GLOBAL PARTNERSHIP *for* EDUCATION

METHODOLOGY SHEET FOR GLOBAL PARTNERSHIP FOR EDUCATION (GPE) INDICATORS

Indicator title	**Indicator (13)** Reduction in repetition and dropout, as measured by the internal efficiency coefficient at the primary level in each DCP
Result measured (from GPE Results Framework):	**Strategic Goal (3)** Effective and efficient education systems delivering equitable, quality educational services for all

JUSTIFICATION FOR INDICATOR

Background/context for indicator:	The realization of SDG 4, within the framework of GPE 2020, will require increased efficiencies of education systems in countries across the world as improvements in resource efficiency can free significant resources that may then be utilized to increase access and address education quality. There is evidence that, in many cases, more resources have not translated into better results in terms of education quality and learning outcomes. Furthermore, the education sector needs to save resources internally by reducing various types of inefficiencies before increased resources to the sector can be reasonably justified. Hence improved system efficiency is central to any reform aimed at improving education quality and learning effectiveness. The incidence of students repeating grades and dropping out before the end of the prescribed duration of a given cycle or level of education presented barriers to achieving the Education for All (EFA) goals. According to the Global Education Monitoring Report 2015, in 32 countries at least 20 percent of children enrolled in primary school are unlikely to reach the final grade[1]. In the particular case of GPE countries, repetition and dropout are associated with lost in terms of years of education with varying extent across countries. For instance, in Honduras, in order to get one child to the beginning of grade 5, 1.1 years of education is lost through repetition and dropout. The corresponding figure is 5.1 years for Madagascar[2]. The lost in terms of years of education due to repetition and dropout reflects inefficient public and private spending on education. In fact, when a child repeats a grade, the government pays double or more what it would cost if there were no repetition, while a child dropping out of primary school before learning the basics will have used finite government resources with a sub-optimal return[2].

[1] GPE, *Result for Learning Report 2014/2015*, Retrieved December 7, 2016 from http://www.globalpartnership.org/content/results-learning-report-2014-15 p. 40
[2] UNESCO, *EFA Global Monitoring Report 2015*, retrieved August 3, 2016 from: http://unesdoc.unesco.org/images/0023/002322/232205e.pdf

Rationale for indicator selection:	This indicator is included to reflect an aspect of Strategic Goal 3, "Effective and efficient education systems delivering equitable, quality educational services for all". When a large share of students entering the first grade of a given cycle or level of education do not complete the cycle within the prescribed duration due to dropout or repetition, both public and private resources invested in their education become wasteful or inefficient. In particular, repetition translates into greater spending to achieve a given learning outcome, while dropout involves spending resources on individuals that will not derive the full benefit for themselves or society[3]. Hence, if we assume that the intended output of an education system is that it enables students to complete a full cycle of a given level of education within the prescribed period, then inefficiency occurs when more years of schooling is required relative to the optimal duration, producing a higher cost per unit of output. Similarly, inefficiency occurs when students drop out before completing a given level of education (the years they have spent in the system are effectively "lost"), indicating lower outputs per unit of resources invested. The internal efficiency coefficient (IEC) indicator summarizes the wastage or inefficiency resulting from repetition and dropout in an education system. It is also useful to education donors since, given aid to education does not exactly vary with the number of students enrolled in a cycle, IEC provides a non-monetary assessment of the efficiency with which resources made available to an education system are being used to achieve the main objectives of the system.
DEFINITION	
Indicator definition:	**Internal efficiency coefficient (IEC):** the number of pupil-years required to produce a number of graduates from a given school-cohort for a cycle or level of education in the absence of repetition or dropout ('ideal pupil-years") expressed as a percentage of the actual number of pupil-years spent to produce the same number of graduates[4]. The coefficient ranges in value from 0 (no students complete a full cycle at the relevant level) to 1 (all students who initially enroll graduate without any repetition or dropout). **Pupil-years:** One school year spent in a grade by a pupil (regardless of whether she is a repeater or will later drop out of the system) is a counted as one pupil-year. In a perfectly efficient system, all the students in a given cohort who enter the first grade of a given cycle or level of education will have completed the cycle in the prescribed duration. In other words, in a school cycle of 'n' years, perfect internal efficiency is achieved when inputs relate to outputs as follows:

[3] UNESCO, World Bank, UNICEF, and Global Partnership for Education, *Education Sector Analysis Methodological Guidelines, Volume 1. Sector-wide Analysis, with emphasis on primary and secondary education* (2014), retrieved July 19, 2016 from http://www.globalpartnership.org/content/methodological-guidelines-education-sector-analysis-volume-1 p.107

[4] UIS, *The UIS Glossary,* retrieved April 2017 from: http://uis.unesco.org/glossary

- 1 unit of output to 'n' units of input, or
- 1 successful completer to 'n' pupil years[5]

The ideal input-output ratio is n/1. In reality, however, not all children will complete, for example, Grade 5 in the five year minimum - a share of those in the cohort will repeat certain grades while others will drop out before completing, increasing the number of pupil-years compared to the prescribed duration and therefore the input-to-output ratio; in turn decreasing the internal efficiency of the system. In other terms, because of repetition and dropout issues, more inputs are needed per unit of output and the ratio of the input to the output would increase.

Let's consider an example of a cohort of 1000 students who enrolled in the first grade of elementary school and have to complete the cycle within the theoretical duration of 5 years. The ideal pupil-years required to produce 1000 graduates is: 1000 x 5 = 5000 pupil-years. Then, the ideal input/output ratio is[5]:

$$\frac{5000\ pupil-years}{1000\ successful\ completers} = 5.$$

As above, the actual number of students completing a cycle within the theoretical duration will likely be far less than the ideal scenario. Assume, in reality, 300 out of 1000 students in a cohort are able to complete the cycle within 5 years; also assume that the cohort as a whole was enrolled for 6000 pupil-years including all graduates, repeaters and dropouts, then the actual input/output ratio is[5]:

$$\frac{6000\ pupil-years}{300\ successful\ completers} = 20$$

As mentioned, the input-output ratio increases when repetition and dropout are accounted for and this illustrates a lost in terms of efficiency.

Calculating the Internal Efficiency Coefficient (IEC)[2]:

$$IEC_{j,g,x} = \frac{ideal\ number\ of\ pupil-years}{effective\ number\ of\ pupil-year\ invested}$$

In the example above, 300 individuals completed the cycle which ideally would have taken 5 years. The ideal pupil year is $300 \times 5 = 1500$. However, as mentioned, a total of 6000 pupil years were 'spent' by the entire cohort, including dropout and repetition.

The corresponding IECis given by:

$$IEC = \frac{300\ successful\ completers * 5\ years}{6000} * 100\%$$
$$= \frac{1500}{6000} * 100\% = 0.25 * 100\% = 25\%$$

[5] UNESCO and IIPE, *Statistics for educational planning: Module 2*, Retrieved August 3, 2016 from: http://www.unesco.org/new/fileadmin/MULTIMEDIA/FIELD/Beirut/images/T_2_Eng.pdf

	Thus, a coefficient of 0.25 or 25% suggests that only 25% of education resources actually invested are theoretically required to produce the number of graduates who leave the system. In other terms, only 25% of the equivalent resources invested for the actual 6000 pupil years would have been necessary to 'produce' 300 graduates in a hypothetical case of no repetition and dropout. The corollary here is that 75% (= 100 – 25%) of the pupil-years invested are related to inefficiencies or wastage of resources caused by repetition and dropout[2].
Unit of measurement:	Percentage
Disaggregation:	None
Year for data reported (select only one and mark an "x")	__ fiscal year _X_ calendar year
Frequency of data collection:	Bi-annual, starting 2019

DATA TREATMENT

Source of information for collecting data:	Source document, template, etc.:	Country Education Sector Analyses
	Source agency:	IIEP, World Bank, and others
Formula:		*Note that GPE does not actually calculate the IEC from raw data, but rather collects data from existing publications, making sure that figures are comparable across publications. The description below is therefore provided for the purposes of information only.* A more technical conceptual framework for IEC is as follows[4]: $$IEC_{j,x} = \frac{\boldsymbol{n_{j,x}} * \sum_{y=n}^{n+r} \boldsymbol{G_{j,g,y,x}}}{\left\{\sum_{y=n}^{n+r} \boldsymbol{G_{j,g,y,x}} * \boldsymbol{y_{j,,x}}\right\} + \left\{\sum_{y=1}^{n+r} \boldsymbol{D_{j,g,y,x}} * \boldsymbol{y_{j,x}}\right\}} * \mathbf{100}$$ where: ***j***= Country ***g*** = cohort ***x***=Level or cycle of education $\boldsymbol{n_{j,x}}$ = prescribed duration of a level or cycle of education x in country j $\boldsymbol{r}$ = number of repetitions taken to complete a given cycle or level of education $\boldsymbol{y_{j,x}}$= number of years of study of level or cycle of education x in country j $\boldsymbol{G_{j,g,y,x}}$ = number of students in country ***j*** graduating from cohort, ***g,*** after ***y*** years of study in level of education ***x*** $\boldsymbol{D_{j,g,y,x}}$ = number of dropouts in country j from cohort, ***g,*** after ***y*** years of study in level of education j

Hence, the numerator, $\boldsymbol{n_{j,x}} * \sum_{y=n}^{n+r} \boldsymbol{G_{j,g,y,x}}$, is the prescribed duration of a given level of education, ***n***, multiplied by the sum of the graduates of cohort ***g*** from final grade ***n*** after ***y*** years of study and taking into account ***r*** repetitions. This gives the ideal number of pupil-years required to produce the graduates of cohort ***g***.

The denominator, $\left\{\sum_{y=n}^{n+r} \boldsymbol{G_{j,g,y,x}} * \boldsymbol{y_{j,,x}}\right\} + \left\{\sum_{y=1}^{n+r} \boldsymbol{D_{j,g,y,x}} * \boldsymbol{y_{j,x}}\right\}$, is the sum of the graduates and dropouts from grade ***n*** after ***y*** years of study and taking into account ***r*** repetitions multiplied by the actual number of years of study, ***y***, which gives the sum of the pupil-years spent on all grades from year ***y*** to ***y + (n+2)*** (i.e. allowing for two years of repetition), including repeaters and dropouts.

Reconstructed cohort method[3,4]:

Collecting detailed data over time (longitudinal data) and monitoring individual data for each and every student on a regular basis is not practical in terms of costs and time. Instead, indicators of the internal efficiency coefficient – that is, the repetition, dropout and promotion rates, and the survival rate to the last grade -- are derived using the reconstructed cohort method, which models the flow of a fictional cohort of 1000 students using data on enrollment by grade for at least two consecutive years.[8] The method is based on three assumptions[5]:

a) At each grade, the same rates of promotion, repetition and dropouts, can be applied
b) No new entrants, aside from the fictional cohort of 1000 students, enter in any subsequent school years during the "lifetime of the cohort"[3]
c) A defined number of repetitions allowed

I. Assume a cohort of 1,000 students entering grade 1 of an n-year cycle in the year y.
II. The promotion, repetition and dropout rates at each grade are calculated using the following formulas:

(i) Promotion rate: $p_{j,i,t,x} = \frac{NE_{j,i+1,t+1,x}}{E_{i,t,x}}$

Where:

$p_{j,i,t,x}$ = promotion rate at grade i in school year t in level of education x in country j

$NE_{j,i+1,t+a,x}$ = number of new students entering (or number of students promoted to) grade i + 1 in school year t + 1 in level of education x in country j

$E_{j,i,t,x}$ = number of students who enrolled in grade i in school year t in level of education x in country j

(ii) Repetition rate: $r_{j,i,t,x} = \frac{R_{j,i+1,t+1,x}}{E_{j,i,t,x}}$

	Where: $r_{j,i,t,x}$ = repetition rate at grade i in school year t in level of education x in country j $R_{j,i+1,t+1,x}$ = number of students repeating grade i in school year t + 1 in level of education x in country j $E_{j,i,t,x}$ = number of students who enrolled in grade i in school year t in level of education x in country j (iii) Dropout rate: $d_{j,i,t,x} = 100 - (p_{j,i,t,x} + r_{j,i,t,x})$ Where: $d_{j,i,t,x}$ = dropout rate at grade i in school year y III. Calculate the number of promotes, repeaters and dropouts at each subsequent grade level and year by multiplying the promotion, repetition and dropout rates at each subsequent grade and year. IV. At each level of education, the number of promoters and repeaters at each subsequent year is totaled, which gives the pupil-years used at each level of education. V. Total pupil-years used to produce the number of graduates (including repeaters) is calculated by aggregating the pupil-years used at each level of education from school year y to y + (n+2) VI. Total ideal pupil-years required to produce the same number of graduates is calculated by adding the number of students who graduate, without repetition, from the final grade, ***n***, of the given level of education, from school year y to y + (n+2) VII. Calculate resulting IEC by dividing the ideal pupil-years required to produce the same number of graduates in the cohort by the actual number of pupil-years used to produce the number of graduates in the cohort
Aggregation formula:	The corporate indicator is calculated as the proportion of GPE DCPs with an IEC above 0.7 for the primary level out of the number of GPE DCPs with available data (N): $$IEC\_GPE = \sum_{j=1}^{N}(IEC_{j,x} >= 0.7) / N$$ *N* = total number of DCPs included in sample $IEC_{j,x} >= 0.7$ = a dummy that takes the value 1 if the IEC for country j is greater than or equal to 0.7, and 0 otherwise Note that the baseline sample will remain the same, however GPE will also report in parallel on an expanded sample if new data becomes available or new members join the Partnership.
Data limitations (if any known /	1. Limitations in the reconstructed cohort method, in particular how

anticipated):	well the derived indicators describe the way in which a cohort actually progresses through a cycle of education depends on the validity of the assumptions on which this model is based and the reliability of the statistical data available for estimating the flow rates[3]. It may not be the case that this cross-sectional estimation reflects the actual experience of a given cohort. 2. Conceptually, economic efficiency requires that most students graduating within the prescribed duration of the cycle is optimal. However, this does not necessarily imply achievement of optimal learning outcomes[4]. 3. According to this calculation method, early dropouts (i.e. from lower grades) can result in higher internal efficiency than late dropout (i.e. from higher grades). This means that from an economic perspective, promoting efficiency at lower levels and not higher levels may be in contradiction with educational objectives aiming at retaining pupils in school until higher grades when they would have acquired the broader set of knowledge and skills[4]. 4. The ideal number of years to complete a cycle varies by country, which confounds cross-country comparisons, and may complicate aggregation.
Interpretation	A high value of this indicator indicates that DCPs, by and large, have relatively efficient primary education systems, where a large share of students in a given cohort who enter the first grade of primary will have completed the cycle in the prescribed duration. The IEC itself ranges from 0 (no students complete a full cycle at the relevant level) to 1 (all students who initially enroll graduate without any repetition or dropout – i.e. perfectly efficient system). Thus, an IEC above 0.7 reflect a high overall level of internal efficiency of the primary education system in producing graduates in the.

REFERENCES

- GPE. *Result for Learning Report 2014/2015*, Retrieved December 7, 2016 from http://www.globalpartnership.org/content/results-learning-report-2014-15
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ANNEXES

Annex 1- Standard Operating Procedure

Process Name: Data Collection, Quality Assurance, & Storage for Indicator # 13 of the GPE Results Framework	**Owner:** R&P Team	**Updated:**
Function: Measuring GPE Impact	**Version #:** 1	**Review:**

Material changes from prior version of SOP

None; this is the first version.

Summary

This SOP describes the process for data collection, quality assurance, and storage for indicator # 13 (Repetition and drop out impact on efficiency, as measured by the internal efficiency coefficient at the primary level in each DCP) of the GPE results framework.

Results / Outputs

This process should result in the results framework being updated with quality assured data on indicator #13.

Interim outputs of the Secretariat:

Completed data collection template

Final Output:

Updated results framework database

Scope

- Begins: The process begins with the M&E Data Analyst collecting data of the most recent 5 years on the Internal Efficiency Coefficient (IEC) in GPE DCPs.
- Ends: The process ends with updated data being integrated into the results framework database by the Monitoring and Evaluation Data Manager.
- Includes: All procedural aspects
- Excludes: Methodological aspects of calculating the indicator value. These can be found in the methodology sheet.
- Note: Need information

Standards (Policies, Approvals, Deadlines, etc.):

- Policies: GPE 2020, Monitoring Sheet for GPE Results Framework Indicator #13
- Deadlines: M & E Data Manager updates results framework database with the Indicator # 13 data by March 30th
- Approval: The completed data template is prepared by the M&E Data Analyst and includes quality checks by the M & E Data Manager and final approval by head of M & E

Issues /Risks:

- Relevant documents might not be updated with the latest data in time and this might delay the process.

Overview:

By 15th February

By 28th Feb

By March 30th

Steps in the Process	Roles / Responsibilities	Outputs / Deliverables	Tools / Templates
1. Collect Data **Typically by 15th February**			
• Collect data of the most recent 5 years on the IEC in GPE DCPs from published sources	• M & E Data Analyst		
• Review the most recently published Education Sector Analysis documents and confirm if the data collected is the same and up to date.	• M & E Data Analyst		
Aggregate Data and Compute Indicator Values **Typically by 28th February**			
• Enter data into the template provided by the M&E Data Manager	• M & E Data Analyst		• Data Collection template
• Compute indicator values using the completed data collection template, based on the latest available classification of Countries Affected by Fragility and Conflict and forward to M & E data Manager.	• M & E Data Analyst	• Completed data collection template	• List of Countries Affected by Fragility and Conflict from the GPE Intranet
• Review completed data collection template and send comments/queries to the M & E Data Analyst	• M & E Data Manager		
• Respond to the comments/queries, update data collection template as necessary and forward to M & E data Manager	• M & E Data Analyst	Updated data collection template.	
Update Results Framework Database **Typically by 30th March**			

• Forward data collection template to the Head of M & E for review and approval	• M & E Data Manager		
• Review and approve completed data collection template	• Head of M & E	Approved data collection template	
• Update database using completed template submitted by the M & E Data Analyst	• M & E Data Manager	Updated database	N/A
• Notify the secretariat on the availability of data in the results framework database through the intranet	• M & E Data Manager	Notification on GPE intranet	