important source of education data for policymakers at the national and international levels, as well as at the sub-national level if the sample size is sufficient. Information gathered from household surveys is especially valuable because it can be cross-referenced with other characteristics to create insightful analysis that informs sound policy decisions.

Characteristics, such as health, employment, income, expenditure and other topics covered in household surveys provide adequate insight for evidence-based policy formulations and planning purposes.

Nevertheless, due to various reasons, the application of household survey data in monitoring and planning of education has been limited. The most broadly used series of household surveys (the Demographic and Health Survey and Multiple Indicator Cluster Survey) use sets of about six, or nine education questions that cover only the most fundamental education topics.

In contrast, some household surveys ask over 40 education questions and touch on a variety of topics, but these often lack rigorous design and formulation.

Household surveys usually collect data on the characteristics of both the household and individuals within the household. Data on individual household members is collected for several variables, spanning usually the age and sex of the respondent, literacy status, educational attainment, missing school participation and employment situation, among other characteristics.

The same can be requested for household members on whose behalf the respondent answers. Household surveys typically collect data from a nationally representative sample of households, which are randomly selected from a list of households.

Table 1: Information that can be registered through household surveys

Household-related	Individual-related
• Household/family composition; • Food expenditures; • Housing characteristics; • Household (physical) assets; • Savings; • Health expenditures; • Combined household income/ purchasing power (adequacy or financial ability to buy products and services).	• Sex; • Age; • Place of birth; • Marital status; • Education attainment; • Literacy status; • Distance to school; • Health care access; • Anthropometrics (e.g. height, weight); • Fertility status; • Migratory background/ethnicity; • Employment status; • Occupation; • HIV status.

Source: Porta Emilio, Gustavo Arcia, Kevin Macdonald, Sergiy Radyakin, Michael Lokshin, 2011: Assessing Sector Performance and Inequality in Education. (See Chapter 2 on 'Using Household Survey Data'), Washington, DC, The World Bank, **access:** http://siteresources.worldbank.org/EXTEDSTATS/Resources/3232763-1252439241095/ADePTBookChap-2.pdf; Strauss, John and Duncan Thomas, 1995: Human Resources: Empirical Modeling of Household and Family Decisions. In: Handbook of Development Economics (vol. 3A), ed. J. Behrman and T. N. Srinivasan. Amsterdam, North Holland Press.

It is well known that household surveys also provide the means to estimate the national demand and need for education because the decision to enrol and keep children in school is made at the household level by household members who weigh the cost against the benefit of an education.

Household surveys can deliver insights into factors of deciding for, or against education and its associated activities. For instance, enrolling boys and girls in formal schooling; enrolling them at the appropriate age; participating as parents in school governance activities; and complementing learning activities as a family at home. Factors like these are subject to significant private investment for families before these very families capture the economic benefits of education[1].

Challenges with household surveys

A general problem with household surveys is that the collected education data is not always uniform and thus not necessarily comparable across the different surveys in different countries. Differently formulated, sampled and processed data ultimately tells different stories. Policy formulations that have been built on household survey data evaluations in one country, therefore, cannot be translated into any other country context

[1] Strauss, John and Duncan Thomas, 1995: Human Resources: Empirical Modeling of Household and Family Decisions. In: Handbook of Development Economics (vol. 3A), ed. J. Behrman and T. N. Srinivasan. Amsterdam, North Holland Press.

where similar survey results appear to be present.

It is of further concern that currently available education data from household surveys is under-utilized in education planning, despite its invaluable information to inform policy debates. One reason is that the data user is often not aware of the usefulness of education data in household surveys due to an apparent limitation in terms of variables and question design. Another reason is that the present education data is understood primarily as background characteristics, rather than an object of study[2]. Given these characteristics, as outlined above for the household and individual levels, household surveys offer a wealth of possibilities to identify marginalized populations and concentrate development efforts.

As to the utilization of household survey data on education, it is important to properly interpret the data, as data by itself may not explain anything if not put into perspective by comparing, disaggregating and correlating different variables.

With this in mind, it is necessary to look at socio-economic, cultural and demographic characteristics of the population; at time periods, pre-, present and past educational programmes and reforms; and systemic and infrastructural conditions addressed with teacher, facility/facilities and available teaching materials.

For more general information on household surveys, see:

Using Household Survey Data[3]

Exploring Household Surveys[4]
(See modules B1 to B5 on 'Household Survey Data for EFA Monitoring')

[2] Ibid.

[3] Porta, E., Arcia, G. Macdonald, K., Radyakin, S. and M. Lokshin, 2011: Assessing Sector Performance and Inequality in Education. Washington, DC, The World Bank Group. (Chapter 2 on 'Using Household Survey Data'). Access: openknowledge.worldbank.org/bitstream/handle/10986/2326/632520PUB0Exto00public00BOX361512B0.pdf

[4] Systematic Monitoring of Education for All, Training Manual, access: http://www5.unescobkk.org/education/efatraining/

1.1 Examples of household surveys

Different types of household surveys are used to collect data on different issues, including education. Among household surveys, some are national and some are internationally-led.

The national household survey

National household surveys are generally designed to generate data and information relevant for the national context for specific issues. Such design does not necessarily apply to all international standards, definition, and methodologies in generating data. Data populated from such surveys might not be comparable with other household survey data produced in other countries.

The following is an example from the Lao Social Indicator Survey 2017. The first example shows the collection of information on basic household member characteristics, while the second example shows how to collect education relevant information.

Figure 1: Example 1 from the Lao Social Indicator Survey II in 2017

LIST OF HOUSEHOLD MEMBERS — **HL**

First complete HL2 for all members of the household. Then proceed with HL3 and HL4 vertically. Once HL2-HL4 are complete for all members, make sure to probe for additional members: Those that are not currently at home, any infants or small children and any others who may not be family (such as servants, friends) but who usually live in the household. Then, ask questions HL5-HL20 for each member one at a time. If additional questionnaires are used, indicate by ticking this box:

HL1. *Line number*	**HL2.** First, please tell me the name of each person who usually lives here, starting with the head of the household. *Probe for additional household members.*	**HL3.** What is the relationship of (***name of thehead of household***)?	**HL4.** Is (***name***) male or female? 1 MALE 2 FEMALE	**HL5.** What is (***name***)'s date of birth? MONTH (98 DK)	YEAR (9998 DK)	**HL6.** How old is (***name***)? *Recordin completed years. If age is 95 or above, record '95'.*	**HL7.** Did (***name***) stay here last night? 1 YES 2 NO	**HL8.** *Record line number if woman and age 15-49.*	**HL9.** *Record line number if man, age 15-49 and HH8 is yes.*	**HL10.** *Record line number if age 0-4.*	**HL11.** *Age 0-17?* 1 YES 2 NO ✩ *Next Line*	**HL12.** Is (***name***)'s natural mother alive? 1 YES 2 NO ✩ *HL16* 8 DK ✩ *HL16*	**HL13.** Does (***name***)'s natural mother live in this household ? 1 YES 2 NO ✩ *HL15*	**HL14.** *Record the line number of mother and go to HL16.*	**HL15.** Where does (***name***)'s natural mother live? 1 ABROAD 2 IN ANOTHER HOUSEHOLD IN THE SAME PROVINCE 3 IN ANOTHER HOUSEHOLD IN ANOTHER PROVINCE 4 INSTITUTION IN THIS COUNTRY 8 DK	**HL16.** Is (***name***)'s natural father alive? 1 YES 2 NO ✩ *HL20* 8 DK ✩ *HL20*	**HL17.** Does (***name***)'s natural father live in this household ? 1 YES 2 NO ✩ *HL19*	**HL18.** *Record the line number of father and go to HL20.*	**HL19.** Where does (***name***)'s natural father live? 1 ABROAD 2 IN ANOTHER HOUSEHOLD IN THE SAME PROVINCE 3 IN ANOTHER HOUSEHOLD IN ANOTHER PROVINCE 4 INSTITUTION IN THIS COUNTRY 8 DK	**HL20.** *Copy the line number of mother from HL14. If blank, ask:* Who is the primary caretaker of(***name***)? *If 'No one' for a child age 15-17, record '90'.*
LINE	NAME	RELATION*	M F	MONTH	YEAR	AGE	Y N	W 15-49	M 15-49	0-4	Y N	Y N DK	Y N	MOTHER		Y N DK	Y N	FATHER		
01		0 1	1 2				1 2	01	01	01	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
02			1 2				1 2	02	02	02	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
03			1 2				1 2	03	03	03	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
04			1 2				1 2	04	04	04	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
05			1 2				1 2	05	05	05	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
06			1 2				1 2	06	06	06	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
07			1 2				1 2	07	07	07	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
08			1 2				1 2	08	08	08	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
09			1 2				1 2	09	09	09	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
10			1 2				1 2	10	10	10	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
11			1 2				1 2	11	11	11	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
12			1 2				1 2	12	12	12	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
13			1 2				1 2	13	13	13	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
14			1 2				1 2	14	14	14	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	
15			1 2				1 2	15	15	15	1 2	1 2 8	1 2		1 2 3 4 8	1 2 8	1 2		1 2 3 4 8	

* *Codes for* ***HL3****: Relationship to head of household:*

01 HEAD
02 SPOUSE / PARTNER
03 SON / DAUGHTER
04 SON-IN-LAW / DAUGHTER-IN-LAW
05 GRANDCHILD
06 PARENT
07 PARENT-IN-LAW
08 BROTHER / SISTER
09 BROTHER-IN-LAW / SISTER-IN-LAW
10 UNCLE/AUNT
11 NIECE / NEPHEW
12 OTHER RELATIVE
13 ADOPTED / FOSTER / STEPCHILD
14 SERVANT (LIVE-IN)
96 OTHER (NOT RELATED)
98 DK

Source: Lao Statistics Bureau, 2018: Lao Social Indicator Survey II 2017, Survey Findings Report. Vientiane, Lao Statistics Bureau and UNICEF, **access:** https://www.lsb.gov.la/wp-content/uploads/2017/05/Lao-Social-Inndicator-Survey-Lsis-II-2017.pdf

Figure 2: Examples from the Lao Social Indicator Survey II in 2017

EDUCATION 1 — **ED**

ED1. *Line number*	**ED2**. *Name and age.* *Copy names and ages of all members of the household from HL2 and HL6 to below and to next page of the module.*		**ED3**. *Age 3 or above?* 1 YES *2* NO ⇩ *Next Line*		**ED4**. Has (***name***) ever attended school or any Early Childhood Education programme? 1 YES *2* NO ⇩ *Next Line*		**ED5**. What is the highest level and grade or year of school (***name***) has ever attended? LEVEL: *0* ECE ⇩ *ED7* 1 PRIMARY 2 LOWER SECONDARY 3 UPPER SECONDARY 4 POST SECONDARY NON TERTIARY 5 TERTIARY EDU. 8 DK	GRADE/YEAR: 11 -15 PRIMARY 21 – 24 LOW SEC 31 – 33 UP SEC 41 – 43 POST SEC NON TER. 51 –57 TERTIARY 98 DK ⇩ *ED7*	**ED6**. Did (***name***) ever complete that (grade/ year)? 1 YES 2 NO 8 DK			**ED7**. *Age 3-24?* 1 YES *2* NO ⇩ *Next Line*		**ED8**. *Check ED4: Ever attended school or ECE?* 1 YES *2* NO ⇩ *Next Line*	
Line	Name	Age	Yes	No	Yes	No	Level	Grade/Year	Y	N	DK	Yes	No	Yes	No
01		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
02		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
03		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
04		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
05		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
06		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
07		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
08		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
09		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
10		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
11		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
12		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
13		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
14		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2
15		_____	1	2	1	2	0 1 2 3 4 5 8	__ __	1	2	8	1	2	1	2

Source: Lao Statistics Bureau, 2018: Lao Social Indicator Survey II 2017, Survey Findings Report. Vientiane, Lao Statistics Bureau and UNICEF, **access:** https://www.lsb.gov.la/wp-content/uploads/2017/05/Lao-Social-Indicator-Survey-Lsis-II-2017.pdf

With socio-economic variables, as seen in the example, household surveys constitute an important source of education data for policymakers as they allow them to correlate information and perform detailed analysis that would not be possible with information from any other source[5].

Just like we can obtain education relevant information through household questionnaires, other information on wide-ranging issues of national and international concern can be obtained through these means in a one-off survey, such as on the use of computers, communication and technology and Water, Sanitation and Hygiene (WASH) facilities.

Population censuses

The population census is the oldest type of household survey with the broadest coverage. Population censuses collect data about the entire population, in a specified area, at a regularly marked time interval, usually every five-to-ten years. Each person is asked questions about personal characteristics such as age, sex, marital status, education and employment status.

Population censuses can provide data about the number and composition of the entire population at a given point in time and selected socio-economic and educational characteristics of households and individual persons within the country.

Since the census collects data from every household in the country, it can provide valuable information for policies and the planning of socio-economic development – from national down to local administrative levels. Moreover, the census is the main source and basis for constructing sampling frames for selecting households and population for other surveys. The census is the most comprehensive source of demographic and socio-economic data for several countries. It is also important to remember that data collected from a census is essential to developing the sampling needed for any subsequent thematic-based household surveys.

International household surveys

Internationally-led household surveys are probably the most important source of data for socio-economic and demographic issues. They are conducted in several countries and they apply internationally agreed designs, methodologies and standards in collecting data and generating information[6]. Data generated from international household surveys are comparable across the countries that participated in the surveys. Depending on the purpose of the household surveys, data and information are collected. Some of the international household surveys include adequate modules to collect enough data on education.

[5] fhi360, 2009: Education Policy and Data Centre, Household Survey Guidelines on Education, access: https://www.epdc.org/sites/default/files/ documents/Household_Survey_Guidelines_on_Education.pdf

[6] The Inter-secretariat Working Group on Household Surveys (ISWGHS) provides further advice on household surveys, access: https://unstats.un.org/iswghs/

Some household surveys are designed as multipurpose surveys, with a focus on a broad set of demographic and socioeconomic issues, whereas other surveys focus explicitly on specific subjects such as health. Surveys take a sample from the population and are representative, or can be made representative of the population as a whole (or whatever target population is defined for the survey). They have the advantage of permitting more detailed data collection than is feasible in a comprehensive census. Although many surveys are conducted on an ad hoc basis, there are an increasing number of multi-round integrated survey programmes.

To mention some of the most important, these include the Living Standards Measurement Study; the Demographic and Health Surveys (ORC Macro); the Multiple Indicator Cluster Surveys; and the Labour Force Surveys. The following sections provide a brief overview of some of the internationally-led household surveys, with SDG 4 relevant questions in their surveys.

Multiple Indicator Cluster Survey

The Multiple Indicator Cluster Survey (MICS) is a household survey developed by UNICEF to enable countries to monitor the situation of children and women. It is capable of producing statistically sound and internationally comparable estimates of a wide range of indicators. MICS was originally developed in response to the World Summit for Children to measure progress towards an internationally agreed set of mid-decade goals and has since evolved into addressing other international commitments, such as the United Nations General Assembly Special Session on HIV/AIDS and the Abuja targets to combat malaria.

Meanwhile, the sixth version of MICS generates information on multi-dimensional poverty, malnutrition, birth attendance, under-five mortality rates, early childhood development, pre-school attendance, early marriage, safe water and sanitation, child labour, birth registration and other indicators relevant for the SDGs, including SDG 4.

The MICS programme will also cover new areas, e.g. social protection, victimization, learning, use of clean fuels and technology and crucial data for disaggregation by disability and migration status.

Multiple Indicator Cluster Survey[7]

Demographic and Health Survey

Since 1984, the Demographic and Health Survey (DHS) project has provided technical assistance to countries to help advance a global understanding of health and population

[7] The UNICEF Multiple Indicator Cluster Survey, access: http://mics.unicef.org/

trends[8]. The DHS has gained a worldwide reputation for collecting and disseminating accurate, nationally representative data about health and populations in developing countries.

The DHS is implemented by Macro International Inc., which is funded by the United States Agency for International Development (USAID), with contributions from other donors such as UNICEF, UNFPA, WHO and UNAIDS. Macro International has partnered with several internationally experienced organizations, such as The Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs, Program for Appropriate Technology in Health (PATH), Blue Raster and The Futures Institute, to expand access to, and the use of DHS data.

DHS surveys collect information about fertility, reproductive health, maternal health, child health, immunization and survival, HIV/AIDS, maternal mortality, child mortality, malaria and women and children's nutrition. The set of questions is similar to the questions used in MICS.

A central aim of DHS is to provide quality data for policy development and programme planning, monitoring and evaluation. To build the policy and programmatic evidence-base, DHS data is first transformed into information, which is then made accessible to decision-makers. Robust analysis of data, beyond those published by the DHS project in its survey reports, is essential for transforming data into information. The results of such analysis when made readily available, understood and assimilated by policy-makers and programme managers can be very effective in these areas. Education-related information when made available through such surveys can add great value towards national and international monitoring of SDG 4.

Demographic and Health Survey[9]

Cross-comparability between MICS and DHS

MICS and DHS initially started out with their unique focus and the issues that they aimed to collect. However, due to data demands from countries and the progress made by both these surveys over the years, they have evolved and worked together to harmonize common practices and associated tools – to the extent they have begun to resemble each other.

The table below, based on a 2016 study[10], shows that 77 per cent of all MICS questions can be found in DHS, and 66 per cent of all DHS questions can be found in MICS. Such

[8] The Demographic and Health Survey, access: https://dhsprogram.com

[9] The Demographic and Health Surveys Programme, access: https://dhsprogram.com

[10] Lisowska, Beata, 2016. Household Surveys: Do competing standards serve country needs? Discussion Paper No. 4, June 28, 2016. Data Scientist, Development Initiatives, access: http://www.publishwhatyoufund.org/wp-content/uploads/2016/11/Household-surveys-do-competing-standards-serve-country-needs.pdf

commonality between these household surveys enhances the possibility of doing more in-depth analysis over larger populations, over a given period of time.

Figure 3: Commonly occurring questions between MICS and DHS

Questions	Questionnaire						Total (Common Questionnaires)	
	Women		Men		Household			
	MICS	DHS	MICS	DHS	MICS	DHS	MICS	DHS
Total number of questions in questionnaire	283	327	111	164	69	53	463	544
Exact for close matches with counterpart	189	178	78	78	49	43	316	299
All matches with counterpart	225	217	82	96	51	48	358	361
Percentage of all matches with counterpart	80%	66%	74%	59%	74%	91%	77%	66%

Source: Lisowska, Beata, 2016: Household Surveys: Do competing standards serve country needs? Discussion Paper No. 4, June 28, 2016. Data Scientist, Development Initiatives, **access:** http://www.publishwhatyoufund.org/wp-content/uploads/2016/11/Household-surveys-do-competing-standards-serve-country-needs.pdf

Living Standard Measurement Study

The Living Standard Measurement Study (LSMS) was established by the World Bank's Development Economics Research Group (DECRG) to explore ways of improving the quality of household data collected by statistical offices in developing countries.

LSMS is a research project initiated in 1980 and the programme is designed to help policymakers identify how policies can be designed and improved to positively influence outcomes in health, education, economic activities, housing and utilities, etc.

LSMS' surveys are different from the other surveys in that they collect detailed expenditure data, income data, or both. LSMS' surveys are in a sense a type of household budget survey. Many countries implement household budget surveys in some form or other on a semi regular basis.

A core objective of these surveys is to capture the essential elements of the household income and expenditure pattern. In some countries, the surveys focus exclusively on this objective, but it is also common for household budget surveys to include additional modules – for example, on health and nutrition.

The objectives of LSMS include:

- To improve the quality of household survey data.
- To increase the capacity of statistical institutes to perform household surveys.

- To improve the ability of statistical institutes to analyse household survey data for policy needs.
- To provide policy makers with data that can be used to understand the determinants of observed social and economic outcomes.

LSMS provides users with actual household survey data for analysis and links to reports and research done using LSMS data.

Living Standard Measurement Study[11]

Labour Force Survey

The Labour Force Survey (LFS) supported by the International Labour Organization (ILO) is one of the most common and most frequently collected household surveys[12].

First conducted in 1940 in the USA, LFS is conducted monthly in the USA and quarterly (four-times a year) in Australia, New Zealand, the United Kingdom and almost all European Union countries.

Labour force surveys are also conducted in most countries in the Asia-Pacific region, such as Brunei Darussalam, Indonesia, Mongolia, Myanmar, Nepal, Thailand and Viet Nam, among others.

The main objectives of LFS include:

- To capture labour market data with regards to qualification and occupation characteristics of the population.
- To estimate the unemployment rate in the country.

In addition to generating official labour force statistics, data from LFS is employed by academics and other researchers. LFS can also be used as a data source for research projects on topics such as female employment, the economic returns of education, migration and ethnic minority groups.

Labour Force Surveys[13]

[11] The World Bank Living Standard Measurement Study, access: http://surveys.worldbank.org/lsms

[12] For a list of labour force surveys, see ILO information on Labour Force Surveys, access: https://www.ilo.org/dyn/lfsurvey/lfsurvey.home

[13] For a list of labour force surveys, access: https://www.ilo.org/dyn/lfsurvey/lfsurvey.home

2 Education Data in Household Surveys

As mentioned previously, education data can be retrieved from several household surveys and household survey data provides a wealth of information that cannot be obtained from other sources. It is used to inform policies and interventions, particularly to address issues around out-of-school children[14].

Table 2 provides an overview of the wide range of common indicators which can be obtained from household surveys; the characteristics they can be disaggregated by; and the kind of questions they can be recognized by.

Though it is not always standard, most of the household surveys collect data on various issues with different disaggregation, mainly by age, sex, wealth, location, disability, ethnicity, etc. However, other household surveys also disaggregate the data by mother tongue/first language, second/other language(s) and migration status in order to identify marginalized groups that require aid and a development focus.

Table 2: Education-related indicators and example questions as found in household surveys

INDICATOR	EXAMPLE QUESTIONS
Literacy/ illiteracy rate	**i. Can the person read and write with an understanding of [NATIONAL] language?** **Can the person read and write with an understanding of another language? [INDICATE LANGUAGE]** Sources: General Population Census of the Kingdom of Cambodia 2008; Household Income and Expenditure Survey, Bangladesh. 2000; Living Standard Survey, Nepal, 2003; Integrated Household Survey, Pakistan, 2001. **ii. Can [NAME] read letters/books/newspaper?** Source: Bangladesh Education Household Survey 2014. **iii. Can you read OR Write?** Source: Expenditure and Consumption Survey, Lao PDR, 2003. **iv. As a regular part of this work, do you (did you) have to read the following [CHOOSE ITEM]? (bills, payments, newspapers, forms, other)** Source: China - STEP Skills Measurement Household Survey 2012 (Wave 1), Yunnan Province, 2012.

[14] Compare: Gale, Charles, 2014: What Household Surveys Tell Us About Education. Global Partnership for Education, access: https://www.globalpartnership.org/blog/what-household-surveys-tell-us-about-education

Educational attainment/ completion rate	**i. What is the highest level and grade or year of school [NAME] has ever attended?** Source: MICS6. **ii. What is the highest qualification [NAME] obtained?** Source: Vietnam Household Registration System Survey 2015. **iii. What is the highest level of education that (NAME) completed?** Source: Myanmar Labour Force Survey, 2015.
Access and participation (attendance) **Gross Intake Rate for Grade one of primary education (GIR)** **Net Intake Rate for Grade one of primary education (NIR)** **Gross attendance rate (GAR)** **Net attendance rate (NAR)** **Age-specific Attendance Ratio (ASAR)**	**i. During [CURRENT] school year, what level and grade [is/was] [NAME] attending?** Source: DHS Cambodia 2014. **ii. What grade or year is [NAME] currently attending?** Source: Household Profile Questionnaire Philippines 2012. **iii. What is the level of education currently attended? (for person in question)** Source: Brunei Darussalam Labour Force Survey 2017.
Transition rate **Promotion rate** **Repetition rate** **Dropout rate** **Survival rate**	**i. Did [NAME] attend school at any time during the [PREVIOUS] school year?** **During [CURRENT] school year, what level and grade [is/was] [NAME] attending?** Source: DHS Cambodia 2014. **ii. During that previous school year, which level and grade or year did [NAME] attend?** **During this current school year, which level and grade or year is [NAME] attending?** Source: MICS6 for Household.
Out-of-school population	**i. Did (NAME) ever attend school?** **ii.a. Did [NAME] attend school at any time during the [PREVIOUS] school year?** **ii.b. During [CURRENT] school year, what level and grade [is/was] [NAME] attending?** Source: DHS Cambodia 2014. **iii.a. What is the highest level and grade or year of school [NAME] has ever attended?** **iii.b. During that previous school year, which level and grade or year did [NAME] attend?** **iii.c. During this current school year, which level and grade or year is [NAME] attending?** Source: MICS6.

Over-age /under-age	**i. At which level of education is [NAME]?** **Which grade is [NAME] attending?** Source: Vietnam Household Registration System Survey 2015. **ii. See examples under access and participation**
Education expenditure	**i. In the last 12 months, how much money was spent for each studying member of the household? (By item, such as books, paper, tuition fees, uniforms, examination fee, internet, etc.)** Source: Bangladesh Education Household Survey 2014. **ii. What are the expenditures on [NAME]'s education over the past 12 months for compulsory subjects in school? (open question)** **How much do you have to pay to enrol [NAME] in school?** Source: Vietnam Household Registration System Survey 2015.

We should take good notice at this point that all the above indicators are retrievable from household surveys and can be disaggregated by the following factors: **AGE, SEX, WEALTH, LOCATION, DISABILITY, ETHNICITY, MOTHER TONGUE/FIRST LANGUAGE, SECOND/OTHER LANGUAGE(S) AND MIGRATION STATUS**

When designing household survey questionnaires, levels of education should be standardized for ease of interpretation across countries in alignment with the International Standard Classification of Education (ISCED) system (see Module 1) and to keep in mind the official age range for the intended education levels.

Household Survey Guidelines on Education[15]

Other data collected in household surveys

There are other examples from household surveys that ask questions related to reasons for not attending school. General household questionnaires are also used to obtain information about the perceptions of school quality by parents.

This is one important source of information about quality of education provided by the school. It does not replace other sources, such as standardized tests that measure learning. Questionnaires that contain direct questions about how parents perceive school quality for children provide unique information, even though the responses have elements of subjectivity in words such as: 'often,' 'relevant,' 'needs,' 'good,' 'mediocre,' and 'judge'. The questions also assume that survey respondents have enough knowledge to pass reliable judgment on all these questions.

[15] Fhi360, 2009: Household Survey Guidelines on Education for use in the context of the IHSN Question Bank EPDC Working Paper No. EPDC-09-04, access: https://www.epdc.org/sites/default/files/documents/Household_Survey_Guidelines_on_Education.pdf

2.1 SDG 4 indicators from household surveys

The purpose of the following section is to show that almost half of all SDG 4 indicators are, or can already be collected by household surveys, thus reducing a concern of how to collect important education data for SDG 4.

When taking a thorough look at the 43 SDG 4 indicators, both global and thematic, it becomes evident that almost half can be calculated purely from household surveys.

For some indicators, household surveys are the only source of data; for others household surveys are one of the sources and can be retrieved from other sources, such as administrative data. Table 3 shows which indicators can be retrieved by means of household surveys.

Table 3: SDG 4 indicators by target retrievable from household surveys

Indicator number	Indicator clause	HHS is the only source	HHS is one of the sources	Other possible sources
Target 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes				
4.1.3	Gross intake ratio to the last grade (primary education, lower secondary education)		√	EMIS
4.1.4	Completion rate (primary education, lower secondary education, upper secondary education)	√		
4.1.5	Out-of-school rate (primary education, lower secondary education, upper secondary education)		√	EMIS
4.1.6	Percentage of children over age for grade (primary education, lower secondary education)		√	EMIS
Target 4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education				
4.2.1	Proportion of children under five years of age who are developmentally on track in health, learning and psychosocial well-being	√		
4.2.2	Participation rate in organized learning (one year before the official primary entry age), by sex		√	EMIS

4.2.3	Percentage of children under five years experiencing positive and stimulating home learning environments	√		
4.2.4	Gross early childhood education enrolment ratio in (a) pre-primary education; and (b) early childhood educational development		√	EMIS
Target 4.3 By 2030, ensure equal access for all women and men to affordable quality technical, vocational and tertiary education, including university				
4.3.1	Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months		√	EMIS
4.3.2	Gross enrolment ratio for tertiary education		√	EMIS
4.3.3	Participation rate in technical vocational programmes (15-to-24-year olds)		√	EMIS
Target 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship				
4.4.1	Proportion of youth and adults with Information and Communications Technology (ICT) skills, by type of skill		√	EMIS
4.4.3	Youth/adult educational attainment rates by age group, economic activity status, levels of education and programme orientation	√		
Target 4.5 By 2030, eliminate sex disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous people and children in vulnerable situations				
4.5.1	Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous people and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated		√	EMIS
4.5.2	Percentage of students in primary education whose first, or home language is the language of instruction		√	EMIS
4.5.4	Education expenditure per student by level of education and source of funding (public and private)		√ (private)	EMIS (public)

Target 4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy				
4.6.1	Percentage of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy; and (b) numeracy skills		√	Examinations
4.6.2	Youth/adult literacy rate	√		
4.6.3	Participation rate of illiterate youth/adults in literacy programmes		√	EMIS
Target 4.7. By 2030, that all learners acquire the knowledge and skills needed to promote sustainable development, including among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development				
4.7.2	Percentage of students by age group (or education level) showing adequate understanding of issues relating to global citizenship and sustainability		√	Examination
4.7.3	Percentage of secondary education students showing proficiency in knowledge of environmental science and geoscience		√	Examination
4.7.4	Percentage of schools that provide life skill-based HIV and sexuality education		√	EMIS

Source and details: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

SDG 4 and the Education 2030 Agenda heavily emphasize the importance of obtaining disaggregated data in order to allow policymakers to focus on the Agenda's main objective of ensuring 'no one is left behind'. As adopted by the education community and Member States with the Incheon Declaration and SDG 4–Education 2030 Framework for Action, the focus rests on inclusion and equity by giving everyone an equal opportunity[16].

Remember!

All people, irrespective of sex, age, race, colour, ethnicity, language, religion, political, or other opinion, national or social origin, property or birth, as well as persons with disability, migrants, indigenous people and children and youth, especially those in vulnerable situations, or other status, should have access to an inclusive, equitable quality education and lifelong learning opportunities. – Incheon Declaration and Framework for Action for the implementation of Sustainable Development Goal 4.

[16] Education 2030 Steering Committee, 2016: Incheon Declaration and Framework for Action for the implementation of SDG 4, access. http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf

Primary importance is given to age, sex, wealth, location, disability, ethnicity, mother tongue(s), migration status and individual characteristics available from household survey background questions. However, this does not mean that other disaggregation is not relevant. SDG Target 4.5 is meant to precisely encapsulate that all indicators are to be disaggregated by socio-economic factors.

2.2 Strengthening SDG 4 monitoring through improved survey data coverage

As mentioned in a previous module, SDG 4 covers areas beyond basic education and expands to include Technical and Vocational Education and Training (TVET), higher education and adult education. Most of the household surveys do not have full coverage, or have little coverage of TVET, higher education, as well as non-formal and adult education. To make household surveys more relevant and useful for SDG 4 monitoring, the data collection can be expanded. However, there are a few countries and a few surveys that already have good coverage of some of the desired indicators under SDG 4.

2.2.1 Improving coverage on TVET and skills

TVET has increased in many Asia-Pacific countries in recent times. Due to rapid economic development and a growing demand for a skilled labour force in various job sectors, countries need good data on how populations are accessing TVET and skills development programmes.

TVET and skills programmes are provided by various agencies and some of the programmes consist of very basic skills training, whereas others lead to diploma entry and degree courses. Therefore, it is necessary to discuss with the relevant agencies and authorities to decide which programmes and what skills need to be covered in data collection.

Box 1: TVET and skills coverage in MLCS, Myanmar

The Myanmar Living Condition Survey (MLCS) included vocational education in their highest completed level of education and in the current attendance grade/level category.

What is the highest level of education that (NAME) completed?

00 NIL
01 Below primary
02 Primary
03 Middle
04 Vocational certificate > Q37
05 High school
06 Under graduate /diploma
07 Bachelor
08 Post-graduate
09 Master
10 PhD

What is the highest level of education that (NAME) completed?

01 YES
02 NO

What is the highest level of education that (NAME) completed?

01 Kindergarten/ grade1
02 Grade 2
03 Grade 3
04 Grade 4
05 Grade 5
06 Grade 6
07 Grade 7
08 Grade 8
09 Grade 9
10 Grade 10
11 Grade 11
12 Vocational school
13 Under Graduate
14 Bachelor
15 Post graduate
16 Master
17 PhD
18 Others

To capture broader skill areas in the survey, the questionnaire also included a separate section (section VII) on training. Myanmar's questionnaire defines training as 'outside the general education system' and the data was collected for persons 12 years-old and above.

Under the above section, three questions have been included:

- Did (NAME) ever attend any vocation/technical training for improving/acquiring professional / technical skills?
- During the last year i.e. since (DATE) to today, how many trainings did (NAME) attend?
- What was the subject of the most recent training that (NAME) attended? (by ISCED level)

Source: UNDP, 2017: Myanmar Living Condition Survey, 2017, **access:** http://www.mm.undp.org/content/myanmar/en/home/library/poverty/MLCS.html

Box 2: Literacy and NFE programmes coverage in Cambodia Socio-Economic Survey, 2014

What kind of non-formal classes is (NAME) currently attending/did (NAME) attend?

1. Literacy (6 months).
2. Vocational training (tailoring, motor repairing, Khmer classical music, hair dressing, poultry raising etc.).
3. Post literacy (Agricultural training activities).
4. Foreign languages.
5. Computer literacy.
6. Others.

Source: National Institute of Statistics, 2014: Cambodia Socio-Economic Survey 2014: Household Questionnaire. Royal Government of Cambodia, **access:** http://nada-nis.gov.kh/index.php/catalog/19/download/126

Looking at MLCS, it can be seen that the survey would be able to calculate TVET and skills-related indicators such as: i) Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex; and ii) The participation rate in technical vocational programmes (15 to 24 years-old) by sex.

Similarly, the Labour Force Survey (LFS) of Cambodia (2011- 2012) covers extensively the various skills acquired through training and participation in various types of programmes, both formal and non-formal. A total of eight questions are dedicated to cover access, the type of training, the place of training and the duration of training. The codes used for the various types of courses studied can help analyse the range of skills that are acquired by individuals.

2.2.2 Improving coverage on literacy and Non-Formal Education in household surveys

Information on literacy programmes is not often collected through household surveys. However, some of the countries started collecting this information through surveys to collect data on those attending literacy and NFE programmes.

Programmes in literacy and NFE can be very diverse in terms of content as well as duration. Therefore, a proper consultation should be undertaken with agencies who are responsible for designing and implementing in-country literacy and NFE programmes.

Combining data with the population who have been attending formal education, data on NFE would help to calculate the indicator on the *participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex*. The data can also help to calculate the indicator *participation rate of illiterate youth/adults in literacy programmes*.

The following are examples from Bangladesh and the Philippines that attempted to collect data on non-formal education programmes and adult literacy through household surveys.

Figure 4: Excerpt from LFS of Cambodia (2011-12)

Section C. Training within the last 12 months (outside of the general education system)
For persons aged 15 years and over

ID	Did (NAME) attend any courses, seminars, workshops or receive private lessons or instruction outside the regular education system within the last 12 months, that is since [MONTH/YEAR]? 1= Yes 2= No ®D.1	How many of these training activities did (NAME) attend within the last 12 months? 1= 1 training 2= 2 trainings 3= 3 trainings 4= 4 or more trainings	What was the subject of the (most recent) training that (NAME) attended within the last 12 months?		For how long did (NAME) attend this training? 1= Less than 1 week 2= 1 week to < 2 weeks 3= 2 weeks to < 3 weeks 4= 3 weeks to < 4 weeks 5= 1 month to < 3 months 6= 3 months to < 6 months 7= 6 months or longer	Who was the main provider of this training? 1= Government 2= State-owned enterprise 3= Non-governmental/ non-profit organization 4= Private business/person 5= International organization 6= Other (specify) *If C.2=1 ®D.1*		What was the subject of the second most recent training that (NAME) attended within the last 12 months?		For how long did (NAME) attend this training? 1= Less than 1 week 2= 1 week to < 2 weeks 3= 2 weeks to < 3 weeks 4= 3 weeks to < 4 weeks 5= 1 month to < 3 months 6= 3 months to < 6 months 7= 6 months or longer	Who was the main provider of this training? 1=Government 2= State-owned enterprise 3= Non-governmental/ non-profit organization 4= Private business/person 5= International organization 6= Other (specify)	
	C.1	C.2	C.3	FIELD code	C.4	C.5	C.5o (other)	C.6	FIELD code	C.7	C.8	C.8o (other)
01	__	__		___	_	_			___	__	_	
02	__	__		___	_	_			___	__	_	
03	__	__		___	_	_			___	__	_	
04	__	__		___	_	_			___	__	_	
05	__	__		___	_	_			___	__	_	
06	__	__		___	_	_			___	__	_	
07	__	__		___	_	_			___	__	_	
08	__	__		___	_	_			___	__	_	
09	__	__		___	_	_			___	__	_	
10	__	__		___	_	_			___	__	_	

Subject of study codes (columns C.3 and C.6):

010= Basic programmes
080= Literacy and numeracy
090= Personal skills development
140= Teacher training and education sciences
210= Arts and craft skills
222= Foreign languages
220= Other humanities
310= Social and behavioural sciences
320= Journalism and information
340= Business and administration
380= Law
420= Life science
440= Physical science
460= Mathematics and statistics
480= Computing
520= Engineering and engineering trades
540= Manufacturing and processing
580= Architecture and building
620= Agriculture, forestry and fishery
640= Veterinary
720= Health
760= Social services
811= Hotel, restaurant and catering
812= Travel, tourism and leisure
813= Sports
814= Domestic services
815= Hair and beauty services
840= Transport services
850= Environmental protection
861= Protection of persons and property
862= Occupational health and safety
863= Military and defence

Source: ILO-IPEC, NIS, 2013: Cambodia Labour Force and Child Labour Survey 2012: Labour Force Report, Phnom Penh, ILO, **access:** https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-bangkok/documents/publication/wcms_230721.pdf

The Bangladesh Bureau of Statistics conducted a Literacy Assessment Survey in 2008 and the Campaign for Popular Education (CAMPE) – an advocacy and campaign network operating in Bangladesh since 1991.

Both these surveys have provided valuable insights to the government on the status of adult literacy. A sample module from Bangladesh and an E-Net survey from the Philippines illustrates the value of having a standalone survey on literacy.

Figure 5: Bangladesh example one on questions related to literacy

Education Watch
The State of Literacy in Bangladesh

Name:…… Code: …… Sex: Male = 1, Female = 2
Cluster No.: …… Household No.: …….. Line No. : ……..

Stratum:						
	Rural Dhaka	1	Rural Chittagong	2	Rural Rajshahi	3
	Rural Khulna	4	Rural Barisal	5	Rural Sylhet	6
	Metropolitan City	7	Municipalities	8		

Name of Information Collector: …….. Date: ……
Name of Supervisor: …….. Date: ……

1. Read the 2words given below. Then draw a line from the words to the corresponding picutres.

Hilsha Fish	
Butterfly	
	

2. Read the 2 sentences given below loudly.

- Birds fly in the blue sky. Can read = 1, Can rea partly = 2, Can't read = 3
- Nazrul is our favorite poet. Can read = 1, Can rea partly = 2, Can't read = 3

Source: ASPABAE, 2012. Research Toolkit: Women's Education and Literacy, **access:** http://www.aspbae.org/sites/default/files/pdf/Research%20Toolkit%20High%20Res.pdf

Figure 6: Bangladesh example two on questions related to literacy

LITERACY SURVEY QUESTIONNAIRE
For Female Member of Household Age 15 and Above

IDENTIFICATION # _____ **Village:** _____

1 Respondents' background

AGE		
GENDER		
CIVIL STATUS		
RELIGION		
INDIGENOUS PEOPLES' GROUP		
NUMBER OF HOUSEHOLD MEMBERS		
RELATIONSHIP TO HEAD OF HOUSEHOLD		
LANGUAGE USED IN THE HOUSEHOLD		
RESIDENCY (Duration of stay in the village)		
LOCATION (Urban/Rural; Distance from town center)		
COMMUNITY AND POLITICAL PARTICIPATION		
EVER ATTENDED SCHOOL		
EDUCATIONAL ATTAINMENT		
REASONS FOR NOT ATTENDING SCHOOL 1. High cost of education 2. Employment/Looking for work 3. Financial constraints (No money for food, transportation, uniform for school) 4. Poor performance/ Low grades 5. Housekeeping /Care giving 6. Early Marriage/Pregnancy 7. Schools are very far/No school within the village/ No regular school transportation 8. Illness/disability 9. Helps in family business 10. Psychosocial reasons/ Traumatized /Victim of bullying 11. Distractions/Peer group pressure (Drinking/Drugs)	12. Lack of Interest 13. Lazy 14. Too Young 15. Graduated from College/Post Sec. 16. No requirements 17. Relocation/Displacement due to natural calamities 18. Peace and Order Situation 19. Parents prefer/prioritize to send boys/males to school over girls/females. 21. Others * If answer is lack of interest or cannot cope, PROBE FURTHER	
ATTENDANCE TO TRAINING		
TYPE OF TRAINING ATTENDED □ Basic Literacy □ Post and advance literacy □ Values and Leadership development □ Medical services and Health development □ Livelihood/Enterprise development □ Financial management □ Farming and production skills	□ Technical skills □ Handicra s □ Home and personal care □ Caregiver □ Creative Arts □ ICT (Info & communication technology)	

Source: ASPABAE, 2012. Research Toolkit: Women's Education and Literacy, **access:** http://www.aspbae.org/sites/default/files/pdf/Research%20Toolkit%20High%20Res.pdf

The other example of a literacy survey is the Functional Literacy, Education and Mass Media Survey (FLEMMS) (2013), which was conducted in the Philippines[17]. FLEMMS aims to estimate the proportion of the population 10 years-old and over who are basically literate and it intends to estimate the proportion of the population 10-to-64 years old who are

[17] FLEMMS is a survey on functional literacy conducted by the Philippine Statistics Authority (PSA). The four previous rounds were conducted in 1989, 1994, 2003 and 2008. The 2013 FLEMMS was conducted by the PSA in coordination with the Literacy Coordinating Council (LCC) and the Department of Education (DepEd). For more information, access: https://psa.gov.ph/sites/default/files/2013%20FLEMMS%20Final%20Report.pdf

functionally literate. It also tries to determine their socio-economic characteristics, the educational skill qualifications of the population in terms of formal schooling and the mass media exposure of the population. Figure 7 taken from the FLEMMS questionnaire illustrates the attempt to collect information on the use of literacy skills by the individual over a period of 12 months. Surveys like FLEMMS are good examples of assessing the functional literacy of individuals when the much costlier option of conducting a full-fledged literacy assessment is not possible by the country.

Figure 7: Example of the Philippines' FLEMMS questionnaire on literacy skills

PUT A CHECK MARK ☑ IN THE BOX THAT APPLIES TO YOU.

	In the last 12 months	**Everyday**	**At least once a week**	**Seldom**	**Not at All**	
		4	**3**	**2**	**1**	
21.	How often do you read the following:					
	A. newspaper					
	B. magazines, comics, and books					
	C. posters, signs, brochures, and flyers					
22.	How often do you watch or listen to:					
	D. television					
	E. radio					
	F. movies, plays, and similar shows					
23.	How often do you					
	G. surf the internet for research work and e-mail?					
	H. surf the internet through Facebook, Twitter, etc.?					
	I. attend meetings of organizations?					
	J. write a report or a correspondence (writing letters)?					
	K. make calculations?					

Source: Philippine Statistics Authority, 2015: 2013 FLEMMS. Functional Literacy, Education and Mass Media Survey. Final Report. Access: https://psa.gov.ph/sites/default/files/2013%20FLEMMS%20Final%20Report.pdf

2.2.3 Improving coverage on early childhood education

Early year education for children can take different forms and approaches and it can include various content. Various typologies are used in denoting early childhood education such as Early Childhood Care and Education (ECCE), Early Childhood Education, Care and Development (ECD), Early Childhood Education (ECE), Pre-primary etc. The International Standard Classification of Education (ISCED) is used as the reference to define 'early learning' for Target 4.2 indicators and to collect comparable data. ECE as defined by ISCED – has been categorized into two sub-types:

Early childhood educational development:

- Educational content designed for children aged 0-2 years;
- Learning environment: visually stimulating, language rich;
- Emphasis on use of language/meaningful communication;
- Opportunities for active play, development of motor skills;
- Excludes programmes of childcare.

Pre-primary:

- Educational content designed for children aged at least three years-old;
- Focus on improved use of language and social skills;
- Development of logic and reasoning skills;
- Introduction to alphabetical and mathematical concepts;
- Physical exercise and play used as learning opportunities.

Most of the well-known household surveys include plenty of data on children and their education, especially for age three and above. To monitor ECE, full coverage for children 0-5 years should be included in the education questionnaire to calculate the indicator *gross early childhood education enrolment ratio in (a) pre-primary education; and (b) early childhood educational development*.

In many surveys, this is not the case right now and data for their education attendance is collected only for three years and above. However, the latest MICS for children under five will capture these issues:

- Example question: Does (he/she) currently attend [INSERT MENTIONED PROGRAMME]?

Having this question in the survey will enable the users to also calculate the participation rate in organized learning (one year before the official primary entry age), by sex.

It remains to point out that Target 4.2 goes beyond participation in education programmes and monitors the home environment and whether children are – in terms of cognitive, physical and psychosocial development – 'on track'. As these are new areas, many surveys do not include questions to collect data on them yet. However, some of the surveys, such as MICS, already include questions, as illustrated below.

Developmentally on track

There is not yet a globally-accepted definition of 'developmentally on track'. Defining and measuring this terminology is a goal for the next development phase of this indicator.

Box 3: MICS example questions on the home environment and tracking children's development

(i) Children developmentally on track

Based on the relevant concepts related to child development, MICS includes the following questions to collect data to track the development of a child:

Can [NAME] pick up a small object with two fingers, like a stick or a rock from the ground?

Is [NAME] sometimes too sick to play?

Does [NAME] follow simple directions on how to do something correctly?

When given something to do, is [NAME] able to do it independently?

Does [NAME] get along well with other children?

Does [NAME] kick, bite, or hit other children or adults?

(ii) Positive and stimulating home learning environments

Following the definition of the indicator on positive and stimulating home learning environment, MICS has included the following question:

In the past three days, did you or any household member aged 15 or over engage in any of the following activities with [NAME]? (Read books or looked at picture, books; Told stories; Sang songs; Took outside the home; Played together; Named, counted, or drew things)

Source: UNICEF, MICS6 TOOLS, **access:** http://mics.unicef.org/tools (MICS6 for Children under five).

At present, the MICS Early Childhood Development Index[18] defines 'on track' in literacy-numeracy if a child can identify at least 10 letters of the alphabet, read four simple words and recognize and name all numbers from one to 10.

A child is developmentally on-track physically if it can pick up small objects easily and is generally well enough to play. A child is developmentally on track in socio-emotional development if it is able to undertake simple activities independently, get along with other children and does not usually kick, bite, or hit other children, or adults. A child is developmentally on track in learning if it participates in any type of organized learning including ECE, kindergarten, or community care. However, these definitions are not universally accepted and other measures use alternative definitions.

Home learning environment

The home learning environment is another area which most of the household surveys do not include. Within the home, caregivers are tasked with establishing a safe, stimulating and nurturing environment and providing direction and guidance in daily life.

Interactions with responsible caregivers who are sensitive and responsive to children's emerging abilities are central to social, emotional and cognitive development. This type of positive caregiving can help children feel valued and accepted, promote healthy reactions, provide a model for acceptable social relationships and contribute to later academic and employment success.

Given that they target the home, household surveys should be improved to include questions to produce

[18] For more on the development of the Early Childhood Development Index, see: Loizillon, A., N. Petrowski, P. Britto and C. Cappa, 2017: Development of the Early Childhood, Development Index in MICS surveys. MICS Methodological Papers, No. 6, Data and Analytics Section, Division of Data, Research and Policy. New York, UNICEF, access: http://mics.unicef.org/files?job=W1siZiIsIjIwMTcvMDkvMTUvMjEvMTUvNDMvMzc4L01JQ1NfTWV0aG9kb2xvZ2ljYWxfUGFwZXJfNi5wZGYiXV0&sha=85c096f0b2c5b0c8

indicators for developmentally on track children and the home learning environment for these children.

MICS 6 Tools[19]

2.3 Challenges with education indicators from household surveys

As previously mentioned, education data from household surveys can be analysed in relation to other variables, such as poverty, location, disabilities, parents' characteristics, wealth, etc. This makes the indicators that are retrieved from household surveys valuable for policymakers and education planners. However, due to variations in the design of the survey, their frequencies, sampling techniques, sample sizes and timing of personnel, challenges in using a household survey for education monitoring may arise. These are identified below.

1. A lack of coordination with ministries (including the ministry of education) and other departments when designing the questionnaires and items in the survey leads to less useful education indicators.
2. For population censuses, this is conducted normally once every five-to-ten years and the census data may only be accessible at least two-to-three years after the completion of the census. Therefore, the usefulness of census data is more to review historic trends than for studying the present situation.
3. The phrasing of questions related to school: i) attainment; ii) enrolment; and iii) attendance influences measuring educational participation. In some cases, assumptions, or adjustments must be made to calculate common education indicators. For instance, this means that being enrolled in school, in the sense of having registered at a school, may not indicate actually attending school, in the sense of going to school every day.
4. The survey timing and duration of survey fieldwork influence the recentness of collected data. If a particular survey started just before the end of a school year and took over a month to complete, the 'grade completed' or 'current grade' may differ from the households asked earlier in time, compared to households asked later during the time of the same survey period. (This may not be a problem for surveys that have a fixed reference date like a population census.)
5. Related to timing, the survey dates rarely coincide with the beginning of the school year (data collection may take place during school vacations, or across two school years), which is the reference date for calculating common education

[19] UNICEF MICS 6 Tools, access: http://mics.unicef.org/tools

indicators, which can lead to discrepancies between the indicators calculated from a household survey and indicators that are derived from other data, gathered periodically by schools and the ministry of education.

For instance, if the fieldwork for a survey commenced in the 2017/2018 school year continued into the 2018/2019 school year (for any kind of reason), overlapping of the school years is prevented by formulating the question to a specific school year; in this case, for the current attendance in 2017/2018, as opposed to asking for attendance 'during the previous year'.

Fieldwork timing, together with the question formulation, also matters if there is non-random variation in participation over the year (e.g. higher attendance at the beginning of the school year, lower during, or at the end of the year due to seasonal events, such as a farm harvest among other reasons). As the MICS and the DHS ask about attendance 'at any time during the school year', the timing of fieldwork should not affect the response.

6. Many household surveys conducted in developing countries do not collect the date of birth of every household member; the age at the time of the survey is usually collected in completed years. The lack of a birth date may have implications for age-related indicators, such as the attendance rates (gross and net), as the age at the beginning of an education period is not always precisely known.

7. Some surveys, especially rapid assessments and case-control studies[20], do not use probability sampling techniques. The findings may not, therefore, represent the entire population under study. Surveys that aim to derive estimates for common characteristics with moderate accuracy require a smaller sample size, while getting reliable estimates for a rare characteristic (or event) with higher accuracy requires a larger sample size. Similarly, estimating at the national and provincial levels only requires a small sample size while finer sub-stratification (such as at the district, or lower level) needs a larger sample size. Thus, the representativeness of the sample depends on the survey design, which is influenced by three factors: the sampling method used; the level of accuracy sought in the estimates for various indicators; and the level of data disaggregation.

8. There is a lack of awareness about the existence and accessibility of household survey data, even within the same ministry, due to bureaucratic procedures, cost and not knowing where to find, or how to request such data. It can be difficult to locate the person (or department) who has the authority to provide survey datasets.

9. Little information about education is presented in main reports of household surveys – limited to only a few paragraphs, or just a section about education. Additional and more in-depth analysis of education and literacy status are very rare.

10. Little presented information usually goes together with a lack of knowledge on, and skills to analyse education data from household surveys to support evidence-based policy formulation, implementation and monitoring.

[20] Case-control studies are retrospective. They clearly define two groups at the start; one with the outcome and one without the outcome. They look back to assess whether there is a statistically significant difference in the rates of exposure to a defined risk factor between the groups. The main outcome measure in case-control studies is the odds ratio (OR).

3 Institutional Mechanisms to Utilize Household Surveys for SDG 4

There is no doubt that household and census data are as important as administrative data to monitor SDG 4. However, to make it more meaningful and relevant for monitoring SDG 4, ministries of education and National Statistical Offices (NSO) should work together.

Simply claiming that it is important and requesting data from the NSO to populate indicators will not help. There should be strategic discussions with the NSO on data collection and indicator generation by means of household surveys.

3.1 Institutionalizing household surveys in SDG 4 monitoring

The following points should be kept in mind in order to set up institutional mechanisms to utilize household surveys more extensively.

Integrating household surveys in National Strategies for Development of Education Statistics

The first point to mention, instead of having ad hoc arrangements to apply a household survey to monitor education, the household survey should be established as one of the data sources and recognized in official statistics for education.

Therefore, clear strategies are required to work with household surveys to generate education indicators when developing NSDES (See Module 2 on the development of NSDES).

The NSOs should be part of all discussions on NSDES and related development processes to ensure that collaboration starts at the very beginning.

Integrating relevant questions for SDG 4 in household surveys

Many countries are revising their household questionnaires to accommodate many of the SDG indicators in their surveys. The ministry of education should be proactive in

discussions with a NSO to ensure both parties are clear on the required information for which household surveys might be used.

Both parties should agree on including different data into different surveys (not necessarily one survey to include all the education data) based on the purpose and practicability of the surveys. A clear role in data collection, analysis and dissemination for the education data in household surveys can also be designated.

The following action points should be considered in order to integrate SDG 4 relevant questions effectively:

IV. Setting up a clear mechanism between NSOs and ministries of education. Instead of relying upon informal discussions, it would be helpful if a formal process of discussions at pre-set intervals is established, with a clear definition of objectives, participants, agenda and roles and responsibilities for the implementation of decisions made.

V. Review of education modules in household surveys: The education modules proposed for household surveys should be reviewed by NSOs and ministries of education, along with other nominated experts to double check if they cover all the important questions relating to education at the household level; particularly those identified as SDG 4 indicators. Deficiencies, if any, noticed in this regard can be rectified there and then.

VI. Agree on the additional questions, or reformulation of the questions to align with SDG 4 indicators: The above stated review should also consider the possibility of collection of data relating to certain quality aspects of SDG 4, particularly the target SDG 4.7 relating to aspects such as cultural perceptions of what constitutes global citizenship, respect for cultural diversity, non-violence, etc. The possibility of suitable additional questions, or reformulation of already existing questions may be considered to capture data on such aspects at the local household level.

VII. Data collection, data release and data dissemination plan: Clear guidelines need to be agreed upon for roles and responsibilities of the collaborating organizations in the areas of data collection, data consolidation, their interpretation and release. Capacity development needs and skill exchange possibilities in the areas of training for data collection and data handling using modern technology need also to be identified and suitable action plans finalized. Similarly, a well thought-out data dissemination plan should also be finalized.

Case Study: Indonesia – Utilizing Multiple Sources of Data, including Household and Special Surveys, for Effective SDG4 Monitoring

Since the SDGs were adopted in September 2015, the Government of Indonesia has implemented a number of initiatives to ensure that the country translates the global development agenda into national plans and programmes. As part of the effort to assess Indonesia's current position in achieving SDG 4, the Bureau of Planning and International Cooperation of the Ministry of Education and Culture (MoEC), in collaboration with the Central Bureau of Statistics (BPS), produced an SDG 4 Baseline Report in 2018 with technical support from UNICEF. The report is a comprehensive analysis of key indicators for all the 10 SDG 4 targets, using multiple data sources, including administrative data (e.g. EMIS); household surveys (e.g. the National Socioeconomic Survey SUSENAS); learning assessments (e.g. PISA and an Indonesian National Assessment Programme); and thematic surveys (e.g. Global School Health Survey). The BPS played an instrumental role in calculating and validating the indicator values based on the global definitions and methodologies.

The development process of the baseline report involved intensive capacity development of a core team from the Directorate of People Welfare Statistics of BPS who are in charge of large-scale household surveys. With UNICEF's technical support, the team was first familiarized with the metadata of all SDG 4 indicators, as well as their definitions, potential data sources and calculation methods based on international comparable standards.

The key indicators included in the report were identified by examining the data availability and relevance to the Indonesian context. A crucial step that followed was a series of hands-on sessions where the BPS team directly developed syntaxes for calculating indicators; particularly those based on household surveys, while applying global methodologies. Subsequently, the core BPS team reviewed, validated and finalized the data analysis, which formed the basis of the baseline report.

This report's development was supported by education data experts from the UNICEF Indonesia Country Office and Headquarters to strengthen the capacity of key officials from both the BPS and MoEC in data processing, interpretation, visualization and narrative writing. The overall process created a stronger ownership and confidence in continuing SDG 4 monitoring and reporting among the core team. The report has been used as one of the main references for the development of the new strategic plan in education for the period 2020-to-2024.

Data quality and data standards

It is also important to assess carefully the characteristics of the household surveys to understand the quality of the education data produced from the survey before we decide on integration of education data in different household surveys. The sampling techniques, sample size, background information and other data collected etc., are based on the purpose of the survey. Most of the surveys might have some data collection for education as they need to undertake some cross-sectional analysis with the educational background of the respondent. But, such questions and its coverage will tell us whether the survey would be able to produce enough data for education. A tool can be used to assess the quality of the household surveys for the purpose of collecting education data.

Box 4: UIS Code of Practice for education statistics produced from household surveys

A data quality assessment for a household survey includes six principles covering statistical production processes and statistical outputs. The national statistics office institutional environment assessment tool includes two principles, capturing policy and legal frameworks and adequacy of resources. A set of indicators for each of the principles provides a reference for reviewing the implementation of the Code. The Code of Practice (CoP) is a technical instrument containing practical rules for ensuring the credibility of statistics using data in household surveys. It is intended to serve as a guide for improving the quality of statistics produced at national, regional and global levels and for building trust in users by encouraging the application of the best international methods and practices in statistical production and dissemination.

For more Information:

Code of Practice for Education Statistics produced from household surveys[21]

In the end, statistics are about their comparable definitions and methodologies. Changing definitions and methodologies will change the values for the variables. Therefore, it is important to have common and standardized definitions for different data and indicators at the national level and to a large extent they need to follow international standards as well. The national statistics office, as a statistical organization of the country, should be the one who develops such standards and methodologies.

[21] UIS, 2017: UNESCO Institute for Statistics Code of Practice for education statistics produced from household surveys, access: http://uis.unesco.org/sites/default/files/documents/code-practice-household-survey-2017-en_1.pdf

It is important that both administrative and household surveys use the same classification system while collecting data by levels of education and by types of education which in some cases may not be with the same classification. In such cases, this can bring up many data discrepancies. Metadata for all the indicators should be developed in consultation with all the stakeholders and international definitions and methodologies should be considered in this regard. Such standards should be able to clearly spell out the coverage, limitations and interpretation and use of data.

3.2 Essential computer software for utilizing household survey databases

Now, a final question may remain on what is the best way to process household survey data electronically. The truth is, there is no 'one-way fits all' method. Different household surveys result in different database formats, with different structuring.

Statistical computer software serves the purpose of navigating and shaping these databases. It goes without mention that using a statistical computer programme requires training.

Now there are also a variety of statistical computer programmes, with most requiring a license to operate them. Some of the most commonly applied software packages are:

i. **PSPP:** PSPP is a free, open-source alternative to the proprietary statistics package SPSS. PSPP provides basic, but very useful, statistical analysis functions. It can be used to construct frequency and crosstab tables; calculate non-parametric tests, significant tests and reliability tests; supports various linear regression models; and can perform factor analysis and compute basic statistics. It also provides some database management features, such as sorting and selecting cases, computing new variables and recoding into existing and new variables. It has both a graphical user interface and a conventional command line interface. It is written in C, uses the GNU Scientific Library for its mathematical routines and Plotutils to generate graphs.

For more information, access: http://www.gnu.org/software/pspp/

ii. **R:** R implements a wide variety of statistical and graphical techniques, including linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, and others. R is easily extensible through functions and extensions, and the R community is noted for its active contributions in terms of packages. Many of R's standard functions are written in R itself, which makes it easy for users to follow the algorithmic choices made. R is highly extensible through the use of user-submitted packages for specific functions or specific areas of study.

For more information, access: https://www.r-project.org

iii. **SAS (Statistical Analysis System):** SAS enables programmers (users) to perform many different kinds of analysis, data management and functions to generate output, such as:

- Data entry, retrieval, management, and mining;
- Report writing and graphics;
- Statistical analysis;
- Business planning, forecasting, and decision support;
- Operations research and project management;
- Quality improvement;
- Applications development;
- Data warehousing (extract, transform, load);
- Platform independent and remote computing.

For more information, access: https://www.sas.com/en_th/software/stat.html

iv. **STATA:** This is a general-purpose statistical software package with a full range of capabilities including data management, statistical analysis, graphics, simulations and custom programming. It is used by many businesses and academic institutions around the world. Most of its users work in research, especially in the fields of economics, sociology, political science and epidemiology.

For more information, access: https://www.stata.com

v. **SPSS (STATISTICAL PACKAGE FOR SOCIAL SCIENCES):** SPSS can handle multiple data sets with an almost unlimited number of variables and cases. It allows data and outputs to be imported and exported using a variety of formats including Microsoft Excel and various text formats. Users can operate SPSS through a menu (and dialog box) driven graphical interface, as well as command line (syntax) interface. SPSS is user-friendly, even beginners can do basic statistical analysis with the software. It offers excellent on-line help, complete users' manuals and self-learning tutorials. The package supports almost all statistical methods, which allows users to perform basic to advanced analysis on data sets. SPSS also has good support for data management and data documentation.

For more information, access: https://www.ibm.com/analytics/spss-statistics-software

For more details on some of the above-mentioned software and SPSS exercises, visit:

Introduction to Data Analysis Software[22]

[22] Systematic Monitoring of Education for All, Module B2: Introduction to Data Analysis Software, access: http://www5.unescobkk.org/education/efatraining/module-b2/1-examples-of-software-for-analysing-household-survey-data-to-assist-efa-monitoring/

Module 5: Data Analysis and Results Communication

Module overview – objectives, topics and learning outcomes

Many countries in the region have data on different aspects of education collected through annual school censuses, periodic censuses and household surveys.

Collected data has little relevance until it is transformed into meaningful information and converted into a body of knowledge on particular issues. One of the challenges countries in the Asia-Pacific region are facing is that data is not processed appropriately so it can be effectively used in decision-making.

There is also the issue of not disseminating data to wider audiences, i.e. parents, to inform them about and involve them in progress and the required assistance in education. On top of this, all data requires a thorough disaggregation to identify populations that have a tendency to get left behind.

The dissemination of comprehensive, reliable and timely data is also viewed as an issue of transparency which is crucial for building trust in education systems and this must be undertaken in a way that is credible, both inside the country and internationally.

The modern education statistical system should assume the role of an information

provider and knowledge manager with data going in and out, rather than the traditional role of merely collecting data and keeping ownership of it.

This module consists of two main parts: one focusing on data analysis; and one focusing on data communication.

The data analysis section will present the essentials for understanding education data processing. The data communication section will encapsulate a range of communication products and what to look out for when creating them.

The following topics are covered in this module:

- Purpose of data analyses and their types;
- What constitutes a good indicator and how to distinguish between different types of indicators;
- The basic steps in data analysis;
- Choosing the right data presentation method for strategic communication with various audiences.

After completing the module, learners will have acquired the following learning outcomes:

- An ability to comprehend data analysis requirements;
- Knowledge of how to create and select appropriate education indicators;
- An understanding of how to choose the right data presentation method for strategic communication.

1 The Purpose of Data Analysis

Data analysis is the process of systematically applying statistical, or logical techniques to describe and illustrate, condense, recap and evaluate data. Analysis is the procedure to make broad generalizations by identifying trends and situations (phenomena) among present information.

In principle, we want to achieve an effective monitoring and evaluation of the education sector. We know that we have a wealth of data at our hands coming from education management information systems and household surveys. This data now must feed back into the planning of the education sector to serve as our evidence to base planning on. In short, the purpose of data analysis in education serves to:

1. Assess progress in the achievement of national and global targets;
2. Identify remaining shortcomings with regard to access, quality and equity;
3. Review policies, strategies, actions and success stories to identify bottlenecks;
4. Use the results to formulate better policies and plans to achieve aspired outcomes.

With the 21st century being characterized as the 'information age', we often have too much information available that can obfuscate its meaning and the ability to make a clear decision.

Due to the lack of analytical and technological capacities, the available information, especially raw data, is often not transformed into meaningful information to serve decision-making processes positively. Data analysis, therefore, functions as a production of meaningful information to make evidence-based decisions.

Meaningful information as a result of proper data analysis allows for:

- Tracking progress towards a set target;
- Effective decision-making for planning and managing at the national, sub-national and local levels;
- Predicting sector trends and performances.

Depending on the type of data we have at hand, it is important to decide between two different types of data analysis as each generate different information:

- Quantitative data analysis;
- Qualitative data analysis.

1.1 Quantitative and qualitative data analysis

Quantitative analysis

Quantitative data analysis can be understood as explaining situations by means of numerical data. In quantitative analysis, we collect numerical data and analyse it using mathematic methods (in particular statistics). In order to be able to use mathematic methods, our data has to be in a numerical form[1].

As quantitative analysis is about collecting numerical data, the following four specific phenomena are best suited to analyse quantitatively:

a. Questions that demand a quantitative answer, such as: 'How many students choose to study social science at higher education?' Or: 'How many maths teachers do we need? Or: How many have we got in our school/district?'

b. Comparisons of numerical values, for example change prior, during, or past a time period, or numerical characteristics of individuals/social groups, such as: 'Are the numbers of students in our university rising or falling?' 'Is learning achievement going up or down?'

c. Understanding the state of something, or other or to identify factors for the situation or the change, e.g., factors which predict the recruitment of maths teachers. What factors are related to changes in student achievement over time?

d. The study which needs testing of hypotheses – e.g. whether there is a relationship between a pupil's achievement and their self-esteem and social background. By looking at the theory, a possible hypothesis to test, would be that a lower social class background leads to low self-esteem, which would in turn be related to low achievement. Quantitative analysis can test this kind of model.

The essence of quantitative analysis is to confirm an assumption, or hypothesis by identifying patterns among a larger sample from a population and this approach is useful in policymaking and planning.

Qualitative Analysis

There are many definitions of qualitative analysis as there are books on the subject. The key word to differentiate qualitative analysis from quantitative analysis is 'exploration'. Qualitative analysers are interested in exploring an observed phenomenon to understand the meaning that people have constructed. That is, how people make sense of their world and the experiences they have in the world.

[1] For more on quantitative analysis, read: Aliaga, M. & Gunderson, B., 2002: Interactive statistics, New Jersey, Prentice Hall.

As Johnson and Christensen (2004) state, qualitative analysis involves working with data that is non-numerical in nature and does not indicate an order, hierarchy or rank[2]. Symbology is an example. Social scientists apply a form of observing and interpretive sociology; that means, to adopt a point of view from the individual's perspective to understand beliefs, values or behaviours by means of participant observation, or case studies, which result in a narrative, descriptive account of a setting, or practice.

In other words, qualitative analysis involves analysing written and spoken language, audio-visual imagery, or in short symbolism, as perceived by the subject of study[3]. Numbers can be analysed qualitatively, if they represent symbolism.

Qualitative analysis studies are mainly useful in:

- Identifying and exploring individual issues or cases;
- Describing complex processes;
- Explaining processes, such as motives, values, and causes of behaviour.

1.2 Qualitative versus quantitative analysis purposes exemplified

The UIS and UNICEF Global Initiative on Out-of-School Children (OOSC) serves as a good example in portraying the use of **both** research methods in analysis of out-of-school children[4]. The evaluation of the initiative studied the problem of OOSC to quantitatively capture who is excluded, where, and how many, as well as to qualitatively explore the barriers and causes of exclusion.

Quantitative example

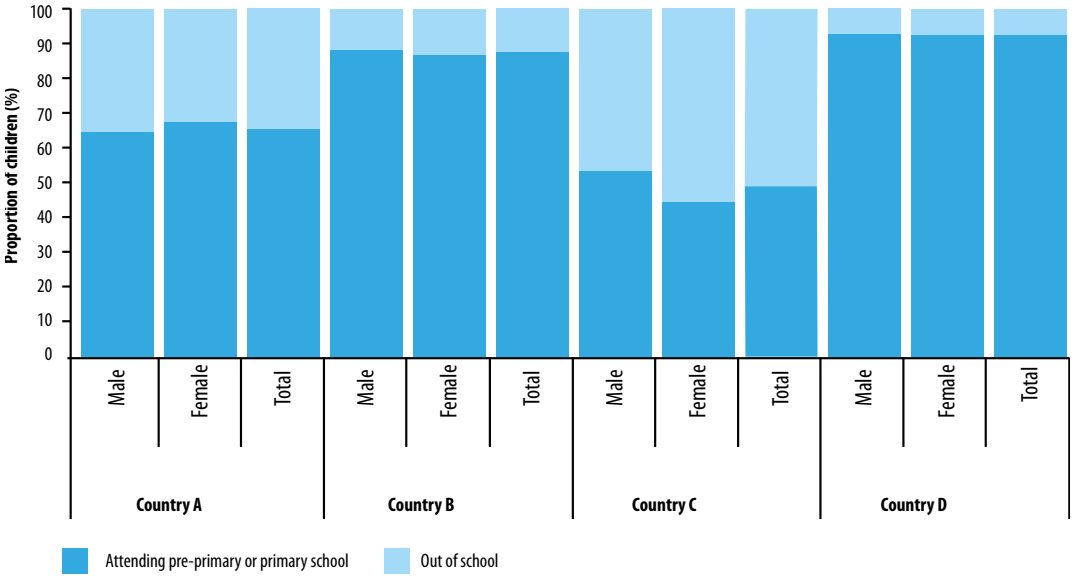
The numbers on the out-of-school population can be collected and analysed to describe the situation at the national and sub-national levels, disaggregated by gender, location, wealth, ethnicity, language, disability and other factors. As seen in Figure 1 below, we can identify the distribution of OOSC by country and gender. We can recognize that differences exist from country to country in terms of the total out-of-school population size, as well as a greater difference by gender in Country C. While, with this example, we can identify the size of a population and take first measures to target the specific population, the question remains why these populations are out-of-school in the first place.

[2] Johnson, R. B. and Christensen, L. B., 2004: Educational Research: Quantitative, Qualitative, and Mixed Approaches. Boston, MA: Allyn and Bacon.

[3] For more on qualitative research, see: Elwell, Frank W., 2009: Macrosociology: The Study of Sociocultural Systems (Chapter 8 on 'Verstehen: The Sociology of Max Weber'), Edwin Mellen Pr; Nkwi P, Nyamongo I, Ryan G. 2001: Field Research into Social Issues: Methodological Guidelines. Washington, DC, UNESCO.

[4] For more practical guidance on the monitoring and evaluation of OOSC, see the operational manual created by UIS and UNICEF, access: http://allinschool.org/wp-content/uploads/2015/12/F_UNICEF1017_OOSCI_manual-web.pdf

Figure 1: Example on the proportion of pre-primary age children in pre-primary or primary school, by sex



Qualitative example

A qualitative report on the situation of the children who are not in school presents us with an example on how we can identify underlying causes. Interviews and focus group discussions took place to collect views and the perceptions of the different stakeholders in schools to gather in-depth data on why children were out-of-school; what they were doing; and to take into account OOSC's family background. These stakeholders were comprised of the children themselves, their parents, the school heads and teachers.

Let's read the following excerpts.

Figure 2: Qualitative study excerpts on the situation of OOSC

3.2.1.4 Lack of safety and security in school

School children interviewed in the study area revealed that bullying, name calling and corporal punishments, made the school environment unsafe. The majority of interviewed OOSC reported that corporal punishment was a contributing factor to their failure to attend school. Other school children interviewed also reported
that excessive corporal punishment made the school environment scary to the extent that some children left school. However, in focus group discussions, village leaders had divided views on the use of corporal punishment in schools, with some arguing that corporal punishment was suitable for naughty children, while others argued against corporal punishment, asserting that excessive application led to poor school attendance. The majority of the village leaders reported the need for more controlled corporal punishment and alternative means to correct children.

3.3.1.1 Approved school contributions

3.3.1.1.1 Primary school

The study revealed that education regulations do not impose any contributions on the parents of primary school children because primary education is entirely free. However, school committees approved some contributions to support running of school activities. Head teachers reported that some of the contributions were paid in cash while others were covered in kind or in labour.

They further reported that contributions included cash for processing and printing midterm and terminal tests, speed tests, preparing and administering mock examinations for Standard IV and VII children, school badges, desks, and school meals. Very few schools reported charging cash for school uniforms, but parents were free to get uniforms elsewhere depending on the unit cost. All the contributions in cash were paid directly through school bank accounts. Teachers interviewed were able to explain cost per parent in school, but it was hard to make generalisations as the contributions appeared to vary from one school to another and from one region to another.

Source: UNICEF and UIS, 2018: Tanzania Qualitative Study Report. Global Initiative on Out-of-School Children.

From a qualitative analysis of the situation, based on experiences and interpretations, by the stakeholders involved, it was revealed that corporal punishment contributes to children not being willing to attend school, as well as some teachers not knowing how to exercise alternative strategies to deal with difficult behaviour.

It was also found that despite national regulations on keeping education free, schools take the liberty to request cash contributions from parents to supplement the running of school activities.

The exploration of these issues brought to light factors that – in order to capture them in numbers – first had to verbalized. From this perspective, qualitative analysis often precedes quantitative analysis as it provides topics to be monitored and acted upon. But it also works the other way around; when quantitative analysis shows discrepancies that cannot be explained without conducting exploration, then qualitative analysis is the way forward.

2 Education Indicators

As we already know, Sustainable Development Goal (SDG) 4 has put a strong emphasis on monitoring certain education aspects in order to evaluate progress towards achieving the Education 2030 Agenda. These aspects have been agreed upon by countries worldwide and resulted in the ten targets of SDG 4. We could say, developing the ten targets has been the result of qualitative data analysis by exploring each and every country's perception on crucial education problems that require solving. To track the situation for each of these ten targets, this requires being able to express the particular situation in some form of a numerical measure that tells us whether a situation has changed for the worse, or for the better. We call this an indicator.

An indicator can be used for different circumstances as different indicators can have different functions. Table 1 attempts to provide a brief overview of the functions of indicators, distinguished by monitoring, evaluation and also assessment.

Table 1: Monitoring, evaluation and assessment using education indicators[5]

FUNCTIONS OF INDICATORS			
	MONITORING	**EVALUATION**	**ASSESSMENT**
Purpose:	During implementation. Formative – continuously drawing lessons and insights to adjust implementation.	After implementation. Summative – evaluating how policies/programmes have been implemented.	During and after implementation. Can be both formative and summative to review outcome/impact.
Aimed at:	Operations and management.	Policy-making and leadership.	Curriculum designers, teachers, course providers.
Focus on:	Account of what and how things have been done and immediate results and lessons.	Effectiveness of policies and strategies vis-à-vis goals and targets.	Learning objectives, teaching-learning methods and materials, outcomes and impact.

[5] Monitoring can take place regularly during policy implementation to check progress and to identify issues and lessons to adjust the implementation processes. Evaluation is carried out after the completion of specific stages of implementation; to reflect on what has and has not been accomplished; and the factors and constraints. Assessment occurs when we review the outcomes and impacts of curriculum design and various teaching/learning processes and materials.

Information regarding:	Inputs and process.	Outcomes and impact.	Learning achievements per objectives, teaching-learning processes.
Indicators on:	Resource inputs, access and participation, efficiency, quality of delivery.	School capacities; graduates; learning achievement, socio-economic changes.	Learning results according to teaching-learning methods and materials

Note: Evaluation indicators may overlap with monitoring and assessment indicators.

Source: Compare UNESCO, 2011: Systemic Monitoring of Education for All. Training Modules for Asia-Pacific. Bangkok, UNESCO, **access:** http://uis.unesco.org/sites/default/files/documents/systematic-monitoring-of-education-for-all-training-modules-for-asia-pacific-en.pdf

2.1 What is an indicator?

An indicator is used to show – or indicate – the state of a situation or condition, expressed as a numerical (for example, 90 per cent) or categorical value (e.g. 'yes' vs 'no'). In the context of monitoring and evaluating education, an indicator is a quantitative metric that provides information, for example, to track performance, measure achievement and determine accountability. It is important to note that a quantitative metric can be used to provide data on the quality of an activity, project or programme.

Indicators help to identify problems and issues, which leads to setting targets and developing strategies to reach those targets. Indicators also serve to monitor progress towards achieving, (or failing to achieve) a goal when comparing the same indicator for the same condition over time.

Indicators also provide an early warning by drawing the attention of policy makers and planners to underperformance in time so they can address systemic issues by implementing strategies to improve a system. Indicators are an essential tool that can describe the characteristics, the effectiveness, the equity, or the trends of a particular aspect of the education system. They also provide an objective representation to evaluate progress and outcomes.

In short, an indicator:

- Enables managing the monitoring of delivering education services;
- Enables objective judging on aspects of the functioning of the education system;
- Enables measuring changes in the education system over time.

For more on indicators, see:

An Introduction to Indicators[6]

An example of using education indicators

Understanding the situation of an education system requires more than a simple counting of the number of schools, students and teachers. Let's take a look at the table for country X.

Table 2: Example of education indicators

	2013	2014	2015	2016	2017
School-age children enrolled	325,781	336,043	346,024	356,508	367,061
Percentage change year-by-year		3.15%	2.97%	3.03%	2.96%
Total school-age population in country X	458,201	468,679	478,594	490,383	501,449
Net enrolment rate (percentage)	**71.1**	**71.7**	**72.3**	**72.7**	**73.2**

Here the 'school-age children enrolled' and the 'total school-age population' are raw data, whereas the 'net enrolment rate' and the 'percentage change year-by-year' serve as indicators.

To explain, this table shows that the number of enrolments increased from 325,781 to 367,061 between 2013 and 2017. This is a total increase of 41,280 students over a period of four years.

Year-by-year, this represents an average annual increase of about 10,000 students, or around three per cent. These figures may indicate steady, positive growth in enrolment. However, because we notice fluctuations with a downtrend (3.15 per cent to 2.96 per cent), the following years would need observation to confirm whether this trend remains.

To calculate the 'net enrolment rate', we divide 'school-age children enrolled' by the 'total school-age population', multiplied by 100 to convert it to a percentage figure. Now we have created the indicator that tells us how many of all school-age children actually enrol in education (expressed in per cent). Therefore, we can observe steady progress in enrolling children over time.

[6] UNAIDS, 2010: Monitoring and Evaluation Fundamentals. Geneva, UNAIDS, access: http://www.unaids.org/sites/default/files/sub_landing/files/8_2-Intro-to-IndicatorsFMEF.pdf

2.2 The essence of a good indicator

Creating an indicator can confront us with the dilemma of setting a standard that accounts as progress. A simple illustration is setting a minimum criterion for learning outcomes.

If the standard for what accounts as a positive learning outcome is set too high, achieving the standard will be beyond the capability of the majority of pupils we are trying to educate.

In consequence, the indicator will show that most fail to reach the set standard – without the ability to diagnose the cause. Conversely, if the standard is set too low, all will pass over the criterion level and the indicator fails to measure increased learning outcomes.

Indicators must be designed in a way to capture differences in performance[7]. A good indicator should be clear and concise. It should focus on a single issue that provides relevant information on a situation; particularly information that provides the strategic insight required for effective planning and sound decision-making[8].

Good indicators should accurately measure what they claim to measure. If it is not feasible to collect data for an indicator, or data that can be collected is/are not meaningful, the indicator will have little or no utility[9].

Furthermore, to be meaningful across systems and countries, an indicator needs to reach a certain degree of consensus on its usefulness and validity.

A good indicator has to be:

RELEVANT: While it is difficult for indicators alone to fully capture the vision behind the proposed targets, indicators should ideally reflect the most critical policy themes in the targets. Across all SDG 4 targets, emphasis has been placed on measuring equity.

ALIGNED: The construct to be measured must be valid and reliable relative to the targets. This means that the indicator must have the same meaning and significance in all settings, ideally measured by a similar question, or item. Measuring constructs that vary across settings poses a challenge for global tracking. It may be possible to measure some elements globally, while others may be best measured at the national, or regional level, with flexibility to adapt constructs to local contexts.

FEASIBLE: Global tracking is most effective when data is collected on a regular basis (though not necessarily annually), and all, or nearly all countries routinely collect data in a similar manner. Infrequent or low coverage of data constrains the ability to track changes

[7] For further discussion on the above topic see: Lewin, K. M., & Sabates, R. (2012, March 23). Who gets what? Has improved access to basic education been pro-poor in sub-Saharan Africa? International Journal of Educational Development, 32(4), 517-528; Lewin, K. M. (2005, July). Taking targets to task: Planning post primary education. International Journal of Educational Development, 25(4), 408-422; Technical Advisory Group of the Education For All Steering Committee. (2014). Towards indicators for a post-2015 education framework. Montreal, Canada: UNESCO Institute for Statistics.

[8] UNAIDS, 2010: An Introduction to Indicators. Geneva, UNAIDS, access: http://www.unaids.org/sites/default/files/sub_landing/files/8_2-Intro-to-IndicatorsFMEF.pdf

[9] ibid.

over time. Collecting data over time must also be feasible and cost-effective.

COMMUNICABLE: The indicators must be easily understood by a wide audience and lend themselves to the development of a clear narrative regarding progress towards the goal and its targets. The indicators for education should facilitate clear and transparent reporting about the objectives and achievements at each stage of implementation.

INTERPRETABLE: The indicator values and their changes over time must be easily understood to ensure correct interpretation in education sector planning. Limitations of an indicator should also be visible to prevent misinterpretation.

2.3 Defining education system and education service indicators

Education indicators can be derived by looking at education from two different perspectives:

a. Education as a **SYSTEM**; and
b. Education as a **SERVICE**

2.3.1 Education indicators from a system's perspective

For purposes of monitoring education as a system, education indicators (and indicators in general) are broadly classified into input, process, output, outcome and impact indicators. Input and process indicators are used for monitoring whether appropriate education policies have been issued and adequate resource inputs have been allocated and implemented. Output, outcome and impact indicators are used to evaluate the results, effectiveness and progress of education policies and their implementation.

INPUT INDICATORS: In an education system, input indicators f**ocus on the human, financial and material resources that have been assembled and channelled into educational activities**. Such resource inputs are used to organize the provision of educational services in order to create intermediate outputs such as classes and learning activities. Examples of education input indicators include the percentage of the government budget allocated to education, pupil-teacher ratios, pupil-classroom ratios, the percentage of pupils without textbooks, etc.

PROCESS INDICATORS: In an education system, process indicators show **how the resource inputs discussed above have been utilized to deliver educational services**. These indicators show what actually happened in the classroom and during teaching/learning processes. The students' attendance rate at school, average number of class hours they participated in as a percentage of official class hours and the frequency of use of teaching/learning materials are some examples of process indicators. Other process indicators may include repetition rates and drop-out rates.

OUTPUT, OUTCOME AND IMPACT INDICATORS: These measure **the result of a particular set of interventions** (policies, learning topics, financial aid, etc.). Improvement in these types of indicators should determine the success of the interventions. Output and outcomes should relate to specific objectives, but there may be different levels of objectives. A distinction between output, outcome and impact should be made in education to distinguish the level of results[10].

> **OUTPUT INDICATORS:** These describe **the direct result of the products, or services delivered in education**. Output indicators can provide measures of efficiency and describe the relationship between investments in an education activity and its result[11]. Output indicators are seen as a more direct 'outcome' of schooling, directly measured, with for example, achievement tests and/or the number of students who have graduated, potentially further distinguished by the score with which they graduated[12]. They typically describe total numbers.
>
> **OUTCOME INDICATORS:** Outcome indicators are used to evaluate the **end results of all the educational inputs and processes**. Outcome indicators may be used to evaluate the degree of access to educational services and the degree of satisfaction with the services received. Examples of outcome indicators include intake rates, enrolment ratios, completion rates and GPI (Gender Parity Index).

IMPACT INDICATORS: Impact indicators show the effect implemented activities in education have on the situation of individuals, families, communities, the nation and society as a whole. For example, earnings, employment, contribution to productivity, improved health, decreased crime and other non-monetary long-term outcomes associated with the availability and completion of a quality education. A specific example is the adult literacy rate. It shows the proportion of the adult population who have learnt to read, write and comprehend written text and who can continue to learn using written words. Other impact indicators include those that measure the effect of increased knowledge and skills, emotional development and the impact of changes in students' values, attitudes and behaviour on their family, community, society and the nation.

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[10] Parsons, Jim, Caitlin Gokey, Monica Thornton, 2013: Indicators of Inputs, Activities, Outputs, Outcomes and Impacts in Security and Justice Programming. London, UKaid, access: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304626/Indicators.pdf; Vos, Rob, 1996: Educational Indicators: What's To Be Measured? Indes Working Papers Series I-1. Washington, D.C., Indes Working Papers, access: https://pdfs.semanticscholar.org/3ff9/7df813e86dbaf55544e389c0c6c582757005.pdf

[11] Parsons, Jim, Caitlin Gokey, and Monica Thornton, 2013: Indicators of Inputs, Activities, Outputs, Outcomes and Impacts in Security and Justice Programming. London, UKaid, access: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304626/Indicators.pdf

[12] Scheerens, Jaap, 2011: Measuring educational quality by means of indicators. In: Perspectives on educational quality: illustrative outcomes on primary and secondary schooling in the Netherlands, pp 35-50. Dordrecht, Springer, access: https://www.springer.com/cda/content/document/cda_downloaddocument/9789400709256-c2.pdf?SGWID=0-0-45-1132975-p174098969; UNESCO, 1998: Monitoring progress towards education for all: a methodological guidebook. Paris, UNESCO, access: https://unesdoc.unesco.org/ark:/48223/pf0000112816?posInSet=6&queryId=9c8838b6-bacd-49d9-978d-f40e6f65adb7 (page 3).

Box 1: Outputs, outcomes or impacts?[13]

There is often confusion about the differences between outputs (products and services) and outcomes (the short- and medium-term benefits that those products, or services deliver). One way to distinguish between outputs and outcomes is to consider whether the indicator describes effectiveness.

If yes, we are talking about an outcome indicator. For example, installing computers in every classroom (as resource inputs) has led to an increase in the use of interactive presentations in teaching (the output). However, this does not offer any indication of whether the new technology has improved the teaching effectiveness yet (the outcome).

The actual short-to-medium term effect may be an increase in ICT skills among the students. Going one step further, the potential long-term impact might include an increase in students enrolling in technical education – be it in Technical and Vocational Education and Training (TVET) or university.

The following figure shows the contents of an indicator framework based on an Input-Process-Output/outcome (IPO) model.

Figure 3: Indicator framework-based Input-Process-Outcome model

<table>
<tr><th colspan="6">CONTEXT</th></tr>
<tr><td colspan="3">Demographic, social and economic context of education</td><td colspan="3">I.e.: Education Attainment, Adult literacy rates</td></tr>
<tr><th colspan="2">INPUTS</th><th colspan="2">PROCESSES</th><th colspan="2">OUTCOMES</th></tr>
<tr><td>Financial and human resources invested in basic education.</td><td>I.e: Education expenditure per student.</td><td>Access, participation, progression, transition from lower to upper levels.

Learning environments.</td><td>I.e: Overall participation in formal and non-formal education.

I.e: Total intended instructional time for pupils by level of education; instructional time per subject</td><td>Achievements.</td><td>I.e: Mathematics, science, reading achievements of students in a given grade or level of education.</td></tr>
<tr><td colspan="2">Examples</td><td colspan="2">Examples</td><td colspan="2">Examples</td></tr>
</table>

[13] With Inspiration from: Parsons, Jim, Caitlin Gokey, Monica Thornton, 2013: Indicators of Inputs, Activities, Outputs, Outcomes and Impacts in Security and Justice Programming. London, UKaid, access: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304626/Indicators.pdf (page 15)

roportion of GDP spent on education. ducation expenditure per student. roportion of public/private investment education. chool-level financial and material sources (Building facilities, computer quipment, water access, etc.). eachers working conditions (salaries, orking times, training).	GIR/NIR, GER/NER, ANER. Promotion, dropout and repetition rates. Out-of-school rate by level of education. Pupil-teacher-ratios by level of education. Average class size. Proportion of trained/ qualified teachers. Instruction time per subject.	Graduation rate. Completion rate. Survival rate to the last grade of basic education. Percentage of students achieving functional minimum competencies in mathematics, reading, science.

2.3.2 Education indicators from a service's perspective

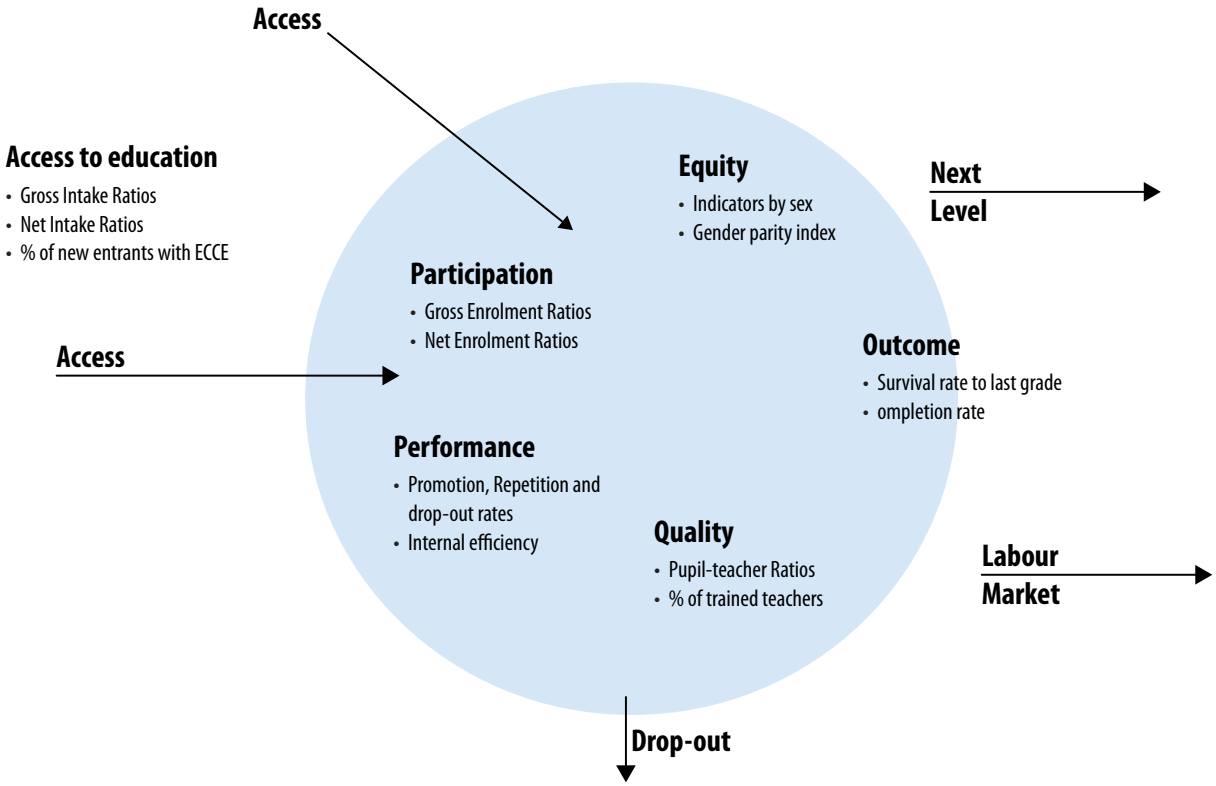
To monitor education as a service, education indicators can be distinguished by the dimension of a part of education that is meant to be measured. We identify dimensions of education service when thinking of questions, for example:

- *Do all children have access to education?*
- *Are all students able to actively participate in education?*
- *Do all students benefit from a good quality education?*
- *Are all students treated with equality?*
- *Is the management of education efficient and effective?*
- *Are the outcomes of education relevant and satisfactory?*

In consequence, and for the sake of structuring the information, education service indicators are organized as indicators on:

- School characteristics, environment and facilities;
- Access and participation;
- Retention and progress within the education system;
- Teaching and learning resources;
- Teaching-learning processes;
- Quality of education;
- Equity;
- Learning achievement and outcomes;
- The impact of education.

Figure 4: Dimensions of education service indicators



Source: UNESCO, 2011: Systemic Monitoring of Education for All. Training Modules for Asia-Pacific. Bangkok, UNESCO, Access: http://uis.unesco.org/sites/default/files/documents/systematic-monitoring-of-education-for-all-training-modules-for-asia-pacific-en.pdf

2.3.3 Selecting an indicator

We can use indicators to monitor the overall situation, to examine specific aspects and concerns and to consider the implications of decisions. Often more than one indicator is required to explain a certain issue. For example, we monitor participation in school through the use of a number of ratios, for instance gross, net and age-specific enrolment ratios.

Sometimes, one indicator can be used to depict several issues. For example, we use the pupil-teacher ratio to check whether there are enough teachers for the number of students. However, this indicator can also be used as a proxy for the quality of education as a lower pupil-teacher ratio will indicate a teacher can dedicate more attention to each pupil – provided all children are actually attending school.

Knowing how to select the most appropriate indicator for a specific purpose is important, because if the wrong indicators are chosen, they can lead to confusing, misleading or even contradictory conclusions.

When we choose indicators, we need to ensure they are based on the right concept,

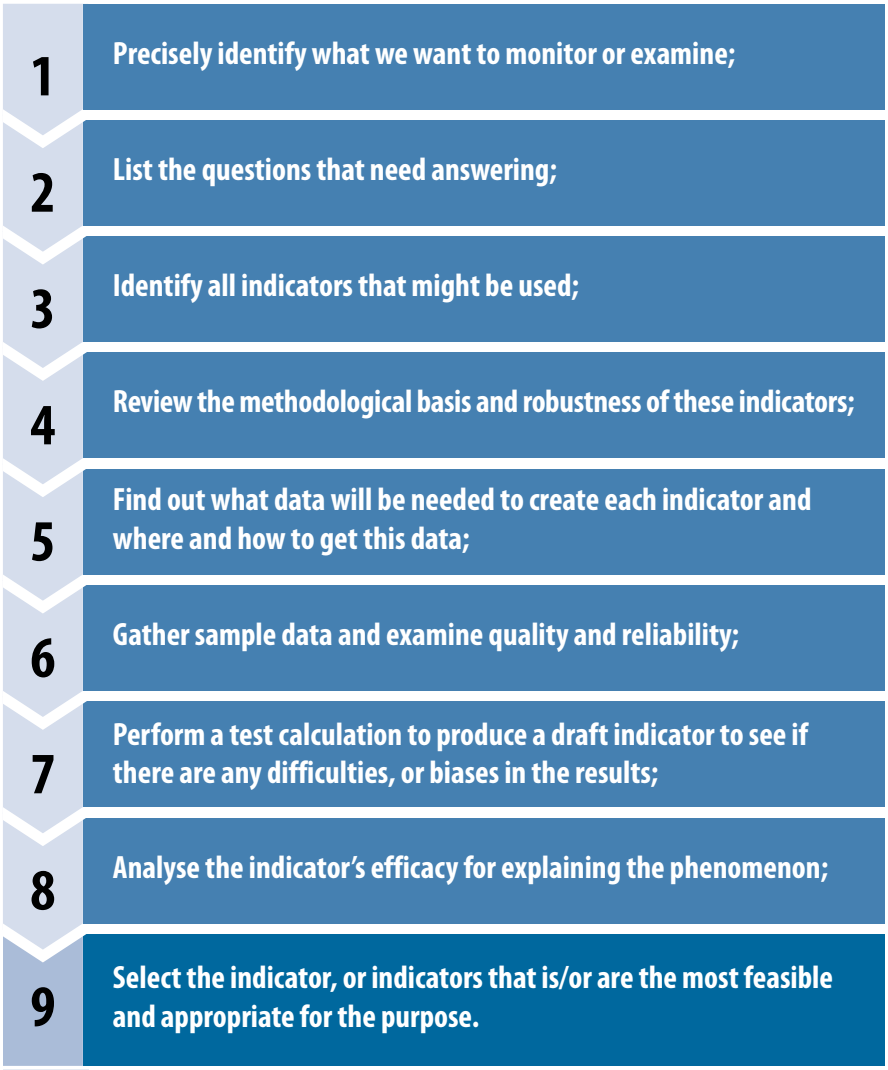
definition, analytical objective, data type, data source and angle of interpretation.

Think in terms of:

- *Is the indicator relevant in its concept to measure the issue looked at?*
- *Has the indicator a clearly defined purpose and limitation?*
- *Is data available and is the available date reliable?*
- *Can the indicator be rigorously calculated?*
- *Can the indicator be easily presented and interpreted?*

The identified steps below should aid in selecting an indicator practically:

Figure 5: Guiding steps to select education indicators



Source: UNICEF and UIS, 2018: Tanzania Qualitative Study Report. Global Initiative on Out-of-School Children.

After selecting a suitable indicator, it is recommended to capture the information needed to generate the indicator, as well as its purpose, application and limitations. Collecting this information will allow us to create an indicator document that provides other users of the indicator the information to replicate the indicator. We can also call this the metadata.

Elements to keep in mind when creating an indicator metadata catalogue

The development of an indicator document on education and SDG 4 helps organize and identify the information that is required to generate indicators. It guides the data collectors, producers, analyst and users. Such a document should include the following[14]:

- **DEFINITION**
- **PURPOSE**
- **METHOD AND FORMULA OF CALCULATION**
- **REQUIRED DATA**
- **POSSIBLE DATA SOURCES**
- **DISAGGREGATION FOR ANALYSIS OF DISPARITIES**
- **INTERPRETATION**
- **QUALITY STANDARDS**
- **LIMITATIONS AND CONSTRAINTS**

If you have not seen it already, the UIS document; 'Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030' serves the exact purpose of an indicator document and allows countries to apply the exact same standards and procedures, thus, making indicators comparable.

See the following figure for an example and follow it to download the document:

Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030[15]

[14] Note: You can find the latest details for each of the SDG 4 indicators at: http://uis.unesco.org/en/glossary

[15] UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, access: http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

Figure 6: Example of what should be included in an indicator document

4.1.5 Out-of-school rate (primary education, lower secondary education, upper secondary education)

Definition:

Children and young people in the official age range for the given level of education who are not enrolled in primary, secondary or higher levels of education. Children and young people who are enrolled in pre-primary education are considered to be out of school.

Purpose:

To identify the size of the population in the official age range for the given level of education who are not enrolled in school in order that they can be better targeted and appropriate policies can be put in place to ensure they have access to education.

Calculation method:

The number of students of the official age for the given level of education enrolled in primary, secondary or higher levels of education is subtracted from the total population of the same age.

$$OSR_n = \frac{SAP_n - \sum_{i=1}^{8} E_{i,AGn}}{SAP_n}$$

where

OSR_n = out-of-school rate for children and young people of the official age for level n of education

SAP_n = population of the official age for level n of education

$E_{ni,AGn}$ = enrolment in ISCED level i of children and young people of the official age for level n of education

Interpretation:

The higher the number of out-of-school children and adolescents, the greater the need to focus on improving access to education. Some children have never been in school or may not eventually enrol as late entrants. Other children may have initially enrolled but dropped out before reaching the intended age of completion of the given level. When disaggregated by sex, location and other characteristics, this Indicator can identify excluded population groups.

Type of data source:

Administrative data, household surveys.

Disaggregation:

By age or age-group and sex (administrative data); by age or age-group and sex, location, and socioeconomic status (household surveys) and others as available.

Data required:

Enrolment by single year of age in each level of education, population estimates by single year of age and data on the structure (entrance age and duration) of each level of education.

Data sources:

Administrative data from schools or household survey data on enrolment by single year of age; population censuses and surveys for population estimates by single year of age (if using administrative data on enrolment); administrative data from ministries of education on the structure (entrance age and duration) of the education system.

Limitations and comments:

Inconsistencies between enrolment and population data from different sources may result in inaccurate estimates of out-of-school children and adolescents. Data from household surveys conducted late in the school year where ages are recorded at the enumeration date may result in over-estimates.

Source: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, Montreal, UIS, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

3 Conducting Statistical Data Analysis

Monitoring SDG 4 follows the same principle and requires dissecting the SDG 4 indicators according to the different concepts they address (learning, participation, completion, teachers, resource inputs and educational processes, etc.) and analysing them by:

- Characteristics of distribution and/or patterns;
- Differences, disparities and imbalances;
- Changes over time and space;
- Progress and shortfalls against targets and plans.

This dissection helps identify causes and actions to address pertaining issues. Data analysis for monitoring Education 2030 goes beyond covering spatial and temporal data by further disaggregating for age, sex, wealth, disability, ethnicity, mother tongue/first language, second/other language(s) and migration, or refugee status.

When we conduct an analysis of statistical data, we must at all times keep in mind our possibilities for disaggregation, as only then we can capture the remaining issues to tackle in education. Let's take a look at the steps for our data analysis in the next section.

3.1 Five steps for data analysis

Step 1: Objectives of data analysis

Before initiating data analysis, we must spell out clearly the objectives of the data analysis, such as what questions should the data analysis answer? For example, should data analysis examine potential gaps in learning achievements, while distinguishing between rural and urban areas? Should it take a stock of completion of basic education? Should it compare the progress between various social groups? Or should it provide analysis on whether there are enough human and technical resources to implement a programme/programmes effectively?

Step 2: Selection of Indicators

After having a clear purpose of the data analysis with the relevant questions that we seek to provide answers for, the second step is to select indicators for the analysis. The

selected indicators should be able to answer directly the objective in question. The data needed for the indictor must also be available, or initiative must be taken to collect the data. Example indicators include the completion rate, or the survival rate, to analyse the performance of the education system under scrutiny.

Step 3: Processing the data

Data processing is the next bigger step in data analysis which encompasses the extraction and merging of raw data from available data sources and, if required, to correct erroneous data. While preparing the data, one should thoroughly check for completeness and coverage (e.g. data for all the areas and groups, for all types of public, private and other types of education). Processing data means to prepare all the data from different sources for one singular database with which to calculate the desired indicator(s).

Box 2: What if data is missing?

Data coming from various sources – especially administrative data, based on school censuses, or other methods – would invariably see some degree of data missing for some of the variables. If data is missing and not properly indicated, or substituted, this can cause the analysis to be biased. The question is: How should we deal with missing data?

1. Recover the missing values

The obvious solution at hand is to contact the participants and ask them to fill out the missing values. For in-person studies, having an additional check for missing values before the participant leaves helps. So, if there is data missing for some of the school, we need to contact the participants so that the missing data can be filled.

2. Substitute the missing values

Imputation is a technique to replace missing values with substitute values. There are different types of imputation techniques (see the annex of this module). To explore some of the techniques to substitute missing values, this Module's annex will provide an overview.

3. Delete the missing values

Also called 'list-wise deletion', this method deletes all data from any participant with missing values. If the sample is large enough, one may delete data without substantial loss in a statistical meaning. However, we must be certain that the values are missing at random and that you are not inadvertently removing a specific group of participants for which there might be reasons why no data exists.

Note: For more information, see the technical note at the end of this module.

Step 4: Producing summary statistics

Once data has been processed, summary statistics can be created to describe the data; to identify patterns for trends and issues; or plainly to describe a situation. This can also be called 'descriptive statistics' because these statistics 'describe' the data we are looking at. We can produce these statistics by:

- Transforming raw data to indicators, e.g. from total numbers to percentages, rates and ratios (this includes anonymizing data);
- Sorting and grouping data by common social, economic and demographic characteristics;
- Presenting the indicators in tables, charts and flow text to enable easy interpretation.

These statistics provide summary indicators on the average, range, median, mode and standard deviation. These summary statistics help to understand a situation to carry out decisions.

As required, every indicator can be disaggregated by many aspects, such as male versus female; rural versus urban; districts, by year; by language, etc. This will allow us to analyse the indicator in many ways.

Box 3: A common misunderstanding on averages

A common problem in dealing with quantitative data is the misinterpretation and reporting of 'averages'. Averages have been reported as means, medians and modes. However, there are important differences:

1. The MEAN: is a mathematically derived average of values, by adding up all values and dividing them through the total number of values. The mean is the most commonly used average. Note that most of the time when people talk about the average, they refer to the mean.

   vi. The mean is a helpful measure of centrality when we want to determine, for instance, the average time spent in years to complete a full cycle of basic education, including repetition and potential intermitting dropout. If the mean (time spent in years) results are too high than the foreseen years for basic education, the mean can indicate a problem.

   vii. The mean can also help determine a comparison of different population groups for males and females regarding their average respective years spent in education. The same can also be done for other disaggregation.

2. The MEDIAN: is the middle value among all values; the median represents the value where half of all values are below and half of all values are above; it is significant to note that in order to determine the median, all the values must be sorted first (otherwise the highest, or lowest value might end up in the middle).

i. The median can be relevant when a sample has very high (or very low) outliers. Income is a classic example. For instance, determining the average teacher salary at a school can be distorted by individual high salaries, even though the majority of teachers earn a low salary. Using the median (the salary value in the middle of all salary values) can report a more accurate average than the mean.

ii. Determining the average age among primary school students may be distorted when a number of students are much older than most primary students (due to late school entrance and repetition). In such a case, the median can report a more accurate age average.

3. The MODE: is a frequency-based conclusion of all values, or a measure of frequency; it is the value that occurs most often; that means in reverse, if no value in the list is repeated, then there is no mode for the list.

i. The mode can be relevant when we want to determine which school has the most incidents of bullying, corporal punishment, harassment, violence and/or sexual discrimination. Knowing the mode (the school with the most incidents) would serve as an indication were urgent intervention has to be prioritized.

ii. The mode can be relevant when we want to determine which school has participated the most often in the annual UNESCO-Japan Prize on Education for Sustainable Development. Knowing which school participated the most often in the competition would serve as an indication that this school might have a special curriculum and/or pedagogy in this area.

An analysis depending on each of these averages results in different information for different responses in practice and since this mistake is common but easily avoided it is therefore mentioned.

Step 5: Analysing the statistics

Summarizing descriptive statistics in education provides us with an initial image of the situation at the school, district, country, or even global level. However, at times it is necessary to analyse the retrieved information deeper regarding differences among and relationships between variables of populations. Going for more complex analysis allows us to test hypotheses and generalize results of a population as a whole.

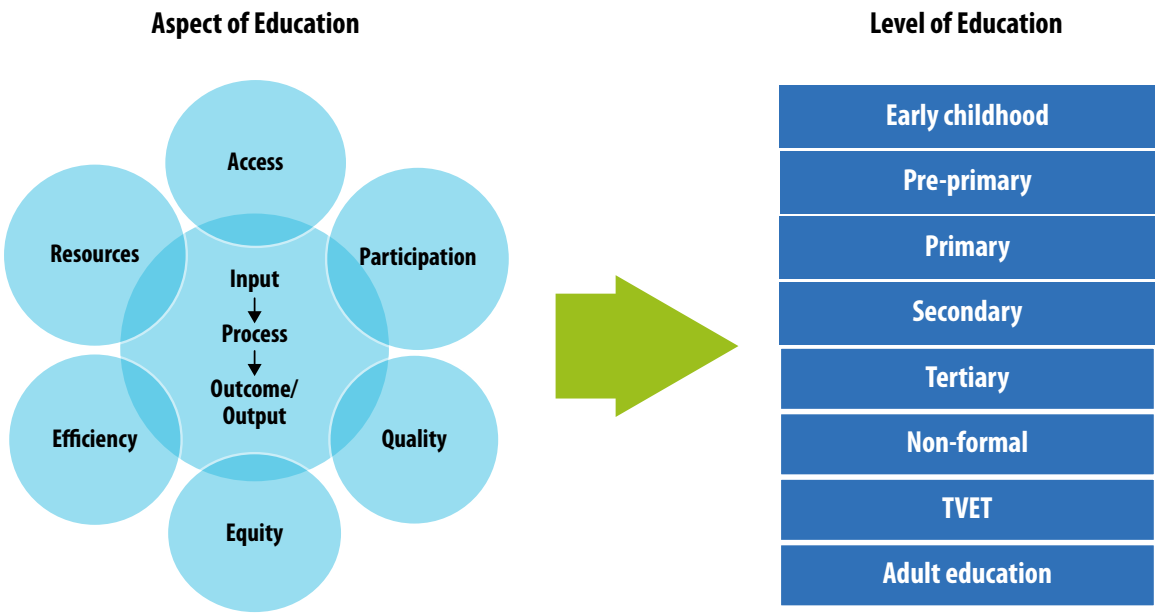
There are several analysis types, some of which are widely known. Table 3 identifies some of the most important data analysis types. We will find explanations in the next section to provide an understanding of their purposes.

Table 3: Different types of statistics used for different types of analysis

ANALYSIS	STATISTICAL TOOL EXAMPLES	PURPOSE AND PERIODICITY
Progress analysis	Time series, percentage point increase, annual growth, etc.	Analysis of trends, of changes overtime.
Gap analysis	Distance from target, population comparison.	Assessing the differences in performance, or results.
Relationship analysis	Correlation (coefficient), regression.	Analysis of whether or not variables influence one another.
Forecasting analysis	Regression, moving average.	Prediction of a future value/ result/outcome. (Can be based on trends).
Multivariate analysis	Causal models.	Analysis of multiple variables at a time.
Equity Analysis	Employs the above analysis techniques, including distributions, parity indices, ranges, percentiles.	Looking into different population groups.

All these analysis types essentially serve the purpose of monitoring the different aspects of education and for all levels of education. It is important to keep in mind that each level of education needs to be evaluated for each of the aspects of education (see Figure 7 for a mind map).

Figure 7: A mind map to remember that all aspects of education should be considered for each level of education



3.2 Statistical analysis tools

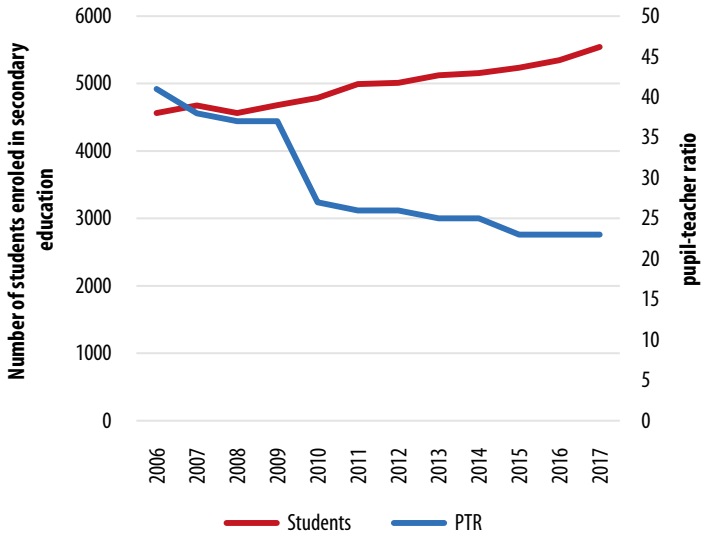
The following section introduces the aforementioned types of analysis in order to familiarize learners with the information these types of analysis can add to the monitoring of education. The explanations, however, are not meant to teach the mathematical procedures to create these types of analysis. Professional statisticians will be capable of creating these types of analysis.

3.2.1 Progress Analysis

Time series

In essence, the time series analysis tells us about the development of an observable phenomenon expressed by its indicator value over time. Meaning, this analysis compares values over time, as long as the definition of the data and the collection methods were consistent. We can create summary tables and charts to visualize the development, ordered by time (chronological order). In Figure 8, we can identify how the number of students and pupil to teacher ratio changes over the years.

Figure 8: Example of time series analysis for number of students; number of teachers; pupil-to-teacher ratio (PTR)



Year	Students	PTR
2006	4563	41
2007	4675	38
2008	4563	37
2009	4682	37
2010	4786	27
2011	4992	26
2012	5012	26
2013	5123	25
2014	5156	25
2015	5234	23
2016	5345	23
2017	5543	23

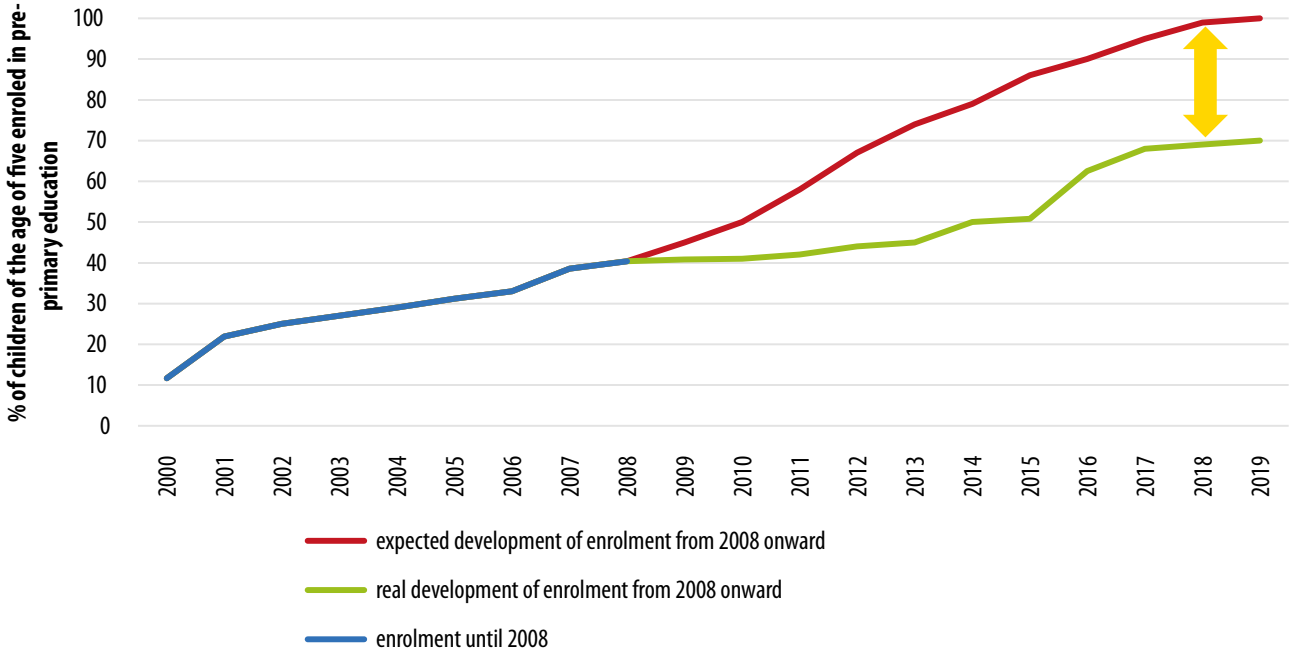
Note: Hypothetical data

3.2.2 Gap analysis

Distance from target

Gap analysis in education can serve different purposes. It can analyse the gap between a current and an expected result. Gap analysis can take advantage of the time series analysis by comparing expected development with the actual development over time. For example, it is expected that 100 per cent of children of the age of five have enrolled in pre-primary schools by 2019. In reality, 70 per cent have enrolled (Figure 9). The distance between two indicator values at a given time is the gap.

Figure 9: Fictional example of a gap analysis for enrolment in pre-primary education



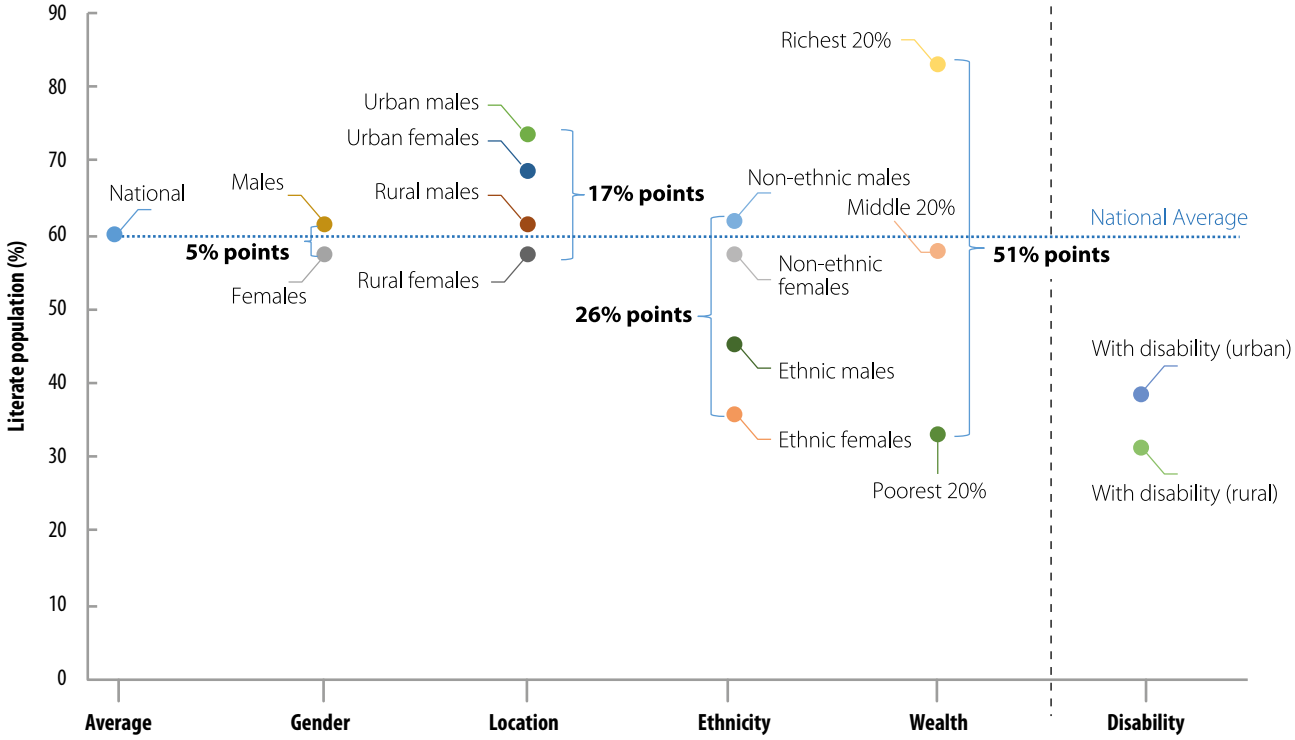
Note: Hypothetical data

Population comparison

Gap analysis can also serve to compare different groups with one another at a given time to identify which group shows higher or lower characteristics, tendencies or achievements, depending on the indicator in question.

In the following example, gaps can be identified for social groups by gender, location, ethnicity, wealth and disability. Furthermore, within these groups' location and gender difference helps further identify gaps.

Figure 10: Literacy rate comparison for a population distinguished by gender, location, ethnicity, wealth and disability



Source: UNESCO, 2018: Paving the Road to Education. A Target-by-Target Analysis of SDG 4 for Asia and the Pacific. Bangkok, UNESCO.

3.2.3 Relationship analysis

Regression

Regression analysis is a statistical technique to examine the relationship between variables. Usually, we seek to ascertain whether a variable has an effect upon another variable.

Regression analysis is used to estimate the strength and the direction of the relationship between two (or more) variables. Thereby, it is distinguished between a dependent variable Y (the variable that is meant to change depending on the change of the other variable) and the independent variable X (the variable believed to influence the other variable).

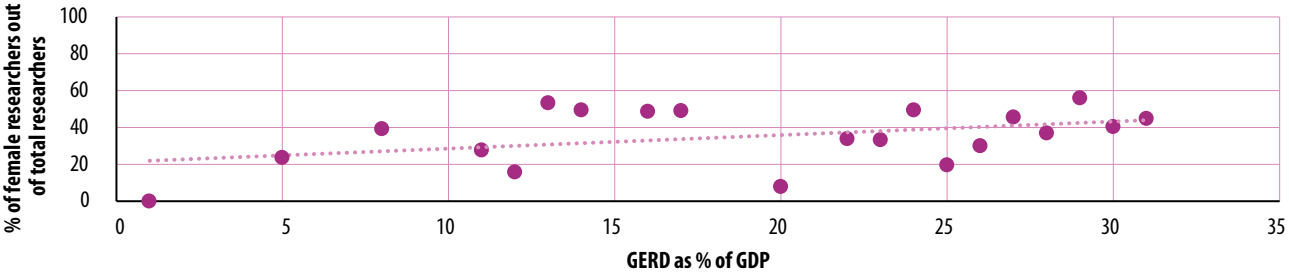
The two basic types of regression analysis are:

- Simple regression analysis: This is used to estimate the relationship between one dependent variable and one independent variable. For example, we can test whether increasing tuition fees will lead to decreasing enrolment numbers; or whether an increase in teachers will lead to better learning achievements.

- Multiple regression analysis: This is used to estimate the relationship between a dependent variable and two or more independent variables. For example, the relationship between a teacher's salary; the years of teacher training; and the class size (student head count); and how these impact on learning achievements. Multiple regression analysis introduces several complexities, but may produce more realistic results than a simple regression analysis.

Regression analysis is useful when we have to identify the impact of a unit change in the independent variable on the dependent variable. The regression types can be further distinguished by being linear or non-linear. The latter requires a more complex mathematical modelling to describe a noticeable pattern in your data (for example a U-shape of the data in your scatter plot, or a circular scatter of your data). Note that regression analysis is also important for forecasting.

Figure 11: Simple linear regression showing how expenditure on research and development increases the percentage of female researchers among the total of researchers in Asia-Pacific (each dot represents a country)



Source: UNESCO, 2019: International Day of Women in Science. Factsheet. Bangkok, UNESCO.

Correlation

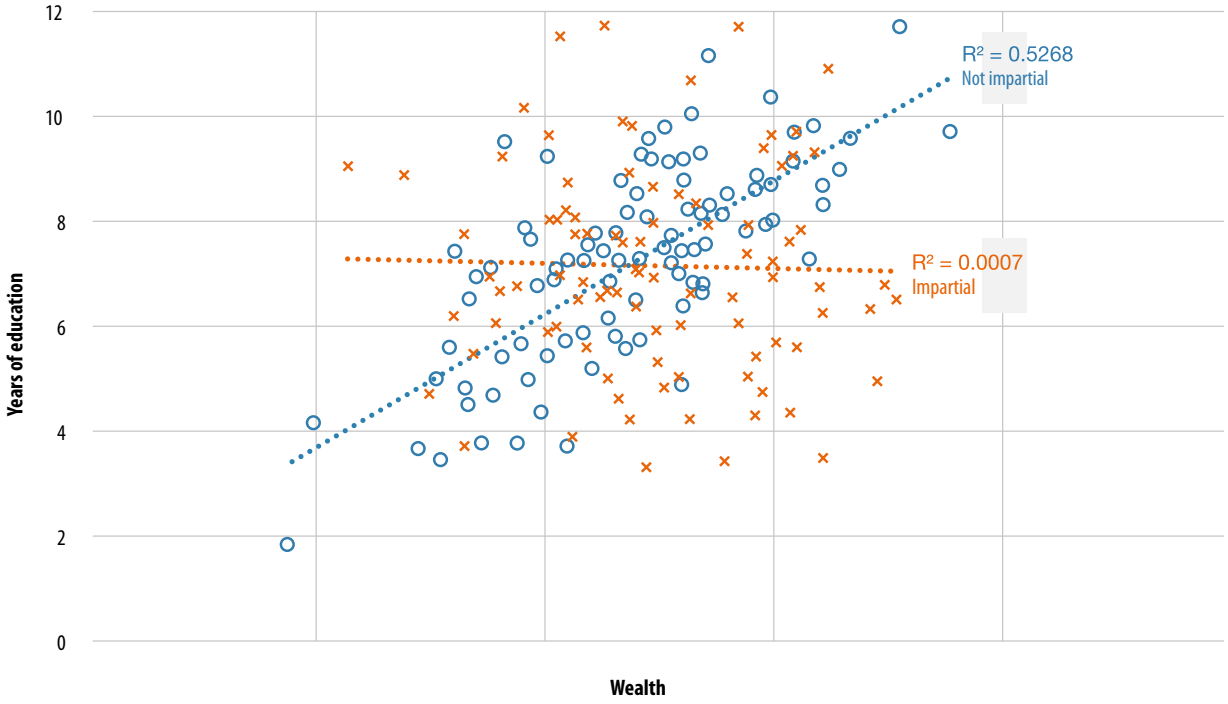
Correlation, or coefficient analysis is used to study the strength of a relationship between two numeric continuous variables (e.g. age, test scores, household income). This analysis is useful to quantify the degree to which two variables are related. Depending upon the values measured, this can be expressed as a positive or negative correlation.

- Positive correlation means that one variable *increases* with the other.
- Negative correlation means that one variable *decreases* when the other *increases*.

The correlation is expressed as between +1 (highest positive correlation) and -1 (highest negative correlation). At a value of 0, there is no correlation. Values closer to zero highlight a weaker/poorer correlation.

Note, that it is often misunderstood that correlation indicates cause and effect. This is not the case because other variables that are not considered in this analysis (e.g. environmental factors) may have impacted on the results.

Figure 12: Impartiality of education with respect to wealth



Note: Hypothetical data.

Source: UIS, fhi 360, Oxford Policy Management and Research for Equitable Access and Learning (REAL), 2018: Handbook on Measuring Equity in Education.

3.2.4 Forecasting

Regression forecasting

Forecasting relies typically on linear regression analysis to help predict future values from past values (e.g. enrolment numbers, budgetary spending). Statistical analysis often uses a linear relationship to predict the average value *Y* for a given value *X*.

A forecasting analysis rests on the assumption that the present circumstances will continue to operate in the future, or at a different place. Forecasting can therefore apply to time and also space.

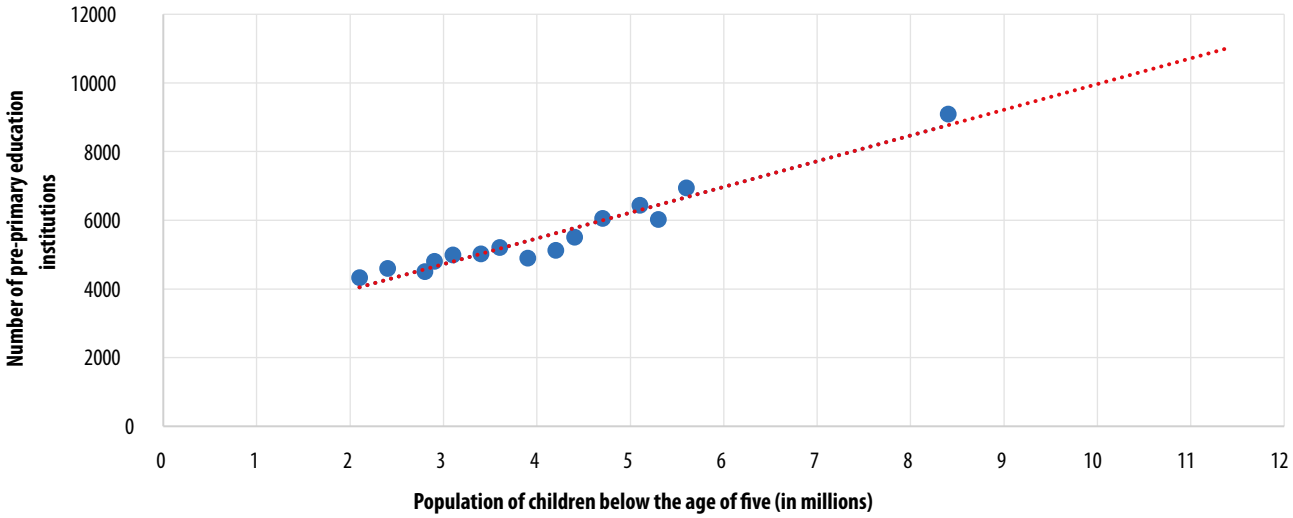
The assumption that the same circumstances apply is often valid when forecasting short-term results, but it falls short when creating medium to long-term forecasts. The further out we attempt to forecast, the less certain we become of the forecast.

Equally, while we may forecast assumptions relating to a location within a country (e.g. number of schools predicted in a district), the same prediction may likely not hold true for a different country due to different circumstances in the other country.

The following are fictional examples with which we can forecast the average number

of pre-primary education institutions in a given district (example 1), or the number of pre-primary intuitions over time (example 2), judging by the known number of children below the age of five and the known number of pre-primary institutions.

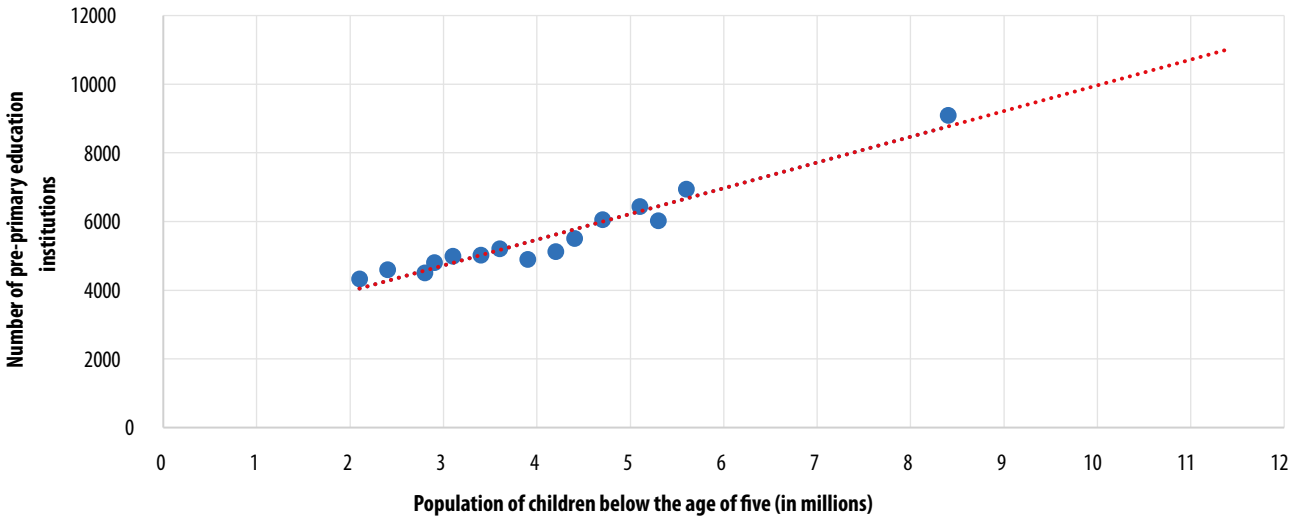
Figure 13: Example 1 of forecasting the number of pre-primary education institutions based on district information



Note: Hypothetical data

The value of the presumed dependent variable Y can be calculated by the function describing formula 'y = 749.2x + 2475.2.' If the population of a district were to increase to 11 million children under the age of five, we can expect to find about 10,716 pre-primary education institutions.

Figure 14: Example 2 of forecasting the number of pre-primary education institutions based on annual statistics



Note: Hypothetical data

The value of the presumed dependent variable Y can be calculated by the function describing formula 'y = 40.543x + 4890.5.' If the total population of children below the age of five were to increase to six million over time, we can expect to find about 5,134 pre-primary education institutions.

3.2.5 Multivariate analysis

Causal model

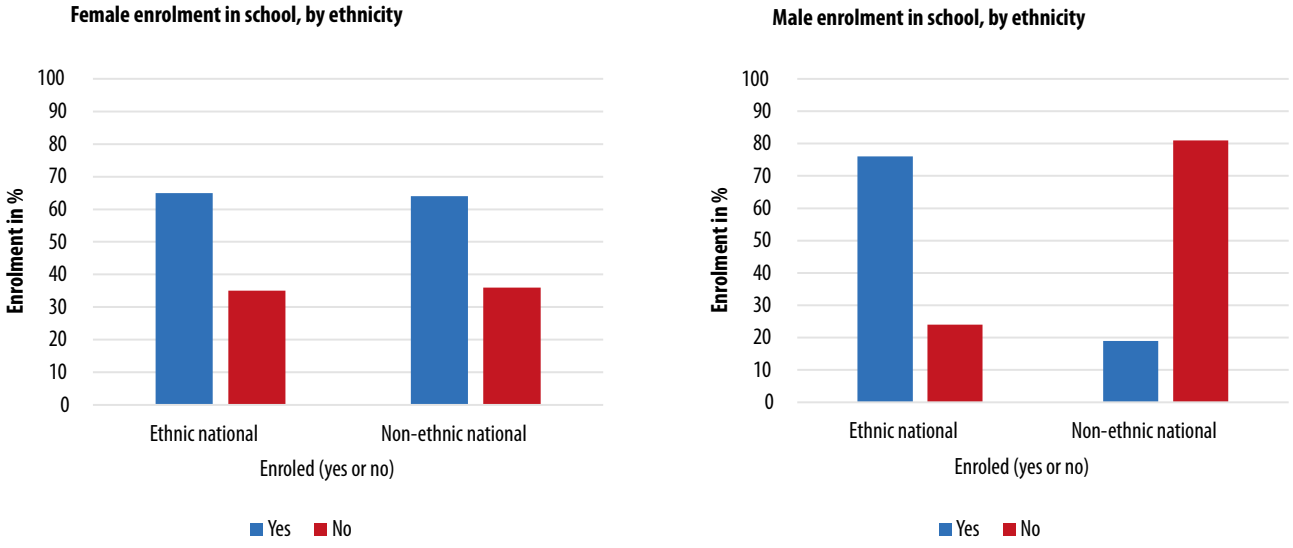
There are a variety of complex mathematical methods of analysis to test whether and how several variables influence one another. For the purposes of monitoring education (unlike research in education), mathematical modelling of multidimensional variables is rarely, if ever needed. There is, however, a technique that is appropriate in exploring, explaining and presenting multivariate analysis.

CROSS TABULATION of two variables differentiated by a third variable is a simple way of analysing whether or not a third variable influences a relationship between two variables. This method requires having identified a previous relationship between two variables, for example, through a preceding correlation analysis.

For example, if we are controlling for the effect of gender on the relationship between enrolment in school and ethnicity, we will produce two partial tables, one for male respondents and another one for the female respondents. While we can never be absolute certain about an underlying cause in multivariate analysis, it will allow us to assume a suggested relationship.

Figure 15: Fictional example of a cross tabulation of three variables and their representation

Gender, by ethnicity status / Enrollment status		Females			Males		
		Ethnic national	Non-ethnic national	Total	Ethnic national	Non-ethnic national	Total
Enrolled	Yes (%)	65	64	64.5	76	19	48.7
	No (%)	35	36	35.5	24	81	51.3
	Total (%)	100	100	100	100	100	100



Note: Hypothetical data

Ideally, analysing multiple variables, we are enabled to identify at least tentative causal relationships. In the example above, a causal relationship is suggested with the variable gender in relation to ethnicity and enrolment.

Certain causal effect can be interpreted as follows:

IRRELEVANT EFFECT: When the anticipated result shows no difference for a population disaggregated by two (or more) variables the causal effect is irrelevant.

CONCURRENT EFFECT: When the effect remains the same for a population disaggregated by two (or more) variables, the causal effect is concurrent (e.g. boys have higher enrolment than girls in both urban and rural areas; gender and location have a concurrent causal effect).

CONDITIONAL/INTERACTION EFFECT: When the effect for one population remarkably changes in the face of a second (or more) disaggregation, we speak of a conditional, or

interaction effect (e.g. the difference for boys is magnified with a higher enrolment in urban areas; for girls in the rural areas).

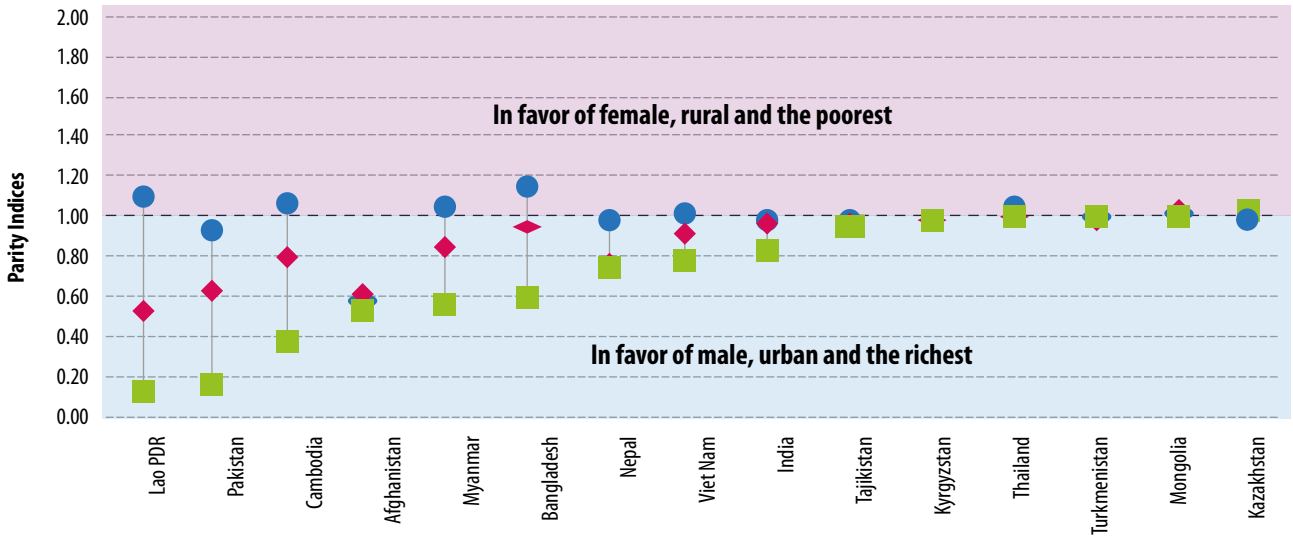
INTERVENING/COMMON EFFECT: When a population, already distinguished by one variable (e.g. gender) shows differences only for another variable (e.g. location), we speak of an intervening or common effect (e.g. the location intervening on the effect of gender).

3.2.6 Equity Analysis

Equity analysis by itself is not a statistical technique but a focus area that employs previous statistical methods to highlight equality, or inequality between opposite populations. Equity itself is a concept, and it can be analysed as such by different means. The above example chart on literacy has already shown one method to analyse equity – or the missing thereof – between groups.

A common approach in monitoring education, as well as social development, is comparing **parity indices** by gender, wealth, location and also migrant, disability and ethnicity status, among others. The parity index is limited to a range between '0' and '2'. The wider the distance from one, either above or below, the greater the disparity between the two values. A gender parity index compares females and males; a location parity index compares rural and urban locations and a wealth parity index compares the poorest 10 per cent of a population and the richest 10 per cent of a population. A value of less than '1' represents disparity in favour of the category in the denominator (males; urban; richest). A value greater than '1' represents disparity in favour of the numerator category (females; rural; poorest), as seen in the example below.

Figure 16: Net attendance rate parity indices for gender (blue), location (red) and wealth (green) at the lower secondary level, 2016



Source: UNESCO, 2018: Paving the Road to Education. A Target-by-Target Analysis of SDG 4 for Asia and the Pacific. Bangkok, UNESCO.

Analysing equity can be approached from several more angles: meritocracy, minimum standards, impartiality, equality of condition and/or equality of distribution. Analysing equity, in the end, depends on the actual measure.

For the purpose of this training manual, the different equity angles will find a brief description. At the end, we will provide you with a link to the Handbook on Measuring Equity in Education for further reading.

MERITOCRACY means that educational opportunities are distributed on the basis of merit, which is commonly applied in the education system (in particular higher education). Examinations are applied to measure merit, although they cannot serve to evaluate a student's real ability.

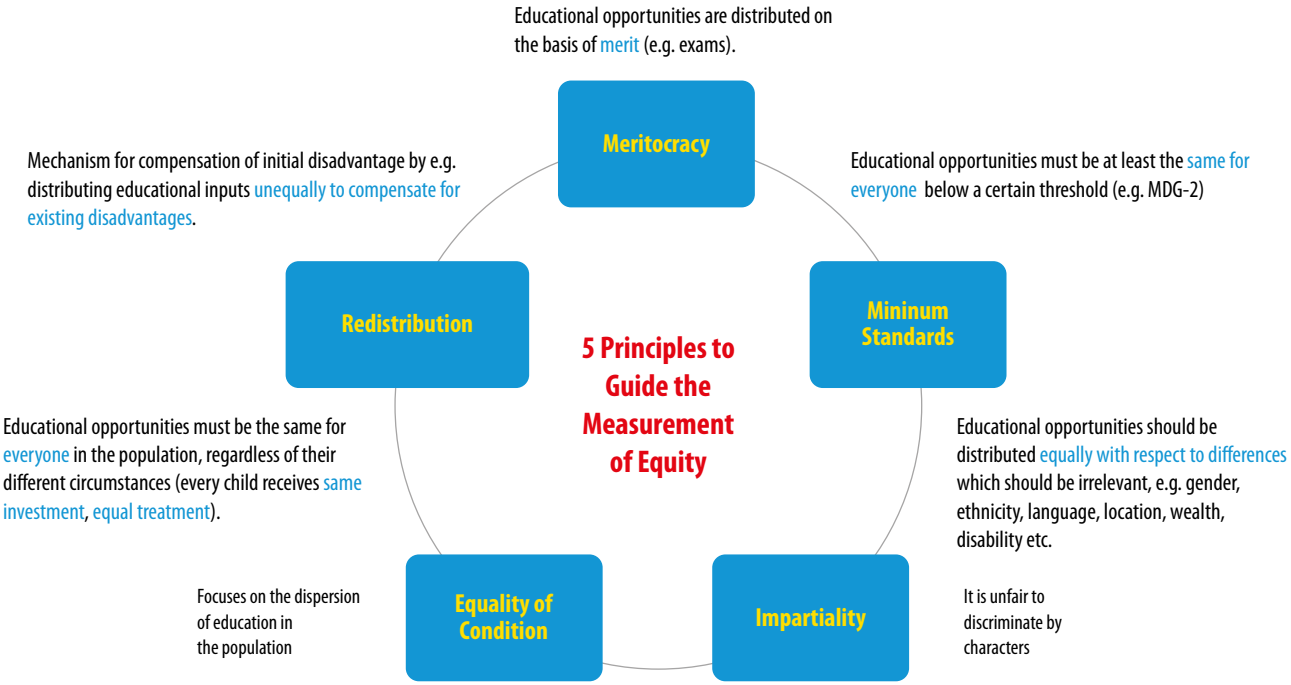
MINIMUM STANDARDS look at whether or not a condition is true for groups, such as being enrolled, or to have completed primary education. This measure is usually taken when an agreement was made on a least condition that must be fulfilled by everyone (e.g. access to free education).

IMPARTIALITY quantifies a relationship between an education indicator and one (or more) measures of circumstance (e.g. wealth, gender, ethnicity, etc.). Perfect impartiality is given when any statistical relationship with education is absent. Impartiality can be analysed with aforementioned tools of gap, ratio, correlation, regression, standard deviation and other tools.

- Ratios are an appropriate and easy way of showing differences between groups, when at least one variable is ordinal or binary.
- When at least two continuous variables are to be compared (e.g. years of education and wealth), correlation or regression analyses are typically applied.

Measuring the **equality of condition** looks at the distribution of a continuous variable across all persons. One visualization option for this method is the cumulative distribution function. This method serves to determine the share of a population for a given value. It is also applicable for test scores, years of education, or access to certain resources for a population.

Figure 17: Overview of equity concepts



Source: Adapted from UIS, 2018: Handbook on Measuring Equity in Education, **access:** http://uis.unesco.org/sites/default/files/documents/handbook-measuring-equity-education-2018-en.pdf

For more information on equity analysis, see:

Handbook on Measuring Equity in Education[16]

For analysis specifically for children with disabilities, see:

Students with Disabilities, Learning Difficulties and Disadvantages, Statistics and Indicators[17]

[16] UIS, fhi360, Oxford Policy Management and Research for Equitable Access and Learning (REAL), 2018: Handbook on Measuring Equity in Education. Montreal, UNESCO Institute for Statistics, access: http://uis.unesco.org/sites/default/files/documents/handbook-measuring-equity-education-2018-en.pdf

[17] http://eprints.hud.ac.uk/id/eprint/464/1/RobsonStudents.pdf

Box 4: Ethical code of conduct in research and analysis

The analysis and reporting of findings must always avoid exaggeration, or plain misrepresentation of data. Analysis and reporting must be executed with honesty and rigour, as otherwise wrong information bears counterproductive national planning.

- Reports should always draw attention to the limitations of the results that have been analysed with regards to reliability and in applicability.
- The significance of results must not be exaggerated, nor misrepresented.
- Data must not be fabricated, falsified nor intentionally misrepresented to allow for concluding with desired recommendations.
- Analysis must be reported fully without omission of significant data, disclosing details of undergirding analytical methods which might bear upon interpretations of any findings.
- Concepts, procedures and results must be presented in sufficient detail to allow others to understand and interpret the present information equally.
- The misuse of findings and misunderstanding of their scope and limitations must be acted upon.
- Public controversy must not be shunned if findings indicate unfavourable results, because it stimulates positive progress.

Source: Australian Association of Research in Education, 1995: Code of Ethics for Research in Education, Victoria, Cold Stream.

4 Communicating the Data Analysis Results

All the effort of data collection and production is to support management and leadership to make good decisions on education planning, policymaking and resource allocation. Openly structured and communicated data makes authorities and community stakeholders accountable for effective management of the education sector[18]. It is important that the data produced is understood by different audiences at different levels. Therefore, data communication is always a very important aspect succeeding the data analysis process.

In the previous sections, we have already seen many examples of data presentations. This section will delve into the theoretical elements of data presentation to understand why we choose certain presentation methods and not others.

4.1 Presenting data to an audience

When preparing a presentation of data and indicators, we should ask ourselves the following questions:

- What am I trying to communicate?
- Who are my audiences?
- What kind of presentation will be most effective?
- What might prevent my audience from understanding the data in the presentation?

Every presentation technique has its own characteristics, advantages and disadvantages; but the choice will depend upon the context within which the presentation is delivered and the message to be conveyed. For example, a chart may highlight distributions and trends visually with immediacy, that is easy to grasp, but it may fail to explain underlying patterns, causes and effects and these can be easily manipulated. Descriptive text can draw attention to salient findings and possible causes and implications. In visual representation of analyses, it is therefore crucial to apply consistency of style and logic to minimize misinterpretation.

The goal of a visual presentation is to make the reader want to interpret it and understand the messages with minimum effort. As a rule of thumb, when creating a

[18] UNESCO-IIEP, 2018: International Policy Forum in Manila, Philippines, Recommendations to promote transparency and accountability, access: http://www.iiep.unesco.org/en/10-ways-promote-transparency-and-accountability-education-4307

visual representation of data, it should follow the following style rules:

- **INFORMATIVE;**
- **SELF-EXPLANATORY;**
- **PLEASANT IN APPEARANCE;**
- **EASY TO UNDERSTAND.**

Always try to communicate with your audience in the most simple, direct and efficient manner possible. Do not overload presentations with too many tables, charts, numbers and text. Identify the findings and ideas and then present them in the simplest possible way. The details are finally for the audience to be accessed in the background report from which the visual presentation has been drawn.

4.2 Tabular presentation of data

Tables are a systematic arrangement of words, numbers or signs, in parallel columns, to depict and summarize statistical data for eventual relationships. They are good for presenting large amounts of numerical information that would otherwise be confusing to describe in text.

A table should facilitate subsequent interpretation of the presented information, especially when various parameters in two or more groups are to be compared. The following section gives a guideline to constructing a table with the basic components so the information can be presented in a manner that is concise, clear, direct and effective.

TITLE: The title is the main description of the table. It should be concise and for the sake of interpretation and record keeping, informative and meaningful. The title should include a date or year of reference regarding the data; the place such as a country, regions, provinces, districts, villages or schools; and any other attribute that is common to all the data entities in the table (see 'Title' in the example below). Note the title can be displayed embedded in the chart, or as the caption.

ROWS AND COLUMNS HEADINGS: Each row and column need a heading that describes the data in that row or column, using labels such as 'number of female students,' or 'percentage of youth and adults in TVET'. Headings usually vary from row to row and from column to column so as to distinguish between them. They may be re-grouped under a major common heading (see below Example Tabular Presentation of Data).

UNIT OF MEASUREMENT: A unit of measurement should be specified for every entry in the table, such as percentages, numbers in millions, or currencies. The unit of measurement is usually given in the title (if the same unit of measurement applies to the whole table), or in the column or row heading (if rows and headings use different units of measurement). To facilitate understanding and interpretation, it is advized to establish a convention used within the country, at best in line with established SDG 4 indicators and their specific unit of measurement.

DATA FIELDS: Actual numbers are included in the data field. Such data should correspond with the rows and columns. No data field should be left vacant. If there is

no data, codes are used to provide explanation for not having data, e.g., missing data with 'm'; not applicable with 'n/a', etc. While recording data, sometimes it is difficult to record the precise value. In that cases, numbers may be rounded to a nearby value using a degree of accuracy that is appropriate to achieve the goal of the presentation. When rounding numbers, unnecessary trailing zeros should be removed and the units of measure altered accordingly.

FOOTNOTES: Footnotes provide important information that help us understand the data in the table. The following information should be provided in footnotes:

- Source of the data which enables interested readers to pursue the underlying information and estimate the quality of the data;
- Conventions used and further explanations of terms found in the table where necessary;
- Complete annotation of row, or column headings, or the title if the labels are too long to insert in full in the table cells;
- Differences in status of some entries in the table;
- Data limitations;
- Any other exceptions/deviations from the stated norm (see 'Footnote' in Example below Tabular Presentation of Data).

Box 5: Tips for presenting data

- **Font style:** Different font styles may be used to highlight specific items of a table that require special attention.
- **The ordering of rows and columns:** This is critical for clarity. As a general rule, rows and columns should be arranged following a natural or logical order, ranked, for example, by alphabetical order, geographical location, year or magnitude. Alphabetical and geographical ordering are both useful for reference, whereas ordering by magnitude makes the ranking of the different entities immediately obvious.
- **Numbers:** Numbers are easier to compare when the table has a vertical orientation. The human eye can make comparisons more easily when reading down a column of data than across several columns.
- **Consistent appearance:** The appearance of the table should be kept consistent throughout the report. For example, conventions for labelling and ordering rows and columns should be kept consistent as much as possible. A common mistake is to switch, or mix up the rows and columns and labelling across tables within a report.
- **Number the table:** Tables should be properly numbered for ease of reference.
- **Unnecessary distraction:** Avoid designing complex tables with many layers of headings for row and columns. Break them into smaller tables. Many tables that should logically appear together should be placed in the appendices.

Figure 18: Example of tabular presentation of data

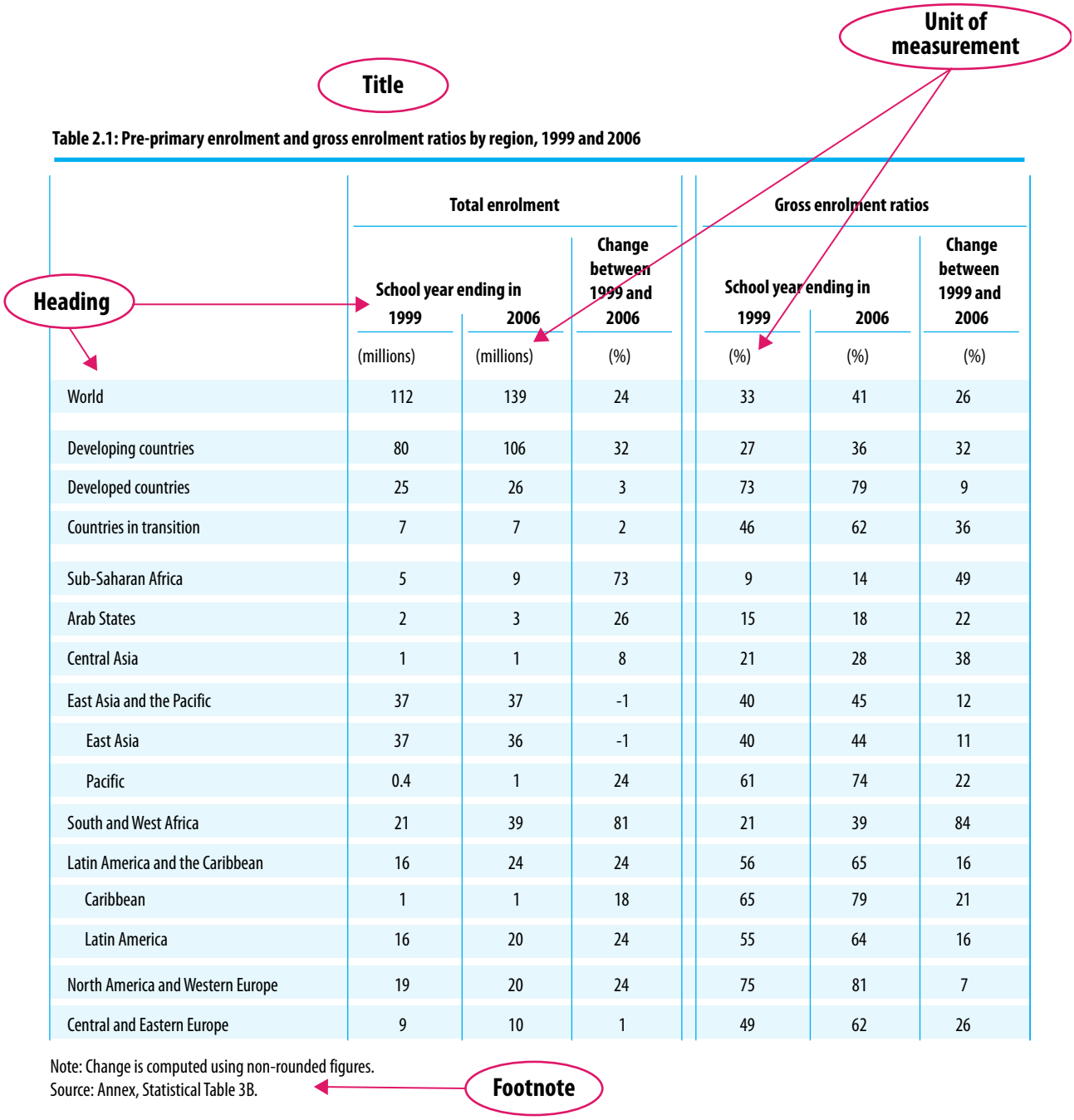


Table 2.1: Pre-primary enrolment and gross enrolment ratios by region, 1999 and 2006

	Total enrolment			Gross enrolment ratios		
	School year ending in		Change between 1999 and 2006	School year ending in		Change between 1999 and 2006
	1999	2006		1999	2006	
	(millions)	(millions)	(%)	(%)	(%)	(%)
World	112	139	24	33	41	26
Developing countries	80	106	32	27	36	32
Developed countries	25	26	3	73	79	9
Countries in transition	7	7	2	46	62	36
Sub-Saharan Africa	5	9	73	9	14	49
Arab States	2	3	26	15	18	22
Central Asia	1	1	8	21	28	38
East Asia and the Pacific	37	37	-1	40	45	12
East Asia	37	36	-1	40	44	11
Pacific	0.4	1	24	61	74	22
South and West Africa	21	39	81	21	39	84
Latin America and the Caribbean	16	24	24	56	65	16
Caribbean	1	1	18	65	79	21
Latin America	16	20	24	55	64	16
North America and Western Europe	19	20	24	75	81	7
Central and Eastern Europe	9	10	1	49	62	26

Note: Change is computed using non-rounded figures.
Source: Annex, Statistical Table 3B.

Source: UNESCO, 2011: Systemic Monitoring of Education for All. Training Modules for Asia-Pacific. Bangkok, UNESCO, **access:** http://uis.unesco.org/sites/default/files/documents/systematic-monitoring-of-education-for-all-training-modules-for-asia-pacific-en.pdf

4.3 Visual presentation of data

Charts with graphs can be easier to understand than tables and are often more effective for highlighting important information quickly for readers who are less apt with numbers. Charts are especially useful for:

- Faster understanding of numbers;
- Recognizing distributions in data, showing patterns and comparing trends;
- Easing comparing numerical information;
- Allowing information to be presented in various ways.

There are numerous ways of visually presenting statistical information. In short, the main purpose of charts is to visually impart information that cannot be easily read and interpreted from a table of data. In other words, the advantage of charts is that they are visually more attractive than tables, and can ease presentations. With the help of computer software packages, graphical visualization of data can be made in a variety of ways.

As mentioned, charts are not suitable for communicating detailed and precise information, and can be time-consuming and expensive to design.

The following section will explain a few charts and provide a structured overview (Figures 19 and 20) to help decide on which chart is appropriate to pick for which purpose.

4.3.1 Explaining when to use certain charts

LINE CHART: These are used to track changes over short and long periods of time. When smaller changes exist, line graphs are better to use than bar graphs. Line graphs can also be used to compare changes over the same period of time for more than one group.

BAR CHART: These are used for categorical data or metric data that are transformed into categorical data and are used to compare things between different groups, or to track changes over time Categories are shown on the horizontal axis. Frequency, percentage, or proportion is shown on the vertical axis. Bars are separated from each other to emphasize the distinctness of the categories. The bars must be of the same width. The length of each bar is proportional to the frequency, percentage, or proportion in the category. Levels ought to be provided on both axes. However, when trying to measure change over time, bar graphs are best when the changes are larger.

PIE CHART: These are best to use when trying to compare parts of a whole. They do not show changes over time. Like bar charts, pie charts are also used for categorical data. A circle is divided into segments, the areas of which are proportional to the values in the question. But the areas are proportional to the angles the corresponding segments make at the centre of the circle. Thus, segments of the circle are cut in such a way that their values are proportional to the angles.

AREA CHART: These are very similar to line graphs. They can be used to track changes over time for one or more groups. Area graphs are good to use when tracking the changes

in two or more related groups that make up one whole category (for example male and female students).

SCATTER PLOTS: These are used to determine relationships between the two different things. We have already seen this type in regression analysis. The x-axis is used to measure one event (or variable) and the y-axis is used to measure the other. If both variables increase at the same time, they have a positive relationship. If one variable decreases while the other increases, they have a negative relationship. Sometimes the variables don't follow any pattern and have no relationship.

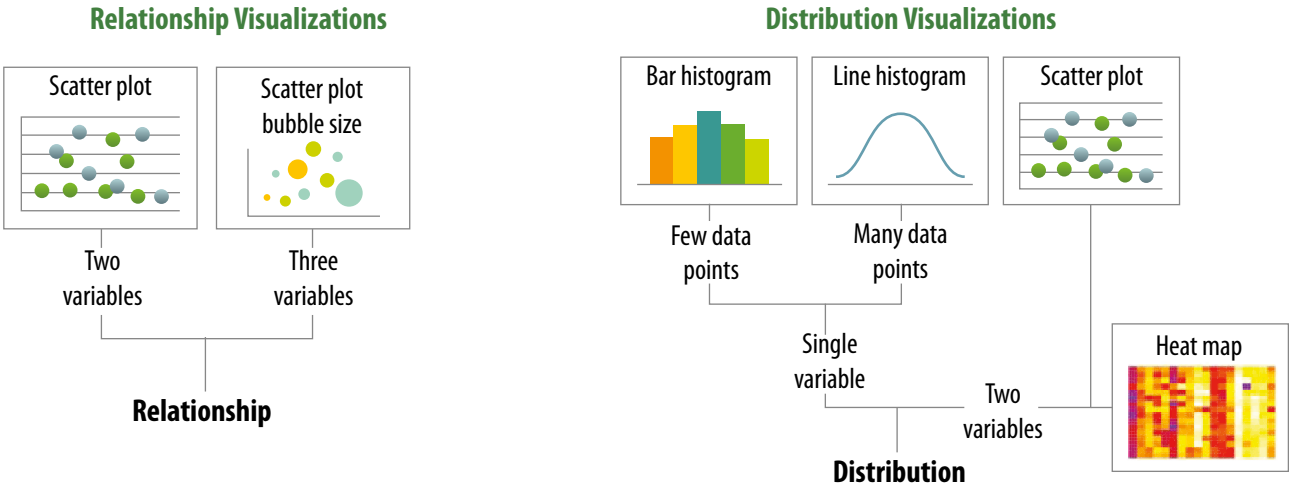
DOT PLOTS: These allow for comparison of one, or several groups by different characteristics. We have seen an example in the gap analysis. This representation allows for an easy comparison across selected groups and their background characteristics.

DISPARITY GRAPHS (OR THREE GRAPHS): This type of graph is used to present disparities of performance across different population groups for one particular indicator. In the following example, the visual representation allows for comparison between the overall national average, and the most disadvantaged subgroup considered (girls from poorest 20 per cent) as well as the most privileged group (boys from the richest 20 per cent).

GEOGRAPHICAL MAPS: Maps are a great way to represent data/indicators which vary across different geographical areas, in particular to advocate for more equitable distribution of resources towards the most disadvantaged, or to target support where it is the most needed. They can be a powerful advocacy tool to present information to decision makers for geographic targeting. Maps can be created at different administrative levels, and therefore can serve the same purpose at various levels of governments.

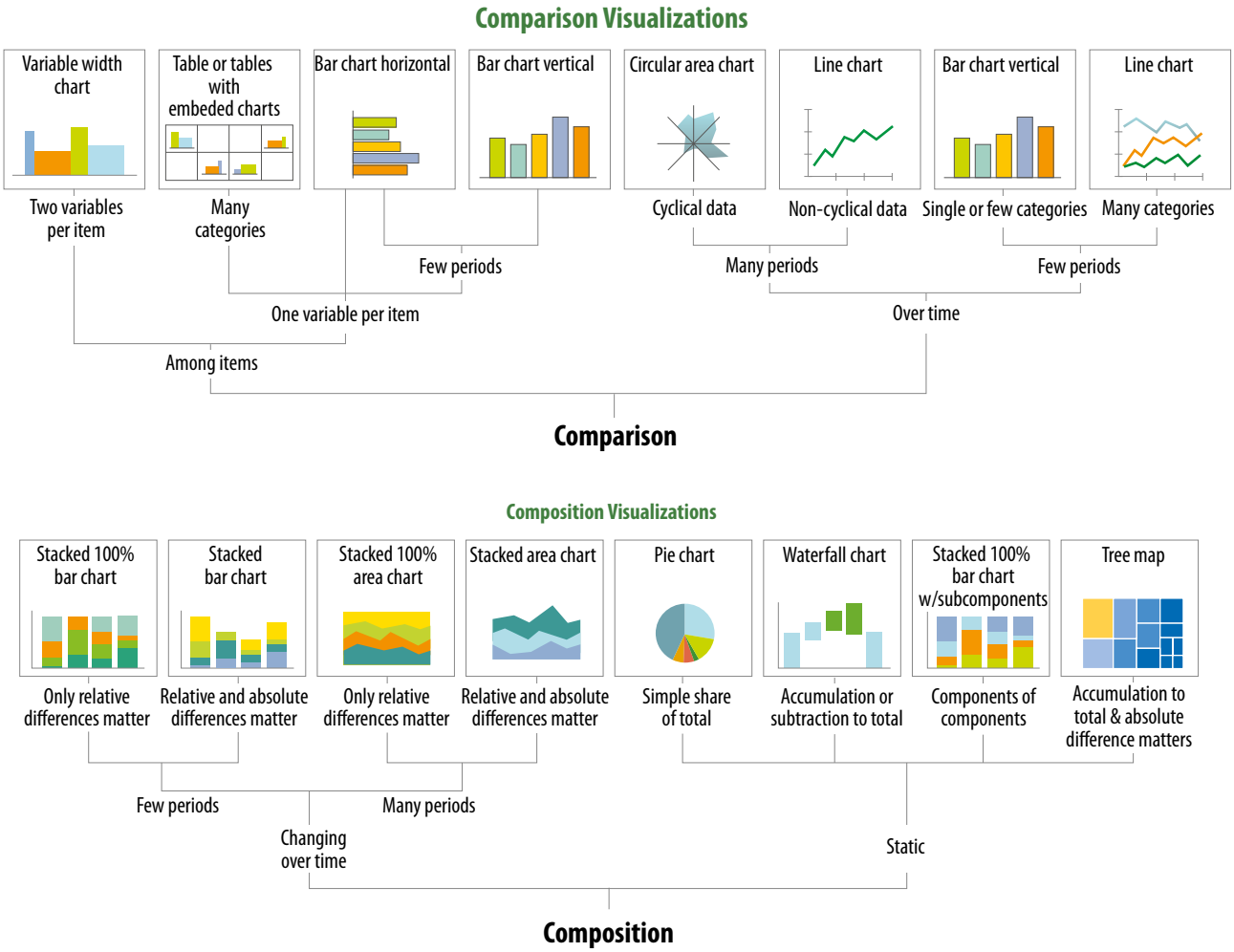
HEAT MAPS: The term 'heat map' refers to displaying colour scaled representation of values on a map, similar to the above geographical map. The colours here are, however, not primarily used to distinguish between districts but to indicate a degree of performance, or shortcomings.

Figure 19: Chart examples appropriate for specific purposes



Source: Adapted from Big Data, 2016: The Four Pillars of Visual Analytics, **access:** http://bigdata.black/featured/the-four-pillars-visual-analytics/

Figure 20: Chart examples appropriate for specific purposes



Source: Big Data, 2016: The Four Pillars of Visual Analytics, **access:** http://bigdata.black/featured/the-four-pillars-visual-analytics/black/featured/the-four-pillars-visual-analytics/

4.3.2 Basic components of a chart

Similar to tables, charts should have a title, axis labels (including the units of measurement), tick marks on the axes (with labels for some tick marks and sub-groups) and footnotes and references to the source data.

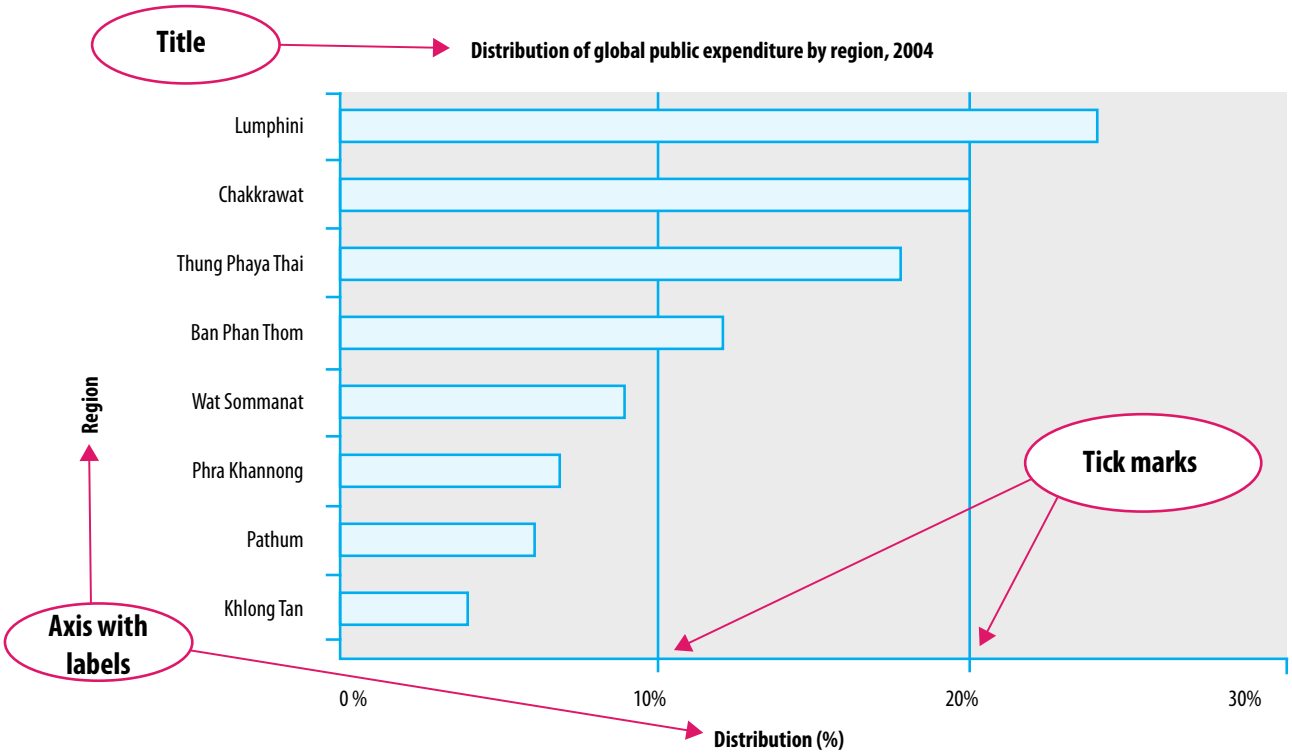
An explanatory title, labels and footnotes are essential for understanding and interpreting a chart. One must nevertheless bear in mind that too many text details and labels can distract the reader from the main message.

An effective chart also has the following characteristics:

- Clear objective and messages to be presented;

- Good choice of graph type for the information that is to be presented;
- Appropriate level of simplicity or complexity, depending on the readers' abilities to analyse, interpret and understand.

Figure 21: Example of a Graphical Presentation of Data



Note: Distribution is calculated using PPP US$.

Source: UNESCO, 2011: Systemic Monitoring of Education for All. Training Modules for Asia-Pacific. Bangkok, UNESCO, **access:** http://uis.unesco.org/sites/default/files/documents/systematic-monitoring-of-education-for-all-training-modules-for-asia-pacific-en.pdf

4.4 Strategic Dissemination

The dissemination of education data is as important as the collection of data. While our data collection and curation serve as the foundation on which to base a decision for policy makers, planners and programme implementers, the resultant information is also relevant for other stakeholders, such as educational institutions, the press, research scholars, research institutions, academia, relevant NGOs, community organizations and citizens in general.

Only when all stakeholders are informed properly can they make adequate decisions that help improve a situation. Ill-fed citizens are unlikely to engage in improving, for example, school conditions by reporting ineffective use of resources. The following table will

provide you with an overview of the possible communication channels to make use of to reach specific audiences.

Table 4: Suggested communication channels for specific audiences

Government officials and policy makers	General public
• Dashboards; • Face-to-face meetings; • Policy briefs, brochures and executive summaries; • Websites	• Magazines; • News media; • Radio and television; • Web-based media (e.g. Social Media); • Websites; • School report cards.
Programme managers and implementers	**Technical and development agencies**
• Monthly/quarterly reports; • Executive summaries; • Audio-visual presentations; • Infographics; • Public websites.	• Full annual reports; • Audio-visual presentations; • Public websites; • Brochures.
Civil society members and organizations	**Academic researchers**
• Fact sheets; • Infographics; • Brochures; • Websites.	• Technical reports; • Special topic articles; • Research databases; • Websites.

Source: Adapted from UN ESCAP Statistics Division, 2019: Stats Brief. Dissemination and Communication of Vital Statistics. Issue No. 17. Bangkok, UN ESCAP.

4.4.1 School report cards – feeding back to the community

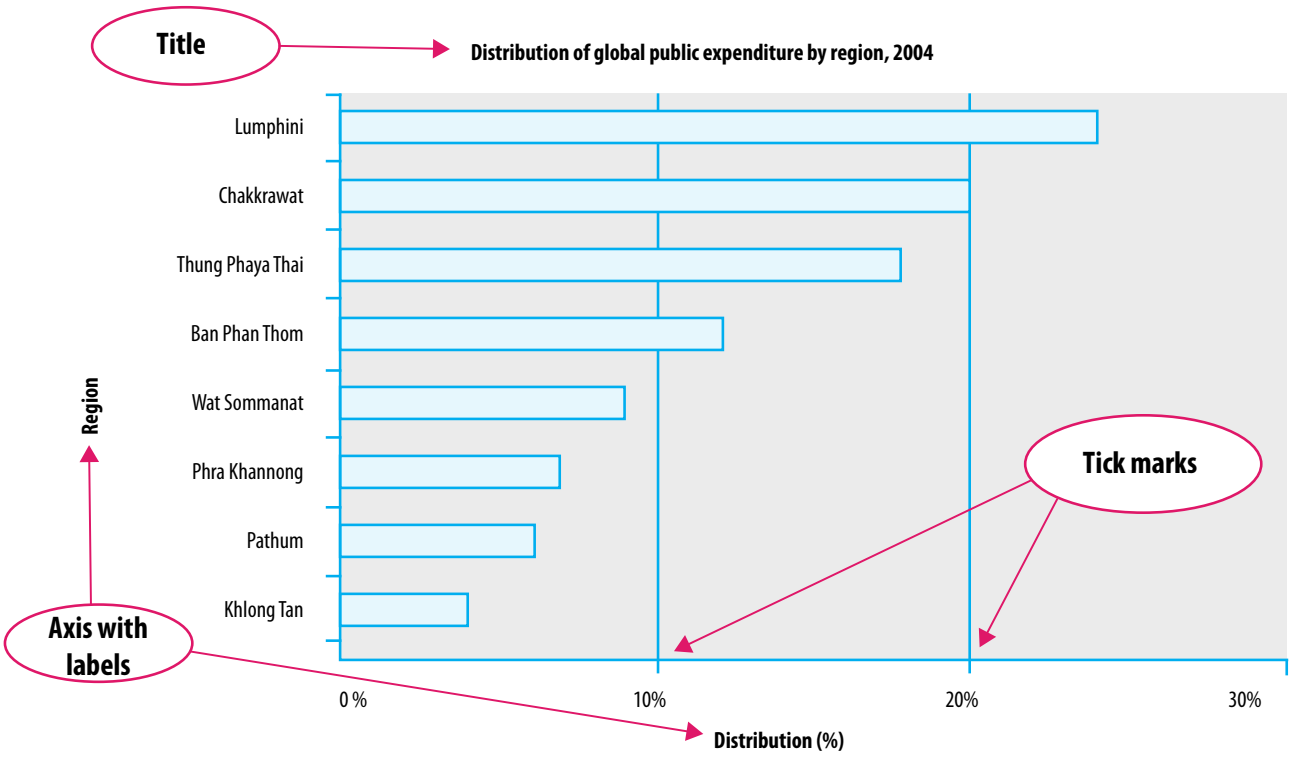
It is worth noting at this point that data should be disseminated at levels as close to their collection as possible. This is the reason for involving the community level, particularly the community around the points of data collection, such as schools, to gain and maintain support in monitoring education reforms. In the end, when we submit data about our circumstances, we would want to see the data being used and having an effect in some form. School report cards provide several functions:

- Support school management function by providing regularly, automatically updated data snapshots about enrolment, participation, learning, teachers, school improvements etc. for each school.
- Improve the feedback loop from the national EMIS database and the schools.

- Improve communication about school-level performance, to increase community awareness as well as hold the schools accountable for improving results as per plan.
- Increase community participation and develop a sense of 'ownership' among community members.

As EMIS collects a wealth of data from schools, it has the capacity to create school report cards automatically and thus, facilitate the dissemination of information back to the school and community (see case study 1 below). The following example allows for a compact overview of most, if not all, important characteristics.

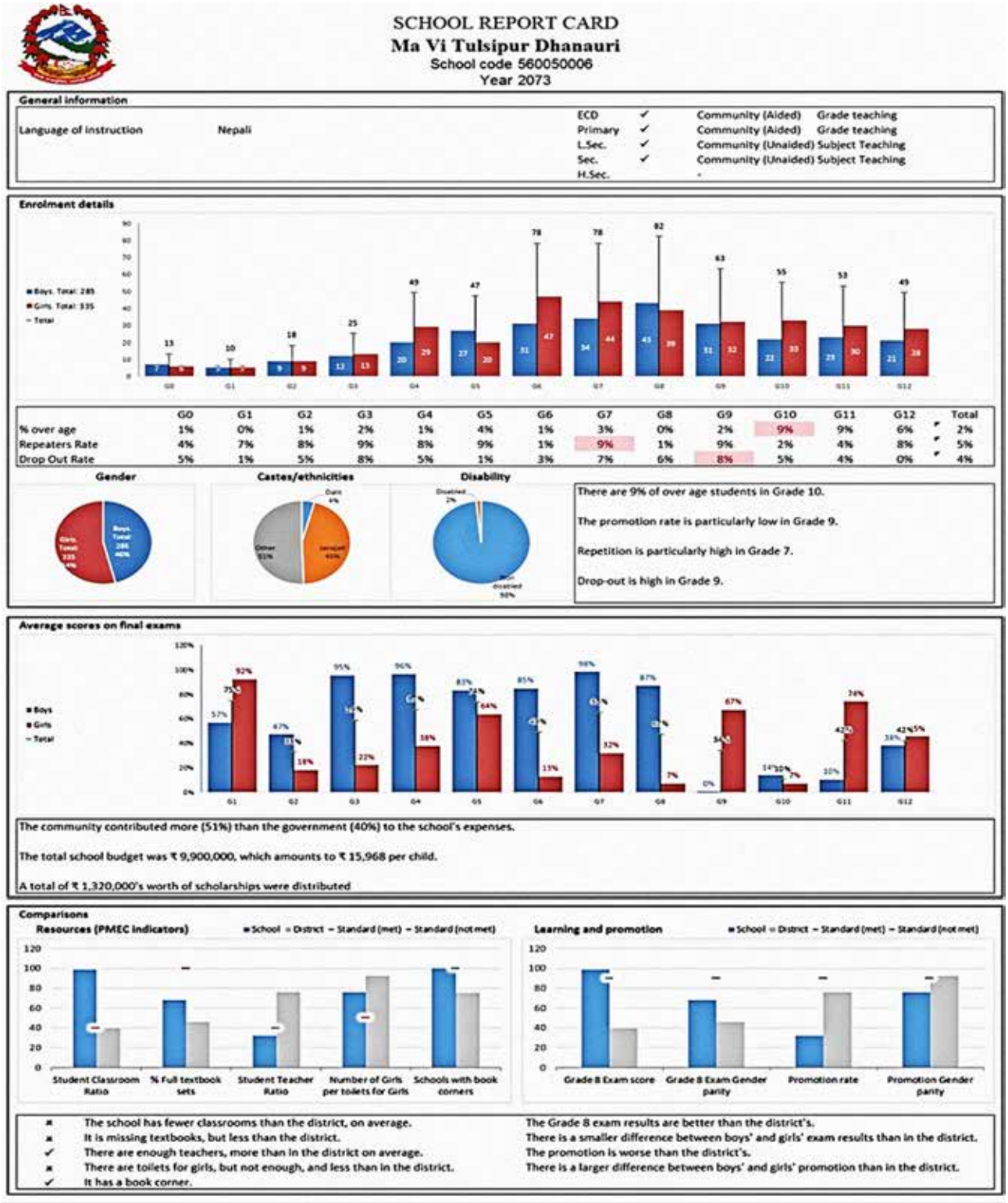
Figure 22: Example of a Graphical Presentation of Data



Note: Distribution is calculated using PPP US$.

Source: UNESCO, 2011: Systemic Monitoring of Education for All. Training Modules for Asia-Pacific. Bangkok, UNESCO, **access:** http://uis.unesco.org/sites/default/files/documents/systematic-monitoring-of-education-for-all-training-modules-for-asia-pacific-en.pdf

Figure 23: Example - school report card from Nepal

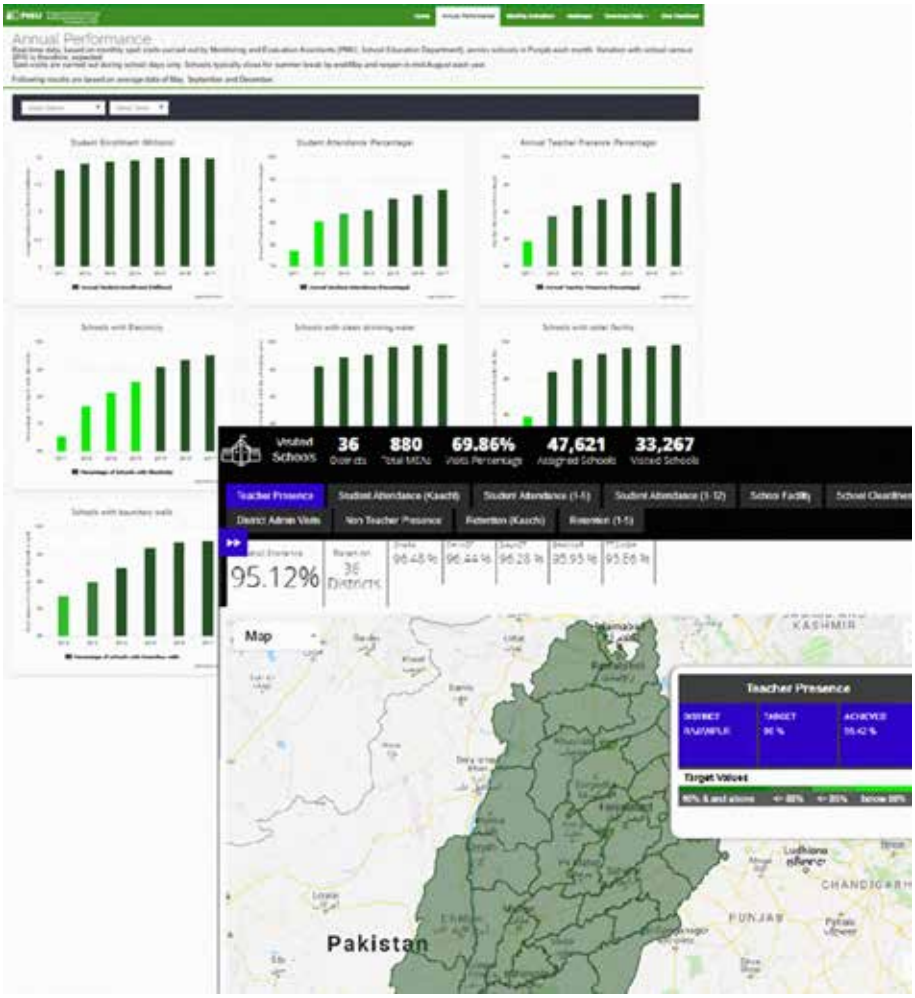


Source: Presentation by the Ministry of Education in Nepal on the lessons learned and outcomes of the collaboration under the Data Must Speak initiative. Prepared for the GPE Webinar, 27 July 2017, Kathmandu, Nepal, **access:** https://www.unicef.org/sites/default/files/2018-08/General%20Presentation%20Nepal.pdf

4.4.2 Supplementing with digital information

As we more and more move towards distributing information through online and mobile platforms to reach families and communities, locally and internationally, at this point we may want to consider if we can supplement or strengthen paper-based school report cards with digital school report cards that can be accessed by all education stakeholders with mobile and computer devices if and when needed.

Figure 24: Example for free, open and real-time digital reporting of school information, Punjab, Pakistan



Source: Programme Monitoring and Implementation Unit, **access:** https://open.punjab.gov.pk/schools/

For a planning guide on online school report cards and the steps to keep in mind, see:

Building Online School Report Cards[19]

Case Study: Unified District Information System for Education and Student Database Management Information System - India[20]

As schools in India suffer from accountability deficits, teacher absenteeism, school dropouts and poor learning outcomes, the government developed the Unified District Information System for Education (U-DISE) as one response to the deficits by means of proliferating data on school systems. The U-DISE is the single largest EMIS database on currently available information on schools and education in this vast country. In 2010, school report cards under U-DISE won a number of awards for bringing higher accountability and capturing education data. U-DISE support is available online, including downloadable software for database organization and instruction manuals, among others. A report module generator enables the selection of specific indicators to generate tailored reports on:

- School profile: management, sources of funding, school type, language of instruction, etc;
- Enrolment and repeater information: by age, sex, social class, etc;
- Teacher provisioning: availability, qualifications, teacher training;
- Infrastructure and learning facilities: physical conditions, water, electricity, etc.;
- Examination results;
- Receipts of school grants;
- Compliance information on the constitution and functionality of school management committees;
- Time of operation: number of instructional days in the school, operating hours of schools;
- Number of remedial classes provided to students;
- Availability of educational resources: textbooks, uniforms, and other provisions guaranteed under the Right to Education Act.

[19] Building Online School Report Cards, access: https://www.excelined.org/wp-content/uploads/2018/08/ExcelinEd.AStateGuideToBuildingOnlineReportCards.May2017.pdf

[20] All U-DISE related data/information, activities, revisions, and events are available on a NIEPA-designed portal, access: http://udise.in/index.html. The accompanying school report card website, access: http://schoolreportcards.in/SRC-New/

To ensure access for those with low literacy skills, instructions are sent to each state that the U-DISE school report cards are to be read out to the local community during teacher/parent meetings for transparency, engagement and accountability purposes.

Expansion of U-DISE on academic performance:

In a bid to keep an annual record of academic performances and basic individual details of all the students across their school education years in the country, the government developed a Student Database Management Information System (SDMIS) and this was launched in 2016.

SDMIS collects additional information on:

- Student entitlements: textbooks, uniform, transport, scholarship, etc;
- Student achievements: attendance, examination-related information, etc;
- Student profile: gender, religion, disability, mother tongue, health, below-poverty-line status and financial status of the child, among other variables.

SDMIS can automatically calculate enrolment ratios (gross enrolment ratio and NER), and flow rates (dropout, repetition, promotion, retention, transition, survival rates, etc).

For more information, see: Bordoloi, Mridusmita and Varun Kapoor, 2018: Mridusmita Bordoloi and Varun Kapoor. Paris, UNESCO-IIEP. http://unesdoc.unesco.org/images/0026/002659/265933E.pdf

Lessons to learn

As no system is ever perfect, even a comprehensive system like U-DISE in combination with SDMIS from the above case study requires adjusting collection, processing and dissemination with all stakeholders. Intergovernmental coordination and interoperability across databases are key to effective and efficient data collection, processing and dissemination. Common problems have been:

- When data is collected annually on a particular date of the year, sub-national agencies may create parallel real-time management information systems with different databases, independent of one another.
- Data on different education aspects may end up being collected by a number of different departments, which in turn results in data silos.
- The subsequent detailed verification and validation processes of the data from different departments and the scale of the process and strict timelines results in data quality issues, either due to schools submitting erroneous data, or the processing being subject to errors.
- Furthermore, large-scale data processing results in time gaps of up to one year from the moment of schools submitting the data and school report cards being available to the public.
- When subnational agencies, including schools, are tasked to submit budget

requests in line with their reported school performances, the central government must pay attention to the budget requirements made by the agencies and schools. Otherwise, the purpose of collecting the data and cross-verifying performance and requirements are obsolete.

Case Study: The benefit of feeding back data analyses to the community - Bangladesh report cards

As a citizen-led initiative, Transparency International Bangladesh (TIB) strives to involve parents in education through useful school data published in leaflets, information boards and desks, interactive discussions at mothers' gatherings and meetings with authorities. The TIB initiative discloses crucial information pertinent to SDG 4 monitoring, as for Target 4.1 on learning outcomes and a free-education proxy, and for Target 4.a on safe learning environments as well as for Target 4.c on teachers.

TIB's survey generates data on school funding, the condition of school facilities, teachers' qualifications, teachers' behaviour, school management, students' learning outcomes, undue payment of extra fees, corporal punishment, among others.

TIB creates baseline survey data, develops reports, leaflets and other information material purposefully made accessible to the local community through e.g. parental school meetings. This information is also shared with the local and national education authorities.

The TIB initiative collects data directly from parents, teachers, the school management committees and education officers. TIB also generates information from the websites of the Ministry of Primary and Mass Education, DPE, and the Bangladesh Bureau of Educational Information and Statistics, besides from newspapers, policies and reports. TIB staff at the national level are responsible for crosschecking and guidance to ensure data accuracy.

The approach that TIB has taken has led to side benefits that have increased the usability of the collected data. Feeding the collected information back to the community, especially parents, makes them participate in the data generation process more actively.

Moreover, due to the initiative making the processed data available through school meetings and by means of accessible information products, the local community (parents) has been able to understand the issues of improving school and learning conditions; and in this process serve as a self-regulatory inspection mechanism on, for example, the quality of teaching, the attendance of teachers, the maintenance of facilities, accurate student number reporting and of course keeping children in school. **For the education authorities, this intervention functions as an additional monitoring mechanism that increases accountability and transparency in education.**

Parents of non-intervention schools, on the other hand, were unable to understand the value of open data and thus failed to raise questions over quality education, or school management issues related to open school data with the eventual consequences for low quality education.

Source: Roy, Dipu and Abu Said Md. Juel Miah, 2018: Bangladesh: using open school data to improve transparency and accountability, Paris, UNESCO-IIEP. Access: http://unesdoc.unesco.org/images/0026/002659/265930e.pdf

4.5 Audio-visual media tools: infographics, animations and documentaries

Various representations can be applied, i.e. concept maps, graphic organizers, flow diagrams, simulations, pictograms to visualize information so that it can be relayed to the audience in a more effective and efficient manner. Borkin et al. (2013) studied visualization types and relationships with memory level. They claimed that visuals containing pictograms may be remembered better than other visual means and moreover infographics are the highest-level recalling type of visual means[21].

Infographics are an essential part of the survey analysts' tool box because they convey complex data in an easy to follow and visually appealing format. From blog posts and web articles to glossy brochures and of course, data analysis presentation, infographics are a ubiquitous part of the information landscape.

Another step up from creating infographics are animations in form of videos. Short, animated videos can be a powerful communications and advocacy tool that captivates the mind of the viewer with moving visuals and easy to absorb narrative. Easily shareable through social media, this can really help to spread a message, raise awareness of issues, or efforts undertaken to address them.

Another valuable tool are videos in a documentary style. We all have seen documentaries, be they on wildlife, or manufacturing processes. Documentary style videos have also been applied in education advocacy, especially to communicate the importance of education.

Combined with statistical information, documentaries tell a real story that can inform crucial information with real life examples and these are reusable whenever needed, while maintaining a consistent message. The overarching goal for these media formats is to create simple public information that is intelligible for the masses.

4.5.1 Characteristics of audio-visual media

Whether infographics or videos, they are typically designed by graphic designers, animators and video editors in collaboration with a communications expert of an institution, as well as a thematic sector expert to create specific visualizations to be used either online, or for posters, banners, public screenings or any other type of communication purpose.

They often involve icons, characters or symbols which are very visual and aim at reducing the amount of text to be read. Here are three reason why audio-visually appealing media should find consideration for statistics dissemination:

- Audio-visual media is easier than ever to create in today's digital age.

[21] Borkin, M. A., Vo, A. A., Bylinskii, Z., Isola, P., Sunkavalli, S., Oliva, A., & Pfister, H., 2013: What makes a visualization memorable?. In: Visualization and Computer Graphics, IEEE Transactions on, 19(12), 2306-2315.

- Decision makers have faster access to more data than ever before.
- It is easier to look at visual media than reading long text.

4.5.2 The basic steps of creating audio-visual material

Like every initiative, creating an infographic, video, or any other kind of presentation material follows phases of planning and execution. As this is a highly creative process, it will require additional expertise.

This will also require additional cost, unless you are talented in media creation yourself and have the necessary tools at your disposal. Otherwise, perhaps someone in your department has a background in traditional, or social media, graphic design, video editing, photography, or animation who may help you in this process.

In any case, it is advisable to consult a professional in the aforementioned areas as they not only have the required creative mind-set but also the required media creation tools. Creating media for the public is always a collaborative effort of experts of the relevant disciplines.

Creating such media is not as simple as it sometimes looks. The following section includes an insight into the general creation process, with information on how you can make the necessary preparations for creating audio-visual materials.

1. **CONCEPTION:** Outline the objectives for your material. What is your theme and what is the central message you want to convey?
2. **PLANNING:** Determine what statistics and identified issues and recommendations you have at your disposal. If necessary, process raw data to obtain the needed statistics. Also, create a brief narrative that helps you order the statistics and the key points to raise that serve to explain your central message.

   For example, outline on paper in writing and in sketched pictures a sequence. For an image like an infographic, draw where and in what order your information should be displayed.

   For a video, create a sequence-by-sequence description (this may include visual sketches of yours) which includes the data and key points to talk about. This is called a 'storyboard'.
3. **EXECUTION:** Contact an expert who is proficient in creating the desired material for your desired product. It is best to request some sample ideas to help you decide what tone your material should take (colourful vs monotone, happy vs serious, elegant vs playful, etc.).

   Depending on your desire, you will receive a set of examples to choose from comprised of images, font styles, sounds (if necessary), layouts (where applicable) and other details. Ensure communication about all the steps involved in the creation process to avoid ending up with a product not of your liking, or displaying the wrong message.

4. **PROOFING:** Proofread the final material. Make sure everything is not only spelled correctly, but ensure the messages are exactly as you want them to be without any creative changes (as the designer/creator may not be an expert in your field, or he or she may likely misinterpret certain messages).

   Also ensure that any external data, or information is appropriately referenced somewhere in your material to ensure transparency and accountability of all information.

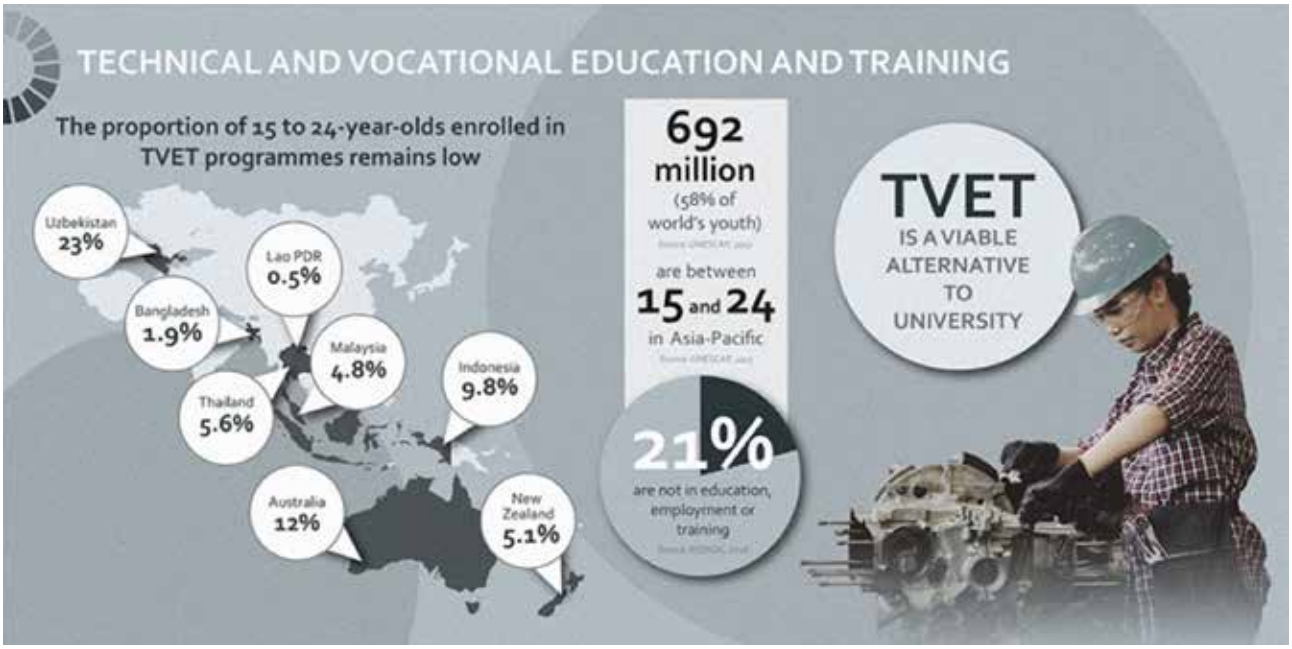
   Likewise, promote your own data source if the data has been collected and curated by yourself, or your department.

Irrelevant of the medium, a central part is to have a good story around the data presented with a focus on who, what, where, when and how in a language the target audience will understand.

4.5.3 Examples of effective audio-visual material for public dissemination

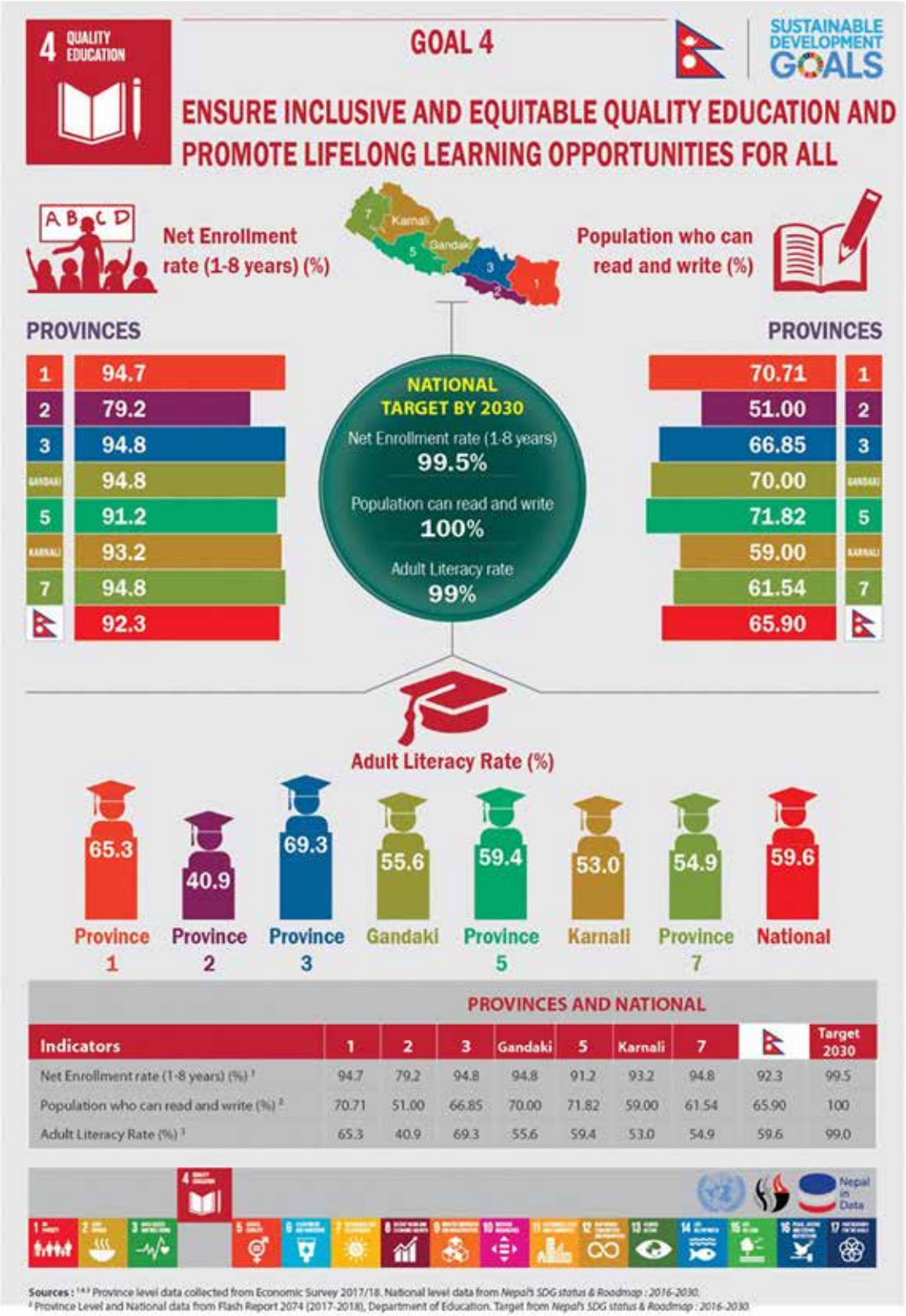
Finally, we will present a few examples for inspiration.

Figure 25: Infographic - Proportion of 15-to-24-yer-olds enrolled in TVET programmes



Source: UNESCO, 2018: Technical and Vocational Education and Training: UNESCO Asia-Pacific In Graphic Detail number 4, **access:** https://drupal.unescobkk.org/content/technical-and-vocational-education-and-training-unesco-asia-pacific-graphic-detail-4

Figure 26: Infographic – SDG 4 in Nepal



Source: UNDP Nepal, 2018: SDGs in Nepal: Infographics, **access:** http://www.np.undp.org/content/nepal/en/home/ library/sustainable-development-goals-national-report---nepal/sdgs-in-nepal-infographics.html

Figure 27: Examples on animation and documentary style videos

Animation style videos

To watch the animation, access:
https://www.youtube.com/watch?v=_tnY8PkJVMY

To watch the animation, access:
https://www.youtube.com/watch?v=JMEueYuMadU

Documentary style videos

To watch the animation, access:
https://bangkok.unesco.org/index.php/content/mothers-determination-building-better-life-through-lifelong-learning

To watch the animation, access:
https://www.unicef.org/education

Source: UNESCO, 2018: Technical and Vocational Education and Training: UNESCO Asia-Pacific In Graphic Detail number 4, **access:** https://drupal.unescobkk.org/content/technical-and-vocational-education-and-training-unesco-asia-pacific-graphic-detail-4

Technical note

Substituting missing values

Imputation is a technique to replace missing values with substitute values. There are different types of imputation techniques.

i. *Average Imputation*

This technique calculates the average value for the variable and then replaces the missing value with the calculated average value. This choice is not always recommended because it can artificially reduce the variability of your data, but in some cases it makes sense. To give an example, where no information is available for a country, the unweighted regional group mean of the given indicator can be used as the imputed value. Because this method is sensitive to the weight of countries in the region, the rule is not applied to countries with substantial relative weights with respect to their region (for example, China in East Asia and the Pacific). In such cases, manual imputation is required even if it results in a non-publishable estimate. Currently such estimates are made for about a dozen countries.

ii. *Common-Point Imputation*

In this technique, the median or mode is calculated to replace the missing average value. This technique is more structured than plain guessing. Yet, it is still a more imprecise and for planning it is a riskier option. Use caution unless you have good reason and data to support using the substitute value.

iii. *Regression imputation*

In regression imputations, the imputed value is predicted from a regression equation. For this method, the information from complete observations is used to predict the values for the missing observations. Regression assumes that the imputed values fall directly on a regression line with a non-zero slope, so it implies a correlation of one between the predictors and the missing outcome variable. The regression imputation will overestimate the correlations, while the variances and covariance are underestimated.

iv. *Hot-Deck Imputation*

UIS uses an automated single imputation method, also referred to as 'hot-deck' that creates a single estimate to replace the missing value in a dataset. Missing values are imputed by substituting these with available data from the next/previous year(s) for the same indicator in question. This method assumes that if a measurement is missing, the next best guess is that the value has not changed in comparison to the next/previously available.

Another technique is to use statistically correlated indicators to impute the missing value of the given indicator (even across time). For example, if the pupil-teacher ratio for primary education for both the public and private sector is missing in a given year, but data on the public sector is available for another year, the rate of change of the public-sector ratio between the two years can be applied to derive the pupil-teacher ratio for the public and private sector for the missing year.

This approach assumes that the value for the required indicator changes in the same way as the value from the substitute indicator. If values of the indicator are only available for years prior to the year of the missing value, the most recent year's value is used as the imputed value for the missing year. If values of the indicator are only available for years after the year of the missing value, the earliest year's value is used as the imputed value for the missing year. If values of the indicator are available for both years before and after, data is imputed using linear interpolation between the two years that are closest to the year of the missing data.

Module 6: Monitoring Challenges Beyond Traditional Aspects of Education

Module overview – objectives, topics and learning outcomes

With the international community's current global and universal education agenda, the fundamental question arises; how to promote universality globally? Many different interpretations take place around the world on what is common and collective and questions arise as to what is an identity? What is public participation? What is a citizen's duty? These issues have to be addressed while respecting individuality versus community; rights versus responsibilities; and traditions versus progress.

Ensuring children, youth and adults have the means to partake in today's societies requires giving them equal reading, writing and calculating skills; equal technological skills; equal access to school resources; and equal understanding of the brickwork of the social, economic and natural environment we live in.

Education is finally to take up its moral and functional purpose globally. This is about equipping learners from an early age and throughout life, with knowledge, skills, attitudes and the behaviour they need to be informed, engaged and empathetic citizens.

The various themes are expressed by various targets and their indicators under Sustainable Development Goal (SDG) 4. For example, Target 4.3 on Technical Vocational Education

and Training (TVET) and Higher Education, or Target 4.7 thematizing the widest range of topics for sustainable development and global citizenship.

Other themes, such as education in emergency situations, or disability are indirectly addressed through collecting data on migrants and refugees, learners with disabilities (Target 4.5), or measuring the quality of learning environments (Target 4.a).

A problem in developing a national education indicator framework results from the very nature of the wide range of themes to address. Countries struggle with uniform definitions for certain topics such as digital literacy skills, or global citizenship and this can be influenced by socio-cultural interpretations and other country-specific contexts.

In consequence, challenges arise regarding measuring these themes. Therefore, this module discusses multiple themes as one encounters them in SDG 4-Education 2030. The aim is to provide a brief, but common knowledge base when planning education; making policies for it; or designing a national education indicator framework.

This module will examine some of the key challenges of the SDG 4-Education 2030 Agenda and provide an overview of other critical topics on which to take action to ensure the achievement of an inclusive and equitable quality education and the promotion of lifelong learning opportunities for all.

The following topics are addressed in this module so the reader will gain a better understanding of their complexity:

- Learning Assessments;
- Technical Vocational Education and Training;
- Education for Sustainable Development and Global Citizenship;
- Learning environments; specifically, emergency settings and disability.

After completing the module, the learner will have acquired the following learning outcomes:

- An understanding of the thematic areas critical to achieving SDG 4;
- The means to explore more information and data pertinent to the stated areas that are critical for SDG 4 monitoring.

1 Learning achievements

The education community has called out a crisis in learning worldwide. Nine in ten children and adolescents in low-income countries have been found to lack basic literacy and numeracy skills by the time they completed primary and lower secondary education[1]. The Asia-Pacific is no exception and many young people in this region are not equipped with the essential skills necessary for life and the highly competitive labour market in the 21st century. It is irrefutable that learning achievements need to be monitored to ensure that as a civilization we actually advance in our development.

An assessment of learning achievements refers to a methodological measurement of achieving the intended learning objectives of an individual, or among populations. The assessment can focus on specific curriculum areas; use a variety of assessment methods, such as written, oral and practical tests and examinations, projects and portfolios; and be administered during, or at the end of an educational programme. The following section provides an introduction to the different types of learning assessments and this will enable the user of this module to understand their different characteristics.

1.1 The Principles of Good Practice in Learning Assessments

Large-scale learning assessments are conducted for a range of reasons, including:

- To establish and describe the knowledge and skills of a particular population (sample, or census) in a learning domain;
- To monitor progress in learning outcomes over time, or between grades;
- To investigate associations between achievement and contexts in which learning takes place;
- To quantify differences in learning outcomes between sub-populations (e.g. girls and boys);
- To report, in the case of census-based assessments, school, or individual level results.

[1] UNESCO, 2018: Paving the Road to Education: A target-by-target analysis of SDG 4 for Asia and the Pacific. Bangkok, UNESCO, access: https://unesdoc.unesco.org/ark:/48223/pf0000265912

National level learning assessments involve the development of national strategies for large-scale assessments, education data and the commitment to building assessment and statistical capacity.

International, or cross-national level learning assessments involve a participatory approach to the development of international standards and methodologies, the provision of diagnostic tools and guidelines. The GP-LA is a statement of principles, designed to be advisory for developing and implementing assessment programmes.

To help countries with developing large-scale learning assessments, the 'Principles of Good Practice in Learning Assessment' serve as the conceptual framework to evaluate the quality of large-scale assessments and data. They provide support to the diagnosis of country level capacity to develop, implement and use data from large-scale assessments.

The Principles are built around six key quality concepts for learning assessments and are as follows:

1. Fitness for purpose;
2. Clarity and consistency of purpose;
3. Objectivity and independence;
4. Transparency and accountability;
5. Technical rigour;
6. Ethicality and fairness.

For more information, see:

Principles of Good Practice in Learning Assessment[2]

1.2 Assessment types

SCHOOL-BASED ASSESSMENT refers to a student assessment regularly organized and administered by each educational institution established in a country. Assessment tools are generally designed by the teaching staff of the institution. The results are used to provide direct feedback to students and parents, to regulate the classroom and to improve the teaching-learning process. In some countries, scores to these assessments count (weight on the final total score) for the graduation, or the selection of students.

[2] UIS and ACER, 2017: Principles of Good Practice in Learning Assessment. UNESCO Institute for Statistics and Australian Council for Educational Research, access: http://uis.unesco.org/sites/default/files/documents/principles-good-practice-learning-assessments-2017-en.pdf

PUBLIC EXAMINATIONS are an exit, or end-point standardized exam that is generally established by a central federal/state examination board in a given country in order to promote, select, or provide a certification to all candidates who qualify. Also eligible are those who have formally, or informally learned and covered the curriculum of a formal education programme as part of the requirements for graduation. The public examination is generally administered each year – to everyone who registers, regardless of age. Unlike national assessments, extensive student background data is rarely collected during public examinations.

HOUSEHOLD-BASED ASSESSMENT refers to a learning assessment administered in the household where the targeted population is randomly selected in the home using the national household list. The Multiple Indicator Cluster Survey (MICS) 6 is an example that can assess children and young people (between the ages of five to 17) regarding their early learning achievements in reading and mathematics at the level corresponding to primary education or Grades 2 and/or 3 – irrespective of their schooling status. The Literacy Assessment and Monitoring Programme (LAMP) is another household-based literacy and numeracy assessment instrument that can be applied to youth and adult populations. A more cost-efficient version is the adapted Mini-LAMP to better serve the needs of lower- and middle-income countries in support of Target 4.6[3].

NATIONAL ASSESSMENT is an assessment of student learning outcomes at a particular age, or education level, or grade and provides feedback on a limited number of measures which are considered significant in the context of the national education system. A national assessment is generally administered to a sample of students and collects background information from students, teachers and parents to inform policymaking at the national, sub-national and local levels. The National Assessment of Student Learning Outcomes (ASLO), or the National Assessment of Student Achievement (NASA) are such an example to assess competencies in mathematics and the national language[4].

CROSS-NATIONAL ASSESSMENT is an assessment that applies to more than one national education system. A cross-national assessment uses its own assessment framework, standards and guidelines in administration and reporting, and it is specifically designed to be applied in more than one country for the purpose of comparing results across countries. These tend to be costly.

CITIZEN-LED ASSESSMENT is an assessment that is citizen driven and accountable to the public. It aims at improving competencies, as in literacy and numeracy, among a population typically using an innovative approach. The Annual Status of Education Report (ASER) and Uwezo are citizen-led household-based assessments and are conducted for a representative sample of targeted households (e.g., children between the ages of five to 16, who could be in school, or out-of-school). These assessments are usually conducted within a country, but can also be applied cross-nationally and therefore be adapted and used in another country. The

[3] For more information, see Mini-LAMP for Monitoring Progress towards SDG 4.6.1, access: http://uis.unesco.org/sites/default/files/documents/mini-lamp-monitoring-progress-sdg4.6.1-2018-en.pdf

[4] For an example on the National Assessment of Student Learning Outcomes for Lao PDR, access: http://nada.uis.unesco.org/nada/en/index.php/catalogue/126; for the National Assessment of Student Achievement - Grade 3 and Grade 5 for Nepal, access: http://nada.uis.unesco.org/nada/en/index.php/catalogue/102

cognitive data and household information collected are used for the monitoring of progress of a target population over time in-country and to ensure accountability. Comparability of one assessment with another might be limited, depending on the methodological approach.

1.3 Examples of cross-national assessments

A comprehensive list of cross-national assessments are listed below. These provide immediate indicators for application.

ASER: This is an annual, citizen-led nationwide survey of the ability of children (in school, or out-of-school), aged six to 16 years-of-age, to read simple text and complete basic arithmetic.

For more information, see: **http://www.asercentre.org/**

EGMA: The Early Grade Mathematics Assessment (EGMA), developed by RTI International and supported by USAID and the World Bank, is used to assess the acquisition of basic numeracy among primary school children in low-income countries.

For more information, see: **https://shared.rti.org/content/early-grade-mathematics-assessment-egma-toolkit**

EGRA: The Early Grade Reading Assessment (EGRA), developed by RTI International and supported by USAID and the World Bank, is used to assess the acquisition of reading among primary school children in low-income countries.

For more information see: **https://shared.rti.org/content/early-grade-reading-assessment-egra-toolkit-second-edition**

ICCS: The International Civic and Citizenship Study (ICCS) is an on-going, comparative research programme of the Inter-national Association for the Evaluation of Educational Achievement (IEA). It investigates the ways in which young people are prepared to undertake their roles as citizens. ICCS reports on students' knowledge and understanding of concepts and issues related to civics and citizenship, as well as their value beliefs, attitudes, and behaviour.

For more information see: **http://iccs.iea.nl/index.php?id=48**

ICILS: The International Computer and Information Literacy Survey (ICILS) was designed to respond to students' readiness and preparation for study, work and life in the digital age. The study measures international differences in students' computer and information literacy (CIL). This type of literacy refers to students' ability to use computers to investigate, create and communicate in order to participate effectively at home, at school, in the workplace and in the community.

For more information see: **http://www.iea.nl/icils**

LLECE: The Latin American Laboratory for Assessment of the Quality of Education (LLECE) is a network of national education quality assessment directors from Latin America and the Caribbean established to produce information and knowledge that enrich education policymaking. LLECE conducts SERCE and TERCE cross-national assessments of Grades 3 and 6 in reading, mathematics and science and reports on the state of education quality in the region.

For more information see: **http://www.unesco.org/new/en/santiago/education/education-assessment-llece/**

PASEC: The programme d'Analyse des Systèmes Educatifs de la Confemen (PASEC), or the Education Systems Analysis Programme, established by the Conférence des Ministres de l'Éducation des pays Africains et Malgache (CONFEMEN) supports the performance of education systems in Francophone Africa in order to assist in the elaboration and monitoring of educational policies. Since 2012, PASEC has been implementing international comparative assessments to better meet the needs of countries. PASEC cover Grades 2 and 5/6 in the assessment of language and mathematics.

For more information see: **http://www.pasec.confemen.org/**

PILNA: The Pacific Islands Literacy and Numeracy Assessment (PILNA) is the regional assessment for the Pacific Islands. In 2015 it was administered to Grades 4 and 6 in 13 Pacific Islands. The regional assessment was the collaboration of Pacific Ministers for Education and their ministries, with the support of the New Zealand Aid Programme.

For more information see: **https://www.spc.int/resource-centre/publications/pacific-islands-literacy-and-numeracy-assessment-pilna-2018-0**

PIRLS: The Progress in International Reading Literacy Study (PIRLS) is one of the core cycles of studies for the International Association for the Evaluation of Educational Achievement (IEA). PIRLS assesses students at Grade 4. PIRLS enables participating countries to make evidence-based decisions for improving educational policy.

For more information see: **http://timssandpirls.bc.edu/index.html**

PISA: The Programme for International Student Assessment (PISA) is a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students. Students take a two-hour test and are assessed in science, mathematics, reading, collaborative problem solving and financial literacy.

For more information see: **https://www.oecd.org/pisa/aboutpisa/**

SACMEQ: The Southern and Eastern Africa Consortium for Monitoring Education Quality undertakes integrated research and training activities that build the technical capacity of 16 regional ministries of education in order to monitor and evaluate the conditions of schooling and the quality of their own education systems. SACMEQ assess students at Grade 6 in reading.

For more information see: **http://www.sacmeq.org/**

SEA-PLM: The South East Asia Primary Learning Metrics is a regional assessment aimed at setting a common approach to assessing learning outcomes for primary Grade 5 students. It includes background questionnaires that gather key data from students, parents, teachers and school principals. It is administered in repeating cycles by Association of Southeast Asian Nations (ASEAN) and Southeast Asian Ministers of Education Organization (SEAMEO) member countries. It includes a set of metrics that can in time also include younger and older children. It is an assessment framework that is specifically developed to suit the context of its member countries.

For more information see: **http://www.seaplm.org/seaplm**

TIMSS: The Trends in International Mathematics and Science Study (TIMSS) is the other core cycle of studies for IEA – the International Association for the Evaluation of Educational Achievement. TIMSS assesses students at Grades 4 and 8. TIMSS enables participating countries to make evidence-based decisions for improving educational policy.

For more information see: **http://timssandpirls.bc.edu/index.html**

UWEZO: Uwezo is an annual, large scale citizen-led assessment that aims to improve competencies in literacy and numeracy among children aged six to 16 years in Kenya, Tanzania and Uganda.

For more information see: **http://www.uwezo.net/**

1.4 Leaving no one behind when monitoring learning

While government-run schools and government-aided private schools are likely to provide data to the collection of education data, data on learning may not be captured from all populations – namely those not in school, those in hard to reach and remote places, or schools for marginalized populations that do not fall under governmental oversight.

In many countries of the Asia-Pacific region, there are many populations considered as ethnic minorities and those living in tracts that are difficult to reach and these often go hand in hand. The types of schools that function in such places are few and far between. Some of them may even be government-run, but by specialized departments, such as departments for the welfare of tribal people/indigenous people.

It is very possible that countries have a considerable number of drop-out, remote, ethnic, or disability populations that may not have access to education due their various circumstances. We may want to ask: Does the country know how many there are? Where are they located? What are the reasons for their inability to participate in education?

Each country having population groups, or schools that fall under similar conditions should check whether data is collected by any department and whether such data can be accessed by the education department, or ministry.

Once we have more clarity on whether education data regarding these populations is captured at all, some effort will need to go into developing learning assessments for these populations. The typical learning assessments are aimed at populations in *school* with *governmental oversight*. Testing these children will require monitoring instruments that are not typically administered in school; household surveys may find suitable applications to capture learning achievements.

Additionally, the typical learning assessment is designed in the national language. Ethnic minorities, however, are known to rely on their mother tongue which is not always the national language. That circumstance adds to the difficulty of assessing their skills, when they are not proficient enough in the national language. When translating a test into their first language, the very formulation of the test question may change, resulting in the test becoming either easier, or more difficult to understand. In either case, it can distort the learning achievement score considerably.

Though censuses are expected to cover all such groups, in practice, there may be exceptions due to difficult terrain/geographic location of the groups being inaccessible, or such locations being inaccessible due to conflict. Household surveys, if administered correctly, can help track and monitor such groups.

To bring about prosperity to a country and its population requires capturing all of the populations with comparable accuracy – leaving no one behind. Only when everyone has been captured regarding his, or her learning achievements can we reflect on the true national picture. Smoother national education statistics for a nicer picture is not the aim of the Education 2030 Agenda.

1.5 A culture of testing – a word of advice

In many countries in the Asia-Pacific region, high-stakes examinations have become the means for controlling access to better schools, higher education and greater life opportunities. Learners are expected to cope with a world that is highly competitive, stressful and test-focused and they are pressured to obtain high scores in tests and exams based on knowledge acquired through memorization.

This fact, however, comes at the expense of other relevant skills that are needed to navigate in an increasingly complex world, such as empathy, interdisciplinary thinking, critical and systematic thinking, self-evaluation and appreciation of diversity, among others. Rote learning and assessing can hardly instil, nor measure these essential human aptitudes.

Our students today are constantly preparing for examinations, their parents are constantly concerned about their children's academic success and the resulting pressure on students leads to stress, anxiety and depression – with consequences for health, as well as school violence and even suicide among primary school children.

If we look up news reports, we would find that this is a relatively recent phenomenon for many countries in the world that emphasize *passing exams* at all costs.

The irony of this tragedy is that research has signalled the crucial relationship between happiness and educational quality; schools that prioritize learner well-being have the potential to be more effective, with better learning outcomes and greater achievements in a learner's life[5].

In simple terms, students learn better when they enjoy being at school without fear of punishment from teachers and parents. Every assessment should serve the student to **identify his or her strengths and weaknesses so as to provide talent nurturing and/or learning support – but not to administer fear and failure.**

[5] UNESCO, 2018: The culture of testing: sociocultural impacts on learning in Asia and the Pacific. Bangkok, UNESCO, access: https://unesdoc.unesco.org/ark:/48223/pf0000261955

2 Education and Training for Work

In order to participate productively in society, in addition to the basic competencies acquired in basic education, youth and adults require skills that are relevant for today's ever-changing labour markets. This topic is primarily addressed through Target 4.3 on participation in TVET and/or higher education, as well as through Target 4.4 on equipping young people with the relevant skills for work.

The expected achievements under these targets are not difficult to comprehend:

1. *Equal access* to *quality* TVET and higher education (Target 4.3);
2. Relevant *skills* that translate into finding and keeping *decent employment* (Target 4.4).

It is significant that TVET is commonly neglected as providing essential skills in the acquisition of not just work-specific skills, but also transferable skills, such as critical thinking, problem-solving, creativity, teamwork, communication, conflict resolution, entrepreneurship and finally, basic but essential ICT skills for the 21st century, to increase young people's abilities to adapt to the fast-changing demands of the labour market. TVET has vast potential that has yet to be capitalized on by most countries.

2.1 The principles of Technical and Vocational Education and Training

TVET is a diverse sector; it comprises formal, non-formal and informal learning. It takes place across a wide range of settings including schools, public and private vocational centres and institutes, higher education institutions and workplaces – in both the formal and informal economies.

TVET also has a multitude of very different institutional arrangements, organizational approaches and regulations. For the purposes of monitoring Target 4.3 and 4.4, there is a need for evidence-based policymaking in TVET and the use of valid and robust monitoring and evaluation instruments for the measurement of the indicators and their outcomes.

Table 1: The typology of TVET provision

1. Institution-based training	(i) Provided by the formal education system.	(a) Under the supervision of the ministry of education.	
		(b) Outside the supervision of the ministry of education.	
	(ii) Provided outside the formal education system	(a) Public.	
		(b) Non-public.	For profit.
			Not for profit.
2. Workplace-based training	(i) Pre-employment training.	(a) Modern apprenticeship.	
		(b) Traditional apprenticeship.	
	(ii) In-service training.		
3. Combination of multiple types of training (e.g. sandwich programmes, dual systems)			

Source: Inter-Agency Working Group (IAWG) on TVET Indicators, 2014. Proposed indicators for assessing technical and vocational education and training - Working Document, **access:** https://unesdoc.unesco.org/ark:/48223/pf0000260674

2.2 Proposed measurement approaches in TVET

TVET faces methodical measurements challenges resulting from its fragmented provision. This fragmentation includes the following:

- Vague or absent definitions of TVET programmes;
- Underdeveloped monitoring indicators;
- Unstandardized mechanisms to collect, process and aggregate data;
- The incapacity to link labour market studies to TVET demand and supply requirements.

It is indispensable to map existing TVET data and their sources before making any decision about monitoring this education sector. An Inter-Agency Working Group (IAWG) on TVET analysed data availability for TVET and co-developed a conceptual framework on TVET indicators. The framework is built around interrelated components of 'relevance', 'access and participation', 'quality' and 'finance' to aid with establishing a systematic measuring of TVET[6]. Each of the components defines indicators to monitor TVET (see Table 2). Policymakers

[6] For the framework, see the Inter-Agency Working Group (IAWG) on TVET Indicators, 2014. Proposed indicators for assessing technical and vocational education and training – Working Document, access: https://unesdoc.unesco.org/ark:/48223/pf0000260674

and stakeholders will have to combine priorities related to the components of relevance, equity and quality, providing the needed financial support within the context of institutional settings, governance and timelines prescribed.

The following table lists the proposed indicators by component and data availability. While they are not officially part of SDG 4 to date, these indicators are helpful in designing, planning and monitoring national TVET policies and programmes.

Table 2: Indicators and data availability in TVET

	INDICATORS		
AREA	**DATA READILY AVAILABLE**	**DATA NOT READILY AVAILABLE**	**DATA OFTEN NOT AVAILABLE**
1. Financing	1.1 Spending on formal TVET.	1.2 Total TVET spending per student.	1.3 Proportion of companies providing apprenticeships and other work-based types of pre-employment training (by company size). 1.4 Spending on apprenticeships and other types of training as a proportion of labour costs (by company size).
2. Access and participation	2.1 Enrolment in school-based TVET by gender as a percentage of total enrolment in the formal education system. 2.2. Enrolment by type of TVET programme.	2.6 Typology of admission policies to formal school-based TVET. 2.7 Transition paths from upper secondary to TVET education.	2.3 Work-based learning participation rate. 2.4 Equity. 2.5 Unsatisfied demand for TVET. 2.8 Policies on articulation with schooling/higher education.
3. Quality	3.1 Student–teacher ratio in formal TVET and in general programmes. 3.2 Completion rate in TVET programmes and in general programmes.	3.3 Proportion of apprentices completing registered programmes (by trade, age and gender). 3.4 Proportion of qualified teachers in TVET and in general programmes.	3.5 Relevance of quality assurance systems for TVET providers. 3.6 Investment in training of teachers and trainers. 3.7 Utilization of acquired skills in the workplace. 3.8 ICT training activities as a proportion of TVET. 3.9 Satisfaction of employers with TVET graduates.

4. Relevance	4.1 Labour force participation rate (by gender, age, and level of education). 4.2 Employment–population ratio (by gender, age and level of educational attainment). 4.3 Unemployment rate (by gender, age and level of educational attainment). 4.4 Employment status (by gender, age and level of educational attainment). 4.5 Employment shares by sector (by gender, age and level of educational attainment). 4.6 Employment shares by occupation (by gender and age). 4.7 Literacy (by gender and age).	4.8 Informal employment rate (by gender, age and level of educational attainment). 4.9 Time-related unemployment rate (by gender, age and level of educational attainment).	4.10 Working poverty rate (by gender and age). 4.11 Average real earnings by occupation and industry (by gender and age). 4.12 Hard-to-fill vacancies (by occupation). 4.13 Net job creation. 4.14 Number of young people outside the labour force. 4.15 Discouraged workers (by gender and age).

Source: Inter-Agency Working Group (IAWG) on TVET Indicators, 2014. Proposed indicators for assessing technical and vocational education and training – Working Document, **access:** https://unesdoc.unesco.org/ark:/48223/pf0000260674

Area 1: Finance

TVET financing is largely determined by the rules and regulations through which financial resources are collected, allocated and managed. It largely depends on the economic situation and the resources available and also on the priorities of decision-makers involved in the various types of TVET with regard to relevance, equity and quality and on the trade-offs that stem from those priorities. This component also relates to the capacity of the system to ensure that resources are equitably and efficiently allocated.

Area 2: Access and participation

This area refers to the extent to which various types of TVET promote equity and inclusion and the implications on the expansion of learning opportunities for excluded groups. This is examined through the lens of access and participation. While this component focuses on the important social aims of TVET, it is simultaneously strongly related to the relevance dimension since it prioritizes the need to increase the number of people who have viable and effective opportunities to benefit from high-quality TVET, leading to positive labour market outcomes.

Area 3: Quality

This area relates to the policy options that produce a TVET system that is focused on the teaching and learning process and its effectiveness. It is a measure of the quality of any TVET programme that it is effectively conducted and relevant in terms of meeting skill needs. The availability of high-quality facilities and equipment is also fundamental to the provision of high-quality TVET. Equally importantly, this component reflects the capacity of systems to innovate and the way in which the teaching and learning process is a site of innovation itself, for example in terms of the rapid changes in the use of ICT. In addition, this component relates to the existence of a systematic approach to quality assurance to support practitioners and policy-makers in improving the quality of training provision and also to guide students in making choices.

Area 4: Relevance

This relates to the responsiveness of TVET to labour market needs and requirements. The relevant policy areas to be considered here relate to market links to TVET programmes and outcomes of TVET programmes. This component reflects the assumption that the primary and key role of TVET is to raise skill levels and to help to address skill needs at all levels in today's complex and changing labour markets. Relevance also entails having the mechanisms and available capacity to understand the transition from school to work and from all types of TVET programmes to capture labour market signals and to anticipate emerging skill needs and the extent to which these inform TVET provision.

For more information material on TVET, see:

UNESCO-UNEVOC International Centre for TVET[7]

[7] The UNESCO-UNEVOC International Centre for TVET, access: https://unevoc.unesco.org/go.php

3 Education for Sustainable Development and Global Citizenship

In order to prepare learners for the 21st century, there is a need for an interdisciplinary approach in which the tutoring transverses across a wide range of competencies – irrespective of whether this relates to the training of lawyers, doctors, farmers, clerks, dentists, politicians, or accountants.

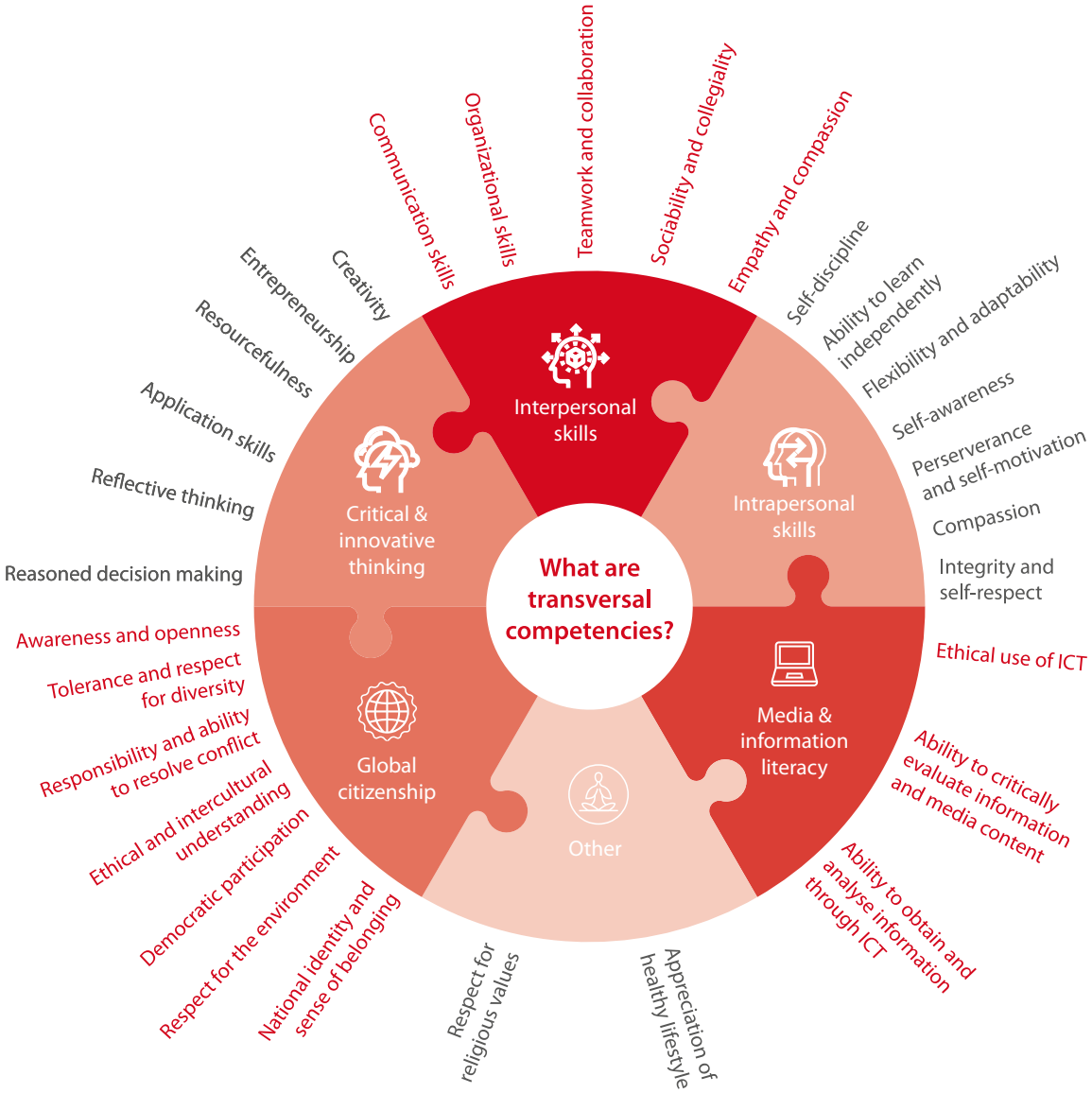
People need competencies that allow them to take action on sustainability issues as informed global citizens. As transversal competencies can be numerous, the following figure on transversal competencies, as they are commonly promoted in education policy and practice, provides a structured insight into what these competencies entail.

We can see that the above figure displays transversal skills that address essential aspects of sustainable development and global citizenship, as they relate to Target 4.7 of SDG 4. Target 4.7 on skills and knowledge for sustainable development has a wide, if not the widest, range of concepts and addresses a range of topics for education to cover and it serves as a moral purpose of education.

Due to this wide range, Target 4.7's global indicator required time to come to a common understanding on which topics, through education for sustainable development and global citizenship, should be monitored. Countries contested believed common definitions, as cultural traditions influence a common understanding. Accordingly, this has resulted in difficulties in developing a consensual monitoring framework. Likewise, the reporting at the country level has not yet taken on board the thematic indicators.

To date, the Technical Cooperation Group (TCG) on Education Indicators has developed a set of internationally-comparable indicators for facilitating the monitoring of SDG 4-Education 2030. This indicator framework is comprised of the global indicator and its sub-components, as well as the thematic indicators that the countries may use to monitor, based on their national context, policy priorities, technical capacities and data availability.

Figure 1: Transversal competencies by six domains



Source: UNESCO, 2016: Assessment of transversal competencies: policy and practice in the Asia-Pacific region. Paris and Bangkok, UNESCO, **access:** https://unesdoc.unesco.org/ark:/48223/pf0000246590

Table 3: Indicator framework for Target 4.7

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development		
Provision	**4.7.1**	Extent to which global citizenship education and education for sustainable development are mainstreamed in national education policies, curricula, teacher education and student assessment.
	4.7.2	Percentage of schools that provide life skills-based HIV and sexuality education.
	4.7.3	Extent to which the framework on the World Programme on Human Rights Education is implemented nationally (as per UNGA resolution 59/113).
Knowledge	**4.7.4**	Percentage of students of a given age group (or education level) showing adequate understanding of issues relating to global citizenship and sustainability.
	4.7.5	Percentage of secondary education students showing proficiency in knowledge of environmental science and geoscience.

Note: The highlighted indicator in the lighter coloured box is to be monitored and reported on at the global level.

Source and details: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

The UIS Metadata for the global and thematic indicators of SDG 4 have included definitions and calculations for the 4.7 indicators[8]

The global indicator of Target 4.7 is defined as the extent to which countries mainstream global citizenship education (GCED) and Education for Sustainable Development (ESD), including climate change education, human rights and gender equality in their education systems, specifically in policies, curricula, teacher education and student assessment.

That it is difficult for all countries to articulate all the indicators under target 4.7 is appreciated. It has been noted that wherever such attempts have been made, they have tended to serve more as 'global signposts' rather than quantitative indicators of the target. GCED and ESD, as the means to deliver Target 4.7, need to be contextualized in every country and be reflected in national education policy priorities with quantifiable targets set at the national level.

Both ESD and GCED need to be translated to the individual country contexts to be in tune with the education commitments, legal frameworks, policy support and human-material-financial resources. The planning and programming will have to be worked out on that basis. Once this

[8] UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, access: http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

is conceptualized, the identification data sources can follow to monitor progress and become part of a national education indicator framework. Some of these indicators could also be cross-cutting ones across other sectors. To provide a basic understanding of ESD and GCED, the following sections summarize the principles behind the two global education approaches.

3.1 Understanding Global Citizenship Education

The concept of Global Citizenship Education (GCED) assumes importance in the context of developing country specific measurements for SDG 4 target 7. GCED refers to a sense of belonging to a broader community and common humanity. It emphasizes political, economic, social and cultural interdependency and interconnectedness between the local, the national and the global spheres of human existence.

The conceptual dimensions of GCED identify three local socio-cultural dimensions that influence the impact of GCED on the learner. These are the cognitive, socio-emotional and behavioural dimensions[9].

- **COGNITIVE:** To acquire knowledge, understanding and critical thinking about global, regional, national and local issues and the interconnectedness and interdependency of different countries and populations.
- **SOCIO-EMOTIONAL:** To have a sense of belonging to a common humanity, sharing values and responsibilities, empathy and solidarity and respect for differences and diversity.
- **BEHAVIOURAL:** To act effectively and responsibly at local, national and global levels for a more peaceful and sustainable world.

It is important to note that these core conceptual dimensions of GCED – with the learning objectives – are subject to local socio-cultural dimensions that influence the one delivery of GCED and learning. For example, the curricula developed at the national or sub-national levels may be strongly influenced by local cultural, ethnic or linguistic identities.

For more information material, see:

UNESCO Global Citizenship Education portal[10]

[9] UNESCO Global Citizenship Education, access: https://en.unesco.org/themes/gced

[10] UNESCO, 2015: Global Citizenship Education, Topics and Learning Objectives. Paris, UNESCO, access: https://unesdoc.unesco.org/ark:/48223/pf0000232993

3.2 Understanding Education for Sustainable Development

ESD may be construed as an integral part of quality education, inherent in the concept of quality education. It is holistic and transformational in nature and it addresses learning content and outcomes, pedagogy and the learning environment. Its focus is on learning making informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity.

To deliver ESD, the pedagogical approaches need to become action-oriented and transformative, supportive of self-directed learning, participation and collaboration, problem-orientation, inter-and-trans-disciplinary and the linking of formal and informal learning.

ESD is characterized by the following:

- **LEARNING CONTENT:** Integrating critical issues, such as climate change, biodiversity, disaster risk reduction (DRR) and sustainable consumption and production (SCP) into the curriculum.
- **PEDAGOGY AND LEARNING ENVIRONMENTS:** Designing teaching and learning in an interactive, learner-centred way that enables exploratory, action-oriented and transformative learning, as well as rethinking learning environments.
- **SOCIETAL TRANSFORMATION:** Empowering learners of any age, in any education setting, to transform themselves and the society they live in to greener economies, with learners equipped with skills for 'green jobs' and motivated to adopt sustainable lifestyles.
- **LEARNING OUTCOMES:** Stimulating learning and promoting core competencies, such as critical and systemic thinking, collaborative decision-making and taking responsibility for present and future generations to be empowered to assume active roles to resolve local and global challenges as contributors to a more just, peaceful, tolerant, inclusive, secure and sustainable world.

It is important to note that ESD can develop cross-cutting key competencies for sustainability that are relevant to all SDGs. Similarly, ESD can also develop specific learning outcomes needed to work on achieving a particular SDG[11].

For more information, see:

UNESCO Education for Sustainable Development portal[12]

[11] For more information on ESD, see the Global Action Programme on Education for Sustainable Development, access: https://en.unesco.org/gap

[12] UNESCO Education for Sustainable Development, access: https://en.unesco.org/themes/education-sustainable-development

3.3 Monitoring ESD and GCED

In October 2018, the UNESCO Institute for Statistics (UIS) updated UIS Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030 which includes a **preliminary** methodology on measuring Target 4.1's indicator 4.7.1: *Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies (b) curricula (c) teacher education and (d) student assessments*.

The indicator has been created with the intention to go beyond the level of the mere mention of GCED and ESD in policy, curricula and teacher education and student assessments. The indicator is based on an evaluation of reports submitted by countries to UNESCO as part of the monitoring process for the 1974 Recommendation concerning Education for International Understanding, Co-operation and Peace Education relating to Human Rights and Fundamental Freedoms that occurs every four years[13]. These reports describe how countries are mainstreaming global citizenship education and education for sustainable development in their education policies and systems.

To put it simply, countries respond to selected questions by means of a standardized questionnaire on four components, as defined in the indicator. These components are:

a. National education policy;

b. Curricula;

c. Teacher education;

d. Student assessments.

The curricula component is further sub-divided into two sub-components: (i) curricular content; and (ii) curricula resources. The score for each question is standardized by applying a Min-Max procedure in order to range between 0 and 100.

For each component of this indicator, the simple mean is calculated from the questions scores within the same component. The results for all responding countries are then divided into approximate terciles (country groupings) to give the following categories for reporting:

- Upper tercile = Making strong progress;
- Middle tercile = Progress is under way;
- Bottom tercile = Has more room for progress.

Results are reported for each component, or sub-component separately but are not combined into an overall score on the grounds that strong progress in one component does not compensate for weak progress in another.

[13] For more information on the 1974 Recommendation, access: http://portal.unesco.org/en/ev.php-URL_ID=47528&URL_DO=DO_TOPIC&URL_SECTION=201.html

Box 1: Example evaluation for integration of ESD and GCED relevant concepts in student learning assessments

Question 15a. Are the principles and topics mentioned in Q7 (peace and non-violence, human rights and fundamental freedoms, cultural diversity and tolerance and human survival and well-being) included generally in student assessments/examinations?

Answer 15a. 1= yes, 0 = no or no information.

Question 15b. If yes, please indicate which of the following dimensions of learning were included in the last student assessment/examinations. (Please tick all that apply)

Answer 15b. One point is awarded for each box which is ticked, except (e) and (f).

- **a.** *knowledge;*
- **b.** *skills and competencies;*
- **c.** *values and attitudes;*
- **d.** *behaviours;*
- **e.** *none;*
- **f.** *no information available.*

Source: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

For the details on SDG 4 indicator 4.7.1, see:

Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030 [14]

[14] UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, access: https://bangkok.unesco.org/content/latest-metadata-global-and-thematic-indicators-follow-and-review-sdg-4-and-education-2030

4 Learning Spaces

It seems appropriate at this point to consider that SDG 4 also wants to monitor the spaces where education takes place. Target 4.a establishes the goal to build and upgrade education facilities that are child, disability and gender-sensitive and provide safe, non-violent, inclusive and effective learning environments for all. With terms of gender, non-violence and effective learning, the relevance of learning spaces that reflect the just discussed concepts of monitoring learning outcomes is important for acquiring aspired values and competencies.

Target 4.a has three indicators, whereas the global indicator is further characterized by three sub-components of electricity and the resulting opportunities for ICTs; water, sanitation and hygiene (WASH) access facilities; and adequately adapted buildings for learners with disabilities.

The two remaining thematic indicators reflect on making schools welcoming to learners and teachers, highlighting the school as being a mutual responsibility for integrated learning that is free of discrimination and violence.

Table 4: Indicator framework for Target 4.a

4.a Build and upgrade education facilities that are child, disability and gender-sensitive and provide safe, non-violent, inclusive and effective learning environments for all		
Resources	**4.a.1**	Proportion of schools with access to basic drinking water, single-sex basic sanitation facilities and basic handwashing facilities.
		Proportion of schools with access to electricity, Internet for pedagogical purposes and computers for pedagogical purposes.
		Proportion of schools with adapted infrastructure and materials for students with disabilities.
Environment	**4.a.2**	Percentage of students experiencing bullying, corporal punishment, harassment, violence, sexual discrimination and abuse.
	4.a.3	Number of attacks on students, personnel and institutions.

Note: The highlighted indicators in the lighter coloured box are to be monitored and reported on at the global level.

Source and details: UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, **access:** http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

The UIS Metadata for the global and thematic indicators of SDG 4 have included definitions and calculations for the 4.a indicators[15].

[15] UIS, 2018: Metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030, access: http://uis.unesco.org/sites/default/files/documents/sdg4-metadata-global-thematic-indicators-en.pdf

4.1 Integrating disability in monitoring education

Disability results from the interaction of a person's functioning and their environment. That is, a person may have an impairment – for example they cannot move their legs – but disability also arises from barriers in the environment that prevent a person from participating in society, or in the case of education; from attending and succeeding in school. Therefore, the focus is not solely on a learner's impairment, but also on the barriers in the school environment that prevent them from quite literally physically accessing an education[16].

What matters with receiving an education is a learner's functioning. That means, what he, or she is capable of doing, not what condition he, or she may have. For example, some children with cerebral palsy have great difficulty walking or speaking, but some only have minor difficulties. Some have cognitive delays and some have no cognitive delays whatsoever.

Simply knowing a diagnosis of impairment does not provide much information on their capacity to carry out learning activities. Information is needed, not on medical diagnoses but on the nature of the impairment and understanding the difficulties to perform a task in school.

Removing the barriers, and providing access support and services in school is the obvious step at hand. Yet removing barriers includes attitudinal and institutional barriers, including the lack of capacity of the education system to understand and address the needs of children with disabilities. In addition, medical rehabilitation, assistive devices, speech therapy, physical therapy and counselling should accompany access to education.

There is a challenge in producing internationally comparable data on persons with disabilities due to the varying definitions and understanding of the term 'disability' across the world. This situation has led to obstacles of:

- Priorities in collecting disability not being consistent over time;
- Collection methods not being consistent and thus incomparable;
- The degrees of disaggregation varying.

To address the aim of producing globally comparable data, the Washington Group on Disability Statistics was established in 2001. The Washington Group developed a set of questions for use in household surveys and censuses to collect information on persons with a disability. The questions are based on the presence of difficulties in the six core functional domains of seeing, hearing, walking, self-care, cognition and communication. Respondents then answer on a four-category scale to each of the six domains as to whether they have no difficulty; some difficulty; a lot of difficulty; or whether they cannot perform in any of the six domains at all.

[16] Technical Guidance- Guide for Including Disability in Education Management Information Systems, UNICEF Education Section, Programme Division February 2016.

Figure 2: The six function domains and the four-scale evaluation of disability

Using the disability model by the Washington Group, a person is considered to have a disability if the respondent is unable to perform, or perform with a lot of difficulty for at least one of the six functional areas.

The Washington Group suggested some questions and categorization helped countries to collect data better and it was possible to translate this into many local languages for better administration of survey questionnaires.

For more information, see:

Washington Group on Disability Statistics[17]

Box 2: A quick history lesson on disability

At the time of the Millennium Development Goals (MDGs), persons with disabilities were not referenced in the agenda. They were excluded from many important initiatives and funding streams around the world. This glaring gap was addressed in the formulation of the 2030 Agenda and SDG 4. Including the topic of disability presents a great opportunity for governments and all stakeholders to recognize the notion of equity in the quest for leaving no one behind.

As early as in 1948, the United Nations Universal Declaration of Human Rights (Article 2 and 26) proclaimed that everyone has the right to education without distinction of any kind. The Convention on the Rights of the Child (1989) was the first treaty developed specifically to uphold the rights of children. It was followed later by the United Nations General Assembly's Special Session on Children (2002) with increased concerns for specific rights of minority groups, including children with disabilities. Articles 1 and 2 of the Convention both state that all rights apply 'to every human being' under the age of 18 years and prohibits discrimination on a number of grounds including that of disability.

Sources: The Universal Declaration of Human Rights, **access:** http://www.un.org/en/universal-declaration-human-rights/; Convention on the Rights of the Child, **access:** https://www.ohchr.org/en/professionalinterest/pages/crc.aspx

[17] The Washington Group on Disability Statistics, access: http://www.washingtongroup-disability.com/

4.1.1 Integration disability statistics in household surveys

One of the most popular surveys that has started using the Washington Group questions is the Demographic Health Survey (DHS) which is discussed in the module on household surveys (Module 4). The survey contains a module that allows the collection of disability data based on the internationally-comparable short set of questions developed by the Washington Group.

Figure 3: Excerpt from the DHS questionnaire module on disability

	IF AGE 5 OR OLDER					
LINE NO.	DISABILITY					
	26	27	28	29	30	31
	Does (NAME) wear glasses or contact lenses to help them see?	I would like to know if (NAME) has difficulty seeing even when wearing glasses or contact lenses. Would you say that (NAME) has no difficulty seeing, some difficulty, a lot of difficulty, or cannot see at all? 1 = NO DIFFICULTY SEEING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT SEE AT ALL 5 = DON'T KNOW	I would like to know if (NAME) has difficulty seeing. Would you say that (NAME) has no difficulty seeing, some difficulty, a lot of difficulty, or cannot see at all? 1 = NO DIFFICULTY SEEING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT SEE AT ALL 5 = DON'T KNOW	Does (NAME) wear a hearing aid?	I would like to know if (NAME) has difficulty hearing even when using a hearing aid. Would you say that (NAME) has no difficulty hearing, some difficulty, a lot of difficulty, or cannot hear at all? 1 = NO DIFFICULTY HEARING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT HEAR AT ALL 5 = DON'T KNOW	I would like to know if (NAME) has difficulty hearing. Would you say that (NAME) has no difficulty hearing, some difficulty, a lot of difficulty, or cannot hear at all? 1 = NO DIFFICULTY HEARING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT HEAR AT ALL 5 = DON'T KNOW

	IF AGE 5 OR OLDER			
LINE NO.	DISABILITY			
	32	33	34	35
	I would like to know if (NAME) has difficulty communicating when using his/her usual language. Would you say that (NAME) has no difficulty understanding or being understood, some difficulty, a lot of difficulty, or cannot communicate at all? 1 = NO DIFFICULTY SEEING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT SEE AT ALL 5 = DON'T KNOW	I would like to know if (NAME) has difficulty remembering or concentrating. Would you say that (NAME) has no difficulty remembering or concentrating, some difficulty, a lot of difficulty, or cannot remember or concentrate at all? 1 = NO DIFFICULTY SEEING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT SEE AT ALL 5 = DON'T KNOW	I would like to know if (NAME) has difficulty walking or climbing steps. Would you say that (NAME) has no difficulty walking or climbing steps, some difficulty, a lot of difficulty, or cannot walk or climb steps at all? 1 = NO DIFFICULTY HEARING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT HEAR AT ALL 5 = DON'T KNOW	I would like to know if (NAME) has difficulty washing all over or dressing. Would you say that (NAME) has no difficulty washing all over or dressing, some difficulty, a lot of difficulty, or cannot wash all over or dress at all? 1 = NO DIFFICULTY HEARING 2 = SOME DIFFICULTY 3 = A LOT OF DIFFICULTY 4 = CANNOT HEAR AT ALL 5 = DON'T KNOW

By introducing a module on disability to existing household surveys, data gaps with regard to disability can be greatly minimized as they make it possible to analyse various aspects of exclusion linked to personal and household characteristics, including those related to disability.

For the questionnaire module in the DHS, see:

DHS Questionnaire Modules[18]

[18] DHS Questionnaire Modules, access: https://dhsprogram.com/publications/publication-DHSQM-DHS-Questionnaires-and-Manuals.cfm

4.1.2 Integration disability statistics in EMIS

As we already know, an EMIS collects, aggregates and reports education data in established cycles. Given the education system embeddedness on data collection of the EMIS, it makes sense to capitalize on its function to capture children by their specific background and be able to gain insights into learners with disabilities.

The Washington Group's suggested questions can be adapted and utilized in an EMIS as they can be in household surveys. The UNICEF Guide for Including Disability in Education Management Information Systems provides examples of how disability-specific questions can be formulated and integrated within an EMIS.

Figure 4: Example of recommended questions for an EMIS form for children with disabilities

Table 2a: Recommended questions for EMIS form for children with disabilities

Compared with children of the same age, how many children enrolled in school have difficulties in the following areas (a child can be counted in more than one area):

	Vision		Hearing		Gross Motor (e.g., walking or climbing steps)		Fine Motor (e.g., writing or fastening clothes)		Intellectual		Communication (understanding and being understood by others)		Behaviour and socialization	
	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty	Some difficulty	A lot of difficulty
Boys														
Girls														
TOTAL														

How many children enrolled in school have difficulties in the following number of areas, as recorded above

	1 area	2 areas	3 areas	4 areas	5 areas	6 areas	All 7 areas	TOTAL
Boys								
Girls								
TOTAL								

Source: UNICEF, 2016: Guide for Including Disability in Education Management Information Systems. Technical Guidance, **access:** http://training.unicef.org/disability/emergencies/downloads/UNICEF_guide-for-including-disability-in-education-management-information-systems.pdf

For detailed guidance on including disability questions in an EMIS, see:

Guide for Including Disability in Education Management Information Systems[19]

[19] UNICEF, 2016: Guide for Including Disability in Education Management Information Systems. Technical Guidance, access: http://training.unicef.org/disability/emergencies/downloads/UNICEF_guide-for-including-disability-in-education-management-information-systems.pdf

4.1.3 Disability requirements in other Sustainable Development Goals

To highlight the significance of collecting disability data, Figure 5 provides an overview of some of the SDGs that require data related to disability. When setting up inter-ministerial, or inter-departmental data collection mechanisms, this will facilitate in accessing disability data for those involved and feed into mutual monitoring and evaluation efforts. You may want to contact the relevant governmental bodies as they correspond to the following SDGs and their targets.

Figure 5: Examples of disability references in other SDGs

SDG 1: No Poverty	**Target 1.3: Implement nationally appropriate social protection systems and measures for all, including floors and by 2030 achieve substantial coverage of the poor and the vulnerable.**
1.3.1: Proportion of population covered by social protection floors/systems, by sex, distinguishing children, unemployed persons, older persons, persons with disabilities, pregnant women, newborns, work-injury victims and the poor and the vulnerable.	
SDG 8: Decent Work and Economic Growth	**Target 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.**
8.5.1: Average hourly earnings of female and male employees, by occupation, age and persons with disabilities.	
SDG 10: Reduced Inequalities	**Target 10.2: By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.**
10.2.1: Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities.	
SDG 11: Sustainable Cities and Communities	**Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.** **Target 11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities.**
11.2.1: Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities. 11.7.1: Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities.	
SDG 16: Peace	**Target 16.7: Ensure responsive, inclusive, participatory and representative decision-making at all levels**
16.7.1: Proportions of positions (by sex, age, persons with disabilities and population groups) in public institutions (national and local legislatures, public service, and judiciary) compared to national distributions. 16.7.2: Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group.	

Source: Adapted from UN DESA, 2016: Disability in the SDGs Indicators (March 2016) **access:** http://www.un.org/disabilities/documents/2016/SDG-disability-indicators-march-2016.pdf

Wherever 'vulnerable groups' are mentioned in the SDGs, this addresses persons with disabilities, too, because of the 2030 Agenda's overarching principle of **leaving no one behind**.

The International Disability and Development Consortium (IDDC), the UN and the International Disability Alliance (IDA) have developed an SDG indicators advocacy toolkit to help address the collection of relevant data with comparable indicators for all the SDGs.

For more information, see:

Disability Indicators: SDG Advocacy Toolkit[20]

4.2 Monitoring education in emergency situations

When talking about education contexts and here in particular about learning spaces, education in emergency situations tends to receive little attention. However, countries across the globe as well as in the Asia-Pacific region have to deal with a rising number of children and youth who live in acute and protracted crises, or conflict-affected areas.

In 2014, UNHCR (United Nations High Commissioner for Refugees) estimated that 51.2 million people were living as refugees, or internally displaced peoples globally. Of these, 10.7 million people were newly displaced in 2014 due to conflict and/or persecution – the largest scale of displacement ever recorded[21].

The Education 2030 Agenda highlights that displaced refugee and stateless children and youth must be accounted for in the next 15 years of education sector planning, development and monitoring at the sub-national, national, regional and international levels. Governments require robust and responsive strategies to ensure quality education reaches the affected. Partnerships to address education in emergencies are key.

Remember!

You should familiarize yourself about the marginalized and vulnerable groups in your country including refugees and internally displaced populations and people affected by natural disasters and ensure that suitable indicators are developed to monitor their progress in getting access to a continued and quality education.

[20] The International Disability and Development Consortium Disability Indicators: SDG Advocacy Toolkit, access: https://www.iddcconsortium.net/resources-tools/disability-indicators-sdg-advocacy-toolkit

[21] UNHCR, 2014: War's Human Cost – Global Trends 2013. Geneva, UNHCR.

4.2.1 Understanding emergencies

Education in emergencies relates to situations of crisis to which count primarily situations of violence, natural disasters and public health pandemics. As a consequence of such situations, affected communities suffer hardships and in most cases destruction of property that forcefully leads to migration and refuge seeking.

ARMED CONFLICT: Though armed conflicts generally traumatize entire populations in the region of such conflicts, they particularly do so in respect of children, women, the disabled and the very old. In the case of children, they leave deep and lasting scars in their young minds and bodies that can remain longer than the period of such violence. Even in cases where the children do not experience such violence directly, they may become orphans, experience sexual abuse or exploitation, suffer landmine injuries, or death, or be forced to join in the fighting. Even when the conflict subsides, they may still have to fight disease, inadequate shelter and limited, or no access to basic essential services. Such conflicts directly affect children's learning as they often interrupt the children's attendance in schools due to reasons of insecurity, non-availability of teachers, or due to attacks being directed at schools and teachers. Armed conflicts are also reported to be a leading cause of world hunger now.

Remember!

Even though education in emergencies focuses specifically on children, further special attention may be needed to address gender issues that may exacerbate already prevailing gender discrimination, if any, against girls in the community. Such discrimination may be cultural and institutional barriers to girls' education that exists even before an emergency. Suitable action may be needed to identify and address such gender barriers in an emergency situation.

NATURAL DISASTERS: Natural disasters include the rapid-onset of storm surges, earthquakes, floods and tsunamis. In such cases, again, children may witness, or directly experience mass destruction of life and property, displacement from homes, develop fear-psychosis of possible repeated disasters, suffer other psycho-social distress and may be left with no structured activities because of the temporary closure of schools. In cases of slow-onset of disasters, such as drought, the displacement of populations can happen, resulting in conflicts between host communities and the displaced populations because of competition for scarce resources. In both the systems, the education system may be burdened by large class sizes, shortages of teachers, issues related to medium of instruction, inadequate supply of materials and damaged infrastructure.

EPIDEMICS AND PANDEMICS: Health emergencies can have a devastating impact on education and its functioning. HIV/AIDS and human influenza pandemic are instances in point. These can result in emergency situations like increased teacher attrition and absenteeism, student absenteeism, drop-outs, stigmatized orphans often getting excluded from schools and schools being shut down in cases of pandemics for months at a time. The preparation of alternative measures, such as home and distance learning are essential in these situations.

4.2.2 Delivering education in emergencies

When parental or the wider social networks and support systems erode during such crises, girls and boys may become household breadwinners and they are forced into seeking unsafe employment to support siblings, or other community members. Adopted adult roles removes them from a protective environment for which they have not been prepared. These circumstances affect children, adolescents and youth physically, psychologically, socially and intellectually.

Providing education is the best response for young people affected by crises and displacement. Advocacy and communication help mobilize donors, governments, partners and affected populations to quickly establish educational activities. UNICEF, UNESCO, UNRWA and other agencies support education in emergencies.

4.2.3 Measurement challenges in education in emergencies

Education activities in emergencies vary greatly according to the nature of the crisis and context of the country. A good education response should do the following:

- Deliver tangible results and aim to maintain children's educational continuity;
- Be flexible in terms of timing, location and methods used;
- Build the capacity of teachers to help children cope with the mental, physical and psychosocial impact of an emergency;
- Focus efforts on groups of marginalized children, such as displaced children, those from ethnic minority communities, girls, children with disabilities, younger children and former child soldiers;
- Find ways to address community tensions and enhance integration;
- Engage governments, local NGOs, or communities as partners.

However, without accurate data on displaced and vulnerable populations *and* on education provision, planning education in emergencies is ineffective and resource-intensive. These populations are often invisible in national education sector plans and therefore, their education is under-funded, or has no budget allocation. Reliable data is critical for monitoring purposes for policy makers and planners[22].

In emergency situations, monitoring should provide high frequency and a broad coverage of information. A high number of humanitarian and aid workers descending upon the emergency-affected areas make coordination and standardization of data collection difficult when not organized centrally. Therefore, the following provides guidance in dealing with collection information in emergency situations.

[22] For the information education, migration and refuge, see: UNESCO, 2018: Global Education Monitoring Report 2019. Migration, displacement and education: Building bridges, not walls. Paris, UNESCO. Access: https://en.unesco.org/gem-report/report/2019/migration

Components to monitor education in emergencies

- Location of learning spaces and the physical settings and facilities;
- Number and location of children out-of-school;
- Reconstruction/rehabilitation of learning spaces;
- Distribution, receipt and use of supplies, including pre-packaged kits;
- Satisfaction of students and teachers with services and resources.

Indicators for monitoring education programmes

- Number of pupils enrolled/attending schools, disaggregated by gender and age;
- Percentage of participation of affected students, based on the proportion of participants to non-participants;
- Factors that may prevent, or limit participation (gender, caste, ethnicity, religion, language, domestic chores, disabilities, etc);
- Ratio of children to teachers in each class;
- Number and characteristics of teachers and paraprofessionals, disaggregated by sex;
- Level of teacher training;
- Age and level-appropriateness of activities for participants;
- Existence of school feeding in learning spaces (if appropriate);
- Availability of water and sanitation near learning spaces;
- Feedback from all stakeholders on material, content and conditions of the programmes, measured through formal feedback forms, or less formal feedback sessions with students, teachers and parents.

For more information, see:

Inter-agency Network for Education in Emergencies[23]

[23] Inter-agency Network for Education in Emergencies, access: http://www.ineesite.org/

5 Final Thoughts

There is a need for better coordination and cooperation among various ministries and the national statistical office regarding data collection. The above digression brings into clear focus that data relating to educational interventions and outcomes from the various sectors can be collected and collated only with close coordination and cooperation.

Partnerships across sectors; the development of necessary policies; the development of necessary indicators; inducting systematic data collection; and engaging local stakeholders, particularly civil society and communities are pre-requisites for monitoring these challenging areas.

It is important to remind ourselves at this point about the new vision of the Education 2030 Agenda while doing this exercise. The targets set against this goal have been inspired by a humanistic vision of education and development based upon human rights and dignity; social justice; inclusion; protection; cultural-linguistic-and-ethnic diversity; shared responsibility and accountability.

It is, therefore, necessary to keep the following concepts in mind:

- Human rights (in particular the right to education);
- Social justice;
- Inclusiveness;
- Protection of vulnerable groups;
- Cultural diversity;
- Ethnic diversity;
- Linguistic diversity;
- Shared responsibility;
- Accountability;
- Public good;
- Peace and tolerance;
- Human fulfilment;
- Sustainable development;
- Decent work;
- Poverty eradication;
- Lifelong learning;

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