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BENCHMARKING SDG 4
PROPOSED METHODOLOGY FOR MEASURING PROGRESS

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1. Background

UIS and GEMR have been assisting countries to fulfil their commitments to establish national SDG 4 benchmarks. Since 2017, when the SDG monitoring framework was approved by the UN General Assembly, the UNESCO Institute for Statistics (UIS) and the Global Education Monitoring (GEM) Report, which share the mandate for monitoring progress towards SDG 4 according to the Education 2030 Framework for Action, have helped countries fulfil their commitment to establish national SDG 4 benchmarks (UIS and GEM Report 2022). The process has involved three key steps:

1. **Seven SDG 4 indicators have been selected:** in August 2019, the Technical Cooperation Group on the Indicators for SDG 4 (TCG), the body responsible for the development of the SDG 4 monitoring framework, endorsed seven SDG 4 indicators that were deemed suitable for benchmarking (**Table 1**).

2. **Invitation to set national benchmarks:** In August 2021, building on the Global Education Meeting declaration of October 2020, which had requested UNESCO to "propose relevant and realistic benchmarks of key SDG indicators for subsequent monitoring" (UNESCO, 2020), an invitation was sent to countries, along with supporting documentation, to submit national benchmark values by 1 October 2021 for 2025 and 2030. Many of the seven benchmarking indicators are disaggregated, mostly by education level, which means countries needed to select 20 benchmark values each for 2025 and 2030

3. **Invitation to revise national benchmarks:** In February 2022, following the release of the initial results, countries that had not taken part in the process in 2021 were further invited to submit national benchmark values by 31 May 2022, while countries that had already submitted benchmarks in 2021 were offered the opportunity to revise them if they wished.

Table 1. Selected SDG 4 benchmark indicators for benchmarking

Thematic area	Indicator		Disaggregation	
Early childhood	Global Indicator 4.2.2	Participation rate one year before primary	1	
Basic education	Thematic Indicator 4.1.4	Out-of-school rate	3	(i) primary, (ii) lower secondary and (iii) upper secondary school age
	Global Indicator 4.1.2	Completion rate	3	(i) primary, (ii) lower secondary and (iii) upper secondary education
Equity	Target 4.5	Completion rate, gender gap in upper secondary	1	
	Global Indicator 4.1.1	Minimum learning proficiency	6	(i) early grades, (ii) end of primary and (iii) end of lower secondary, in (a) reading and (b) mathematics
Quality	Global Indicator 4.c.1	Trained teachers	4	(i) pre-primary, (ii) primary, (iii) lower secondary and (iv) upper secondary education
Financing	Global Indicator 1.a.2 and Education 2030 benchmarks	Education expenditure	2	(i) as share of total public expenditure and (ii) as share of gross domestic product
			20	

The UIS and GEMR have been working together to develop a method for benchmarking the progress countries have made with respect to historical trends as well as their own national benchmarks. A preliminary version of this methodology was described in XXX and the present document provides a technical description of the approach.

2. Objective

The purpose of the proposed methodology is to offer countries a rating of progress based on their progress relative to (1) the historical progress of other countries historical and (2) to their national benchmarks. A third methodology is proposed for the benchmarking indicators related to expenditure.

3. Proposed Methodology

There are two methodologies proposed for categorizing countries' progress: one relative to historical trends and one relative to the country's benchmark. The categorization is presented below for the two proposed methodologies and categorization method is described subsequently. **Both methodologies rely, in principle, on historical trends in order to assess whether progress either recently or needed to achieve the national benchmark is fast, slow, etc.** The historical progress of countries is first discussed before the methodologies are presented.

SDG 4 benchmarking indicators: historical progress

Historically, annual progress in the benchmark indicators has been modest: for most indicators, countries have achieved a median increase of less than 5 percentage points every decade. Progress rates vary by indicator however (**Table 2**). For 14 out of the 18 benchmark indicators that do not involve public expenditure, the median progress rate since 2000 has been less than half a percentage point per year[1]. Median rates of progress were positive for all indicators apart from target 4.1.1, the percent of lower secondary students achieving minimum proficiency in reading. There is also substantial variation in progress across countries for each indicator. The 25th percentile of change across time was regressive for 10 of the 18 indicators that is in the opposite direction of improvement. These included all of the indicators related to learning (4.1.1), two of the indicators related to children out of school (4.1.4) and two of the indicators related to the qualifications of teachers (4.c.1). Ranking countries by progress, those in the bottom 25 percent all showed positive progress towards all of the indicators measuring access to schooling, (4.1.2) measuring completion rates and measuring access to pre-primary education (4.2.2). To some extent, these patterns of regression characterize education systems that have rapidly expanded access to include more disadvantaged students while simultaneously struggling to produce qualified teachers; although there are also multiple examples of education systems that have expanded access and quality together[2].

[1] Progress in this sense refers to an increase in the indicator with the exception of those that measure of out-of-school children in which a decrease is desirable and the gender gap in which progress towards 0 is desirable.

[2] e.g.: see OECD (2019) Which countries have improved and which countries have declined in performance over

Table 2. Median, 25th and 75th percentile of historical change in indicators since 2000 by indicator, annual percentage point change

Indicator Annual percentage point change unless otherwise noted	25th percentile	median	75th percentile
4.1.2.i Completion rate in primary	0.03	0.35	0.98
4.1.2.ii Completion rate in lower secondary	0.11	0.65	1.15
4.1.2.iii Completion rate in upper secondary	0.26	0.55	1.08
GG. Gender gap in completion rate in upper secondary	-0.10	0.05	0.23
4.2.2 Participation rate in organized learning (one year before the official primary entry age)	0.00	0.60	1.64
4.1.1.a Proportion of students in Grade 2 or 3 achieving at least a minimum proficiency level in mathematics	-0.12	0.40	2.68
4.1.1.c Proportion of students at the end of lower secondary achieving at least a minimum proficiency level in mathematics	-0.22	0.17	0.75
4.1.1.b Proportion of students at the end of primary achieving at least a minimum proficiency level in mathematics	-0.63	0.27	1.33
4.1.1.a Proportion of students in Grade 2 or 3 achieving at least a minimum proficiency level in reading	-0.54	0.20	1.80
4.1.1.c Proportion of students at the end of lower secondary achieving at least a minimum proficiency level in reading	-0.33	-0.06	0.39
4.1.1.b Proportion of students at the end of primary achieving at least a minimum proficiency level in reading	-0.40	0.07	0.70
4.1.4.i Out-of-school rate in primary	-0.50	-0.06	0.06
4.1.4.ii Out-of-school rate in lower secondary	-0.71	-0.18	0.05
4.1.4.iii Out-of-school rate in upper secondary	-1.49	-0.63	-0.11
4.c.1.a Proportion of teachers with the minimum required qualifications in pre-primary	-0.33	0.21	1.50
4.c.1.b Proportion of teachers with the minimum required qualifications in primary	-0.11	0.10	0.91
4.c.1.c Proportion of teachers with the minimum required qualifications in lower secondary	0.00	0.14	1.29

their participation in PISA? in *PISA 2018 Results (Volume 1). What Students Know and Can Do*. Paris: OECD. https://doi.org/10.1787/5f07c754-en

4.c.1.d Proportion of teachers with the minimum required qualifications in upper secondary	0.00	0.00	0.78

For more than half of the indicators, countries that were the furthest behind showed on average higher progress rates and far more variation in progress rates. This pattern was found for 13 of the 20 benchmark indicators and exemplified by indicator 4.1.1 covering the percent of lower secondary students achieving minimum proficiency in mathematics (**Figure 1** and **Table 3**). For this indicator, countries starting with fewer than 25 percent of students achieving minimum proficiency in mathematics had a median progress rate of 0.75 percentage points per year. Countries starting with more than 75 percent of students achieving minimum proficiency in mathematics had a median progress rate of -0.24 (**Table 3**). The range of progress of rates was also larger for countries that started from a lower point than those starting from a higher point. For the former group of countries, the 25th and 75th percentile progress rates were 0.19 and 1.13 percentage points per year, respectively, a difference of 0.94 percentage points per year. For the latter group of countries, the 25th and 75th percentile progress rates were -0.42 and 0.00 percentage points per year, respectively, a difference of 0.42 percentage points per year. This pattern of countries starting from a lower point having not only higher progress rates but a higher range of progress rates is intuitive: the countries that have the most potential for rapid progress in terms of learning outcomes are the ones who are the furthest behind. However, the variation in progress for the countries that are furthest behind suggests that rapid progress is not guaranteed, and this variation is consistent with the need for the correct conditions, investments and policies in order to precipitate improvement.

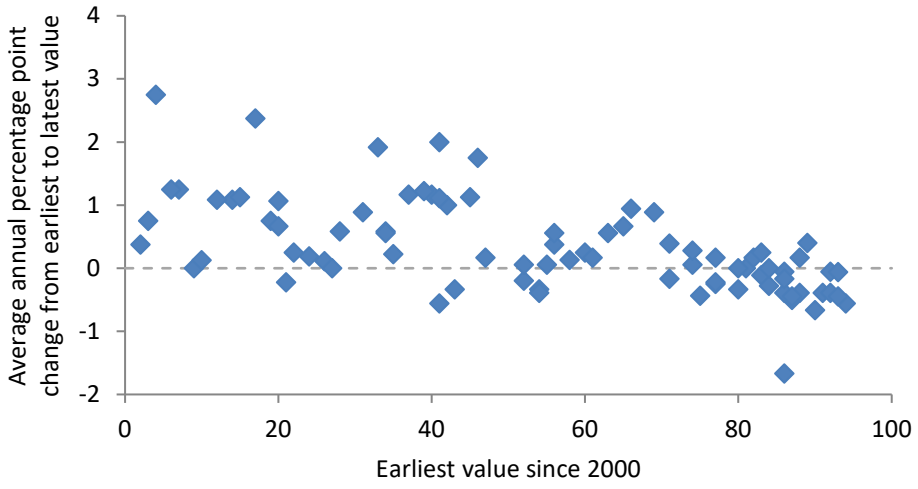
Table 3. Percentiles of historical progress rates by initial indicator value grouping (4.1.1 lower secondary mathematics)

	Countries' average percentage point change per year		
Earliest value since 2000	25 percentile	median	75th percentile
0-25%	0.19	0.75	1.13
25% to 50%	0.19	0.94	1.19
50% to 75%	-0.17	0.17	0.56
75% to 100%	-0.42	-0.24	0

See Figure 1 for data points

Figure 1. Average annual percentage point change and earliest value from 2000 to most recent by country

SDG 4.1.1 Percent of lower-secondary students achieving minimum proficiency in mathmeatics



For SDG 4.1.1 (lower secondary, mathematics) and many other benchmarking indicators, there has been more variation (and higher rates of) progress across time for countries with lower starting points.

Characterizing progress using historical percentiles

In the proposed methodology, progress rates are characterized based on the 25th and 75th percentiles of positive progress observed historically. The 25th and 75th percentiles of progress observed historically offer a simple and useful characterization progress of countries. Progress rates above the historical 75th percentile are considered relatively fast given historical trends while progress rates below the 25th percentile are considered slow. These progress characterizations[3] can then be applied to assess whether a country's recent progress is slow or fast relative to historical trends or whether a country requires slow or fast progress relative to historical trends to achieve its national benchmark.

For each indicator, historical 25th and 75th progress percentiles were defined using data from 2000 to 2015. Data from this period were used in order to provide an assessment of recent progress which was defined as 2015 to present.

Depending on the pattern of historical progress exhibited by an indicator, two approaches are used to define the 25th and 75th percentiles: relative to (i.e.: conditional on) a country's starting point or absolute. As discussed previously, more than half of the benchmark indicators

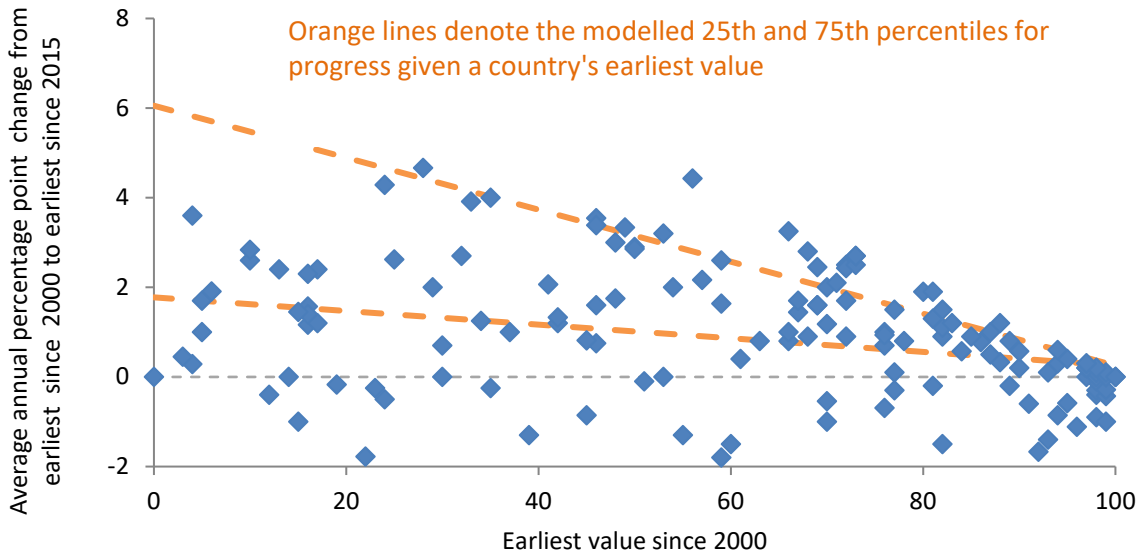
[3] Technically, these are progress benchmarks but the term is avoided here to avoid confusion with the national benchmarks.

(excluding the expenditure-related ones) exhibited a pattern whereby countries with lower starting points exhibited (1) on average higher progress rates and (2) higher variation in progress rates. As a result, the 25th and 75th percentile of growth varies depending on the countries starting point: they may be higher and wider apart for countries with low starting points and lower and closer together for countries with higher starting points. To estimate these conditional percentiles, a quantile regression for the 25th and 75th percentiles were estimated (see Figure 2 for an example). For countries that were high achievers, the percentiles were truncated at a level of 90 percent (or as specified in the Annexe table): for countries higher than these cut-offs the conditional percentile for that cut-off was applied. This was done because the 25th and 75th conditional percentiles of progress were often very small or even negative at indicator values close to 100 percent. It effectively sets a higher bar for high achieving countries. Note that this adjustment does not apply to indicators where the unconditional percentile was used. For countries that did not exhibit the pattern of higher progress for countries with lower starting points, the absolute (unconditional) 25th and 75th percentiles were estimated. The Annexe table lists the indicators and approach used.

Progress is defined as annualized percentage point change with a few exceptions. Annual percentage point change was selected as a measure of progress over the alternative of proportionate change because it is easier to communicate. However, for some indicators, the percentage point change definition of growth provided inverse u-shaped patterns of progress and starting point which complicated the estimation of the quantile regressions to estimate the conditional 25th and 75th percentiles. For these indicators, the growth rate in the indicator was used as the measure of progress in order to better characterize historical progress. The Annexe table lists which definition of progress was used for each indicator.

Figure 2. Average annual percentage point change, earliest value from 2000 to earliest since 2015 and progress percentiles

SDG 4.2.2 Partipation rate in organized learning one year before primary



The upper orange line denotes the 75th percentile of progress historically given a country's starting point, while the lower line denotes the 25th percentile. These conditional percentiles were modeled using a quantile regression model which are similar to linear regression models but predict a percentile for a given value of an independent variable rather than the mean for a given value of an independent variable.

Methodology 1: Categorizing recent progress relative to historical trends

The first methodology uses countries' recent progress rates in relation to the historical progress percentiles to assess their speed of their progress. This approach, however, does not take into account countries national benchmarks. As a result, this approach can be applied to countries that have not set national benchmarks and may be preferred for indicators for which there are few national benchmarks set. The following categorization is proposed:

1. **No data:** Countries that did not have any data for the indicator.

2. **No data for trend:** Countries that had only one data point.

3. **Regression:** Countries whose change in the indicator from 2015 to most recent was negative[4]

4. **Slow:** Countries whose recent progress (from 2015 to most recent) was below the

[4] Note that negative change refers to indicators where progress is defined as positive change. For indicators where progress is negative (e.g.: the percent of out-of-school children) or towards zero (for gender gap indicators), an analogous definition was used.

historical 25th progress percentile.

5. **Medium:** Countries whose recent progress (from 2015 to most recent) was between the historical 25th and 75th progress percentiles.

6. **Fast:** Countries whose recent progress (from 2015 to most recent) was above the 75th historical progress percentile. This category also includes countries that are within 5 percentage points of achieving 100 percent on the indicator.

Methodology 2: Categorizing progress relative to national benchmarks

The second methodology assesses progress based on how far countries are from achieving their national benchmarks. The recent progress of countries is defined as slow, fast or medium based on how close they now are from achieving their national benchmarks. If countries require very fast progress, (e.g.: above the historical 75th progress percentile), then even if they have made progress recently, their progress has been too slow. By contrast, a country that needs a slow rate of progress going forward to achieve their national benchmarks (e.g.: below the historical 25th progress percentile), then their historical progress has been fast enough. This approach is advantageous because it defines growth relative to country's set benchmarks; however, it cannot be applied to countries that have not set benchmarks and is, by definition, sensitive to the benchmark set by countries.

1. **No data:** Countries that did not have any data for the indicator.

2. **No data for trend:** Countries that had only one data point.

3. **No national benchmark:** Countries that have not set national benchmarks.

4. **Regression:** Countries whose change in the indicator from 2015 to most recent was negative

5. **Slow:** Countries have made positive progress recently (2015 to most recent), but they are still *far away* from achieving their national benchmark, that is, they require a progress rate that is above the historical 75th progress percentile to achieve their 2030 national benchmark

6. **Medium:** Countries have made positive progress recently, and now they are not too far from their national benchmark, that is, they require a progress rate that is between the historical 25th and 75th progress percentiles to achieve their 2030 national benchmark.

7. **Fast:** Countries have made positive progress recently, and now they are close to achieving their national benchmark, that is, they require a progress rate that is below the historical 25th progress percentile to achieve their 2030 national benchmark. This category includes countries that have already achieved the national benchmarks as well.

Methodology 3: Categorizing expenditure benchmarks

For expenditure benchmarks, a different categorization approach was used by defining progress in terms of how far country expenditure is from the international expenditure benchmarks. The following definitions are proposed:

1. **No data:** Data is missing for either public education expenditure as a percent of GDP or public education expenditure as a percent of total government expenditure.

2. **Achiever:** The country's public education expenditure as a percent of GDP and of total government expenditure each, respectively, exceed 4 percent and 15 percent.

3. **Partial achiever:** The country's public education expenditure exceeds only one of (a) 4 percent of GDP or (b) 15 percent of total government expenditure.

4. **Non-achiever:** The country's public education expenditure does not exceed 4 percent of GDP and does not exceed 15 percent of total government expenditure.

4. Example: SDG 4.2.2

Methodology 2 was applied to indicator 4.2.2, the participation rate in organized learning one year prior to primary school. The median annual progress towards 4.2.2 historically was 0.6 percentage points per year. Ranked by progress rates, the bottom 25 percent of countries achieved zero or negative change since 2000, while those in the 50-75 percent bracket achieved 1.64 percentage points of progress or higher per year. (**Table 1**). For this indicator, countries that were at lower starting points in pre-primary participation in 2000 exhibited higher variation and higher rates of progress over time in comparison to countries that had nearly universal coverage (**Figure 2**). As discussed above, this pattern suggests that countries with lower starting points have the potential for more rapid improvements in pre-primary participation than countries with higher starting points. As a result, the 25th and 75th percentile rates of progress for a country can be thought of as depending on the country's starting points; for example, for indicator 4.2.2, the 75th percentile rate of progress for a country starting with a participation rate of 20 percent was 4.9 percentage points per year while the 25th percentile progress rate was 1.5 percentage points per year (orange lines in **Figure 2**). For a country starting from a rate of participation of 80 percent, the 75th and 25th percentile progress rates were both lower and closer together: at 0.6 and 1.4 percentage points per year, respectively.

Of the 113 countries that have set national benchmarks for early childhood participation, about half are categorized as having made fast or medium progress. 41 countries were categorized as having fast progress because, as defined above, they now require a relatively slow level of progress to achieve their 2030 benchmarks (see **Table 4**). 21 countries have made positive progress recently but are still quite far from achieving their national benchmarks by 2030, requiring progress that only the fastest 25 percent of countries have achieved historically.

31 countries have not made positive progress since 2015.

Table 4. Categorization of countries for those that have set national SDG 4.2.2 benchmarks

Region	Fast Progress	Medium Progress	Slow Progress	Regressed since 2015	number of countries with national benchmarks
World	41	7	21	31	113
SDG: Africa (Northern)	0	0	50	50	4
SDG: Africa (Sub-Saharan)	58	0	17	25	24
SDG: Asia (Central and Southern)	22	22	56	0	9
SDG: Asia (Eastern and South-eastern)	36	9	18	36	11
SDG: Asia (Western)	50	0	20	30	10
SDG: Latin America and the Caribbean	48	4	15	33	27
SDG: Northern America and Europe	40	13	20	27	15
SDG: Oceania	15	15	15	54	13

Annex Table: Parameters used in the benchmarking methodology (see text for details)

Indicator	Progress definition	Percentile type	Truncation point for 25th conditional percentiles	Truncation point for 75th conditional percentiles	Cut-off for method 1 "fast progress"
4.1.2.i Completion rate in primary	Growth rate	Conditional	90	90	95
4.1.2.ii Completion rate in lower secondary	Growth rate	Conditional	90	90	95
4.1.2.iii Completion rate in upper secondary	Growth rate	Conditional	90	90	95
GG. Gender gap in completion rate in upper secondary	Percentage point change	Unconditional	n/a	n/a	5
4.1.1.a Proportion of students in Grade 2 or 3 achieving at least a minimum proficiency level in mathematics	Percentage point change	Unconditional	n/a	n/a	95
4.1.1.c Proportion of students at the end of lower secondary achieving at least a minimum proficiency level in mathematics	Percentage point change	Conditional	85	90	95
4.1.1.b Proportion of students at the end of primary achieving at least a minimum proficiency level in mathematics	Percentage point change	Unconditional	n/a	n/a	95
4.2.2 Participation rate in organized learning (one year before the official primary entry age)	Percentage point change	Conditional	90	90	95
4.1.1.a Proportion of students in Grade 2 or 3 achieving at least a minimum proficiency level in reading	Percentage point change	Unconditional	n/a	n/a	95
4.1.1.c Proportion of students at the end of lower secondary achieving at least a minimum proficiency level in reading	Percentage point change	Conditional	85	85	95
4.1.1.b Proportion of students at the end of primary achieving at least a minimum proficiency level in reading	Percentage point change	Unconditional	n/a	n/a	95

4.1.4.i Out-of-school rate in primary	Percentage point change	Conditional	10	10	5
4.1.4.ii Out-of-school rate in lower secondary	Percentage point change	Conditional	10	10	5
4.1.4.iii Out-of-school rate in upper secondary	Percentage point change	Conditional	10	10	5
4.c.1.a Proportion of teachers with the minimum required qualifications in pre-primary	Percentage point change	Conditional	90	90	95
4.c.1.b Proportion of teachers with the minimum required qualifications in primary	Percentage point change	Conditional	90	90	95
4.c.1.c Proportion of teachers with the minimum required qualifications in lower secondary	Percentage point change	Conditional	90	90	95
4.c.1.d Proportion of teachers with the minimum required qualifications in upper secondary	Percentage point change	Conditional	90	90	95
1.a.GDP Government expenditure on education as a percentage of GDP	Percentage point change	Unconditional	n/a	n/a	95
1.a.2 Proportion of total government spending on essential services (education)	Percentage point change	Unconditional	n/a	n/a	95