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Institute for Statistics

## **SDG 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all**

### **METADATA**

**Target 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**

**4.c.7 Percentage of teachers who received in-service training in the last 12 months by type of training**

#### **Definition**

Percentage of teachers who received in-service training in the last 12 months by type of training.

#### **Purpose**

The proposed indicator is designed to match SDG 4.c.7 as closely as possible given the sampling design and data collection instruments of CNAs and teacher surveys.

**Data sources:** estimates calculated by the UIS using cross-national learning assessments and estimates reported by the OECD based on TALIS data.

**Metadata points:** The metadata points indicate the source of data (Table 1 provides details for each data source). The estimates provided by UIS also include standard errors and confidence intervals estimated based on the methodologies suggested by the assessment programmes.

#### **Definition of professional development:**

***Data Source 1: Cross-national learning assessment estimates by UIS***

**Estimation method:** The calculation method varied by type of survey (see Table 1). Estimates were made following the guidelines provided by each survey on how to estimate teacher-level indicators. In general, teachers were defined to have either received in-service training in the past 12 to 24 months based on their responses to their respective questionnaires. An indicator variable was defined for each teacher equal to one if they had

received in-service training, zero if they had not, and missing if there was no response to the questionnaire items on recent teacher training.

For surveys whose teacher data is representative of teachers in the country or jurisdiction, the indicator is calculated as the percentage of teachers who received in-service training as a mean of the indicator variable (weighted by the appropriate sample weights). For surveys whose teacher data is representative of students' teachers, the unit of measure is the student. In which case, an indicator variable is defined for students whose value equals that of their teacher. The indicator is calculated as the percentage of students whose teachers received in-service training as a mean of student indicator value (weighted by the appropriate sample weights). In some surveys, students have more than one teacher, and the average of his or her teacher's indicator variable is used.

For PISA 2015 and 2018 teacher data, estimates are computed using the grade non-response adjusted school base weight and standard errors are estimated to be robust to intra-cluster correlation at the school level using a linearized model as part of the SVY module for Stata.

For TIMSS 2015, the unit of analysis was each teacher's-student combination and the teacher weight was used; standard errors were estimated as described in the common meta-data annexe below.

For LLECE, the same approach was applied with the sample weight divided by the number of teachers per student following TIMSS 2015.

**Interpretation:** The indicator may be interpreted as either the percent of teachers or percent of students' teachers receiving in-service training in the past 12 to 24 months, depending on the survey (see Table 1).

**Disaggregation:** By level of schooling, by teacher sex, and urban or rural location (see Annex for definition of urban and rural location by assessment). Note that estimates for sub-populations are representative of the population that would respond to the question identifying the sub-population. Given that response rates to the questions defining the sub-populations are generally not 100 percent in a sample, the estimated mean for the target population as a whole generally differs from the target population which responds to the sub-population question. As a result, for a particular disaggregation, the average of the indicator for the target population for a country may not lie between the averages of the two sub-populations. In addition, in cases where one of the two categories of a sub-population (e.g.: female and male) is not reported (see non-response and small sample size below), then the other category is also not reported. For example, if there is insufficient sample size or response rate for rural areas for a particular year and country and consequently no reported value for rural areas, then urban areas are also not reported for that particular year and country.

**Data Source 2: OECD estimates using TALIS**

**Estimation method:** TALIS is representative of teachers in ISCED 2 level schools (and optionally other levels depending on country participation), sampling schools and then teachers and school leaders within these schools. The OECD reports the percent of teachers who have participated in professional development activities in the past 12 months. See indicator questionnaire in Table 1 below.

**Interpretation:** Because the OECD TALIS data is representative of teachers in the specified level of schooling (typically ISCED 2), the indicator can be interpreted as a percentage of teacher as specified in the SDG indicator. This differs from the learning assessments described above in which only estimates of students' teachers are possible.

**Disaggregation:** The data included in the UIS dataset includes only the publicly available OECD estimates which are not disaggregated.

**Measurement points:** When there is more than one estimate within a level of education, the average of the levels is used.

Table 1. Data sources, target population, and questions on recent in-service training

Data source	Target population	Recent in-service training questionnaire items	Mapping to indicator
LLECE 2013 (TERCE)	Teachers of 3 <sup>rd</sup> grade students; teachers of 6 <sup>th</sup> grade students	Have you participated in any of the following professional development activities in the last two years? Check all relevant answers: <ul style="list-style-type: none"> <li>• Obtained a Master’s Degree</li> <li>• Obtained a diploma</li> <li>• Professional development course (60 hours or more) in language, mathematics, sciences, or another subject related to teaching (separate items)</li> <li>• Have not participated in any professional development</li> </ul>	Yes if any of the responses (except have not participated....) were selected. No if have not participated was selected. Missing if no responses were selected.
PASEC 2014	Teachers of 2 <sup>nd</sup> grade students; teachers of 6 <sup>th</sup> grade students	Have you received additional on-the-job training (educational course, training seminar, educational resource and development centre...) during the past two years? Yes or no	Mapped as stated; missing if no answer.
PISA 2018	Teachers of the national modal grade for 15 year-olds (excluding those teaching language classes as they were given an alternate questionnaire that did not include this question)	During the past 12 months, did you participate in any of the following professional development activities? (yes or no to the following) <ul style="list-style-type: none"> <li>• Courses / workshops (e.g.: on subject matter or methods and/or other education-related topics)</li> <li>• Education conferences or seminars (where teachers and/or researchers present their research results and discuss educational issues)</li> <li>• Observation visits to other schools</li> </ul>	Yes if yes to any of these; No if no to all of them that were answered. Missing if all are unanswered.

Table 1. Data sources, target population, and questions on recent in-service training

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- Observation visits to business premises, public organisations, non-governmental organisations
- In-service training courses in business premises, public organizations, non-governmental organisations

During the last 12 months, did you participate in any of the following activities? (yes or no to the following)

- Qualification programme (e.g. a <degree programme>)
- Participation in a network of teachers formed
- specifically for the professional development of
- teachers
- Individual or collaborative research on a topic of
- interest to you professionally
- Mentoring and/or peer observation and coaching, as
- part of a formal school arrangement
- Reading professional literature (e.g. journals, evidence based papers, thesis papers)

Note: the following activity was also included under this question but excluded from this list as it does not fit well with the definition of in-

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Table 1. Data sources, target population, and questions on recent in-service training

TALIS 2018	Teachers of lower secondary education	service training: “Engaging in informal dialogue with your colleagues on how to improve your teaching”	Indicator data reported by UIS is taken from OECD, TALIS 2018 Database, Table I.5.1.
		<p>During the last 12 months, did you participate in any of the following professional development activities?</p> <ul style="list-style-type: none"> <li>a) Courses/seminars attended in person</li> <li>b) Online courses/seminars</li> <li>c) Education conferences where teachers and/or researchers present their research or discuss educational issues.</li> <li>d) Formal qualification programme (e.g. a degree programme)</li> <li>e) Observation visits to other schools</li> <li>f) Observation visits to business premises, public organisations, or nongovernmental organisations</li> <li>g) Peer and/or self-observation and coaching as part of a formal school arrangement</li> <li>h) Participation in a network of teachers formed specifically for the professional development of teachers</li> <li>i) Reading professional literature</li> <li>j) Other</li> </ul>	

Table 1. Data sources, target population, and questions on recent in-service training

PISA 2015	Teachers of the national modal grade for 15 year-olds (and adjacent grade in some cases)	<p>During the last 12 months, did you participate in any of the following activities? (Please select one response in each row.)</p> <ul style="list-style-type: none"> <li>• Qualification programme (e.g. a &lt;degree programme&gt;)</li> <li>• Participation in a network of teachers formed specifically for the professional development of teachers</li> <li>• Individual or collaborative research on a topic of interest to you professionally</li> <li>• Mentoring and/or peer observation and coaching, as part of a formal school arrangement</li> <li>• Reading professional literature (e.g. journals, evidence-based papers, thesis papers)</li> </ul> <p>Engaging in informal dialogue with your colleagues on how to improve your teaching</p>
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Table 1. Data sources, target population, and questions on recent in-service training

TIMSS 2015	Teachers of 4 <sup>th</sup> grade students; teachers of 8 <sup>th</sup> grade students	<p>M10 In the past two years, how many hours in total have you spent in formal &lt;in-service / professional development&gt; (e.g., workshops, seminars, etc.) for mathematics? (check one only)</p> <ul style="list-style-type: none"> <li>• none</li> <li>• less than 6 hours</li> <li>• 6 – 15 hours</li> <li>• 16 – 35 hours</li> <li>• more than 35 hours</li> </ul> <p>S9 In the past two years, how many hours in total have you spent in formal &lt;in-service/professional development&gt; (e.g., workshops, seminars, etc.) for science? responses as above</p>	<p>No if answered none to both questions; otherwise yes unless no answer for both question, then coded as missing. Teachers that teach only mathematics or science may be asked only one of these two questions, in which case, the unanswered question is treated as missing.</p>
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## **Annex: Metadata for estimating SDG indicators from student level data in cross national student assessments**

### *Definition of sub-populations*

**Female and male:** The dataset used to estimate the indicators include a question asking whether the student is male or female. For TIMSS, the administrative record of the sex of the student was used following how TIMSS reports learning achievement scores by sex.

**Urban and rural:** All assessments ask about the type of location in which the school is located to the school director; however, only LLECE 2013 asks explicitly whether the school is located in an urban or rural area. The other surveys ask the question in various ways included the number of inhabitants or by description. See Table 1 for the questions from each assessments and how they were mapped to urban or rural.

**High and low socioeconomic status:** All assessments except TIMSS provide a measure of the socioeconomic status of students (SES). This is typically based on the response by students about assets at home as well as education of parents. LLECE 2013 used the responses of the family questionnaire to generate its index. PASEC 2014 and PISA 2018 used student responses; no index was generated for the PASEC 2014 2<sup>nd</sup> grade students given their young age and reliability of answers. TIMSS reports an index of home learning resources based on household possessions reported by students and this was used as a measure of socioeconomic status. To define high and low SES students, the median was calculate for each country, student above the median were defined as high SES while those below were defined as low SES. See Table 2 for the names of the variables used to define high and low SES in each assessment.

**Non-response and small sample sizes:** Indicator estimates were not reported for sub-populations if data for the sub-population was available for less than 90 percent of sampled students or if the number of observations for a particular sub-population was less than 100.

### *Standard errors and confidence intervals methodology*

The suggested methodology for estimating standard errors and subsequent confidence intervals varies by assessment and aim to account for clustering at the school-level. All surveys suggest using replicate methods in which the sample variation is obtained from variously defined sub-samples that mimic the sample design; the variation in estimates among the replicates provides an estimate of the sampling variation. The suggested methods were used for all assessments except LLECE 2013. For this survey, replicate weights were provided with each of the learning achievement datasets; however, a large number of students in the background dataset (which included the responses to the bullying and home language questions) were not included in the student achievement dataset. In order to maximize the background data, a linearization method for estimating the standard errors

robust to clustering at the school level was used. Table 3 describes the methodology used for each assessment.

Table 1. Definition of urban and rural sub-populations

Assessment	Population	Question	Responses ( <b>mapping</b> )
LLECE 2013	Grades 3 and 6	How would you characterize the area where your school is located?	In an area considered rural ( <b>rural</b> ) In an area considered urban ( <b>urban</b> )
PASEC 2014	Grades 2 and 6	Your school is located in...	A town ( <b>urban</b> ) A suburb of a big city ( <b>urban</b> ) A big village (hundreds of homesteads) ( <b>rural</b> ) A small village (dozens of homesteads) ( <b>rural</b> )
PISA 2015/2018	15 year-olds	Which of the following definitions best describes the community in which your school is located?	A village, hamlet or rural area (fewer than 3 000 people) ( <b>rural</b> ) A small town (3 000 to about 15 000 people) ( <b>rural</b> ) A town (15 000 to about 100 000 people) ( <b>urban</b> ) A city (100 000 to about 1 000 000 people) ( <b>urban</b> ) A large city (with over 1 000 000 people) ( <b>urban</b> )
TIMSS 2015	Grades 4 and 8	Which best describes the immediate area in which your school is located?	Urban–Densely populated ( <b>urban</b> ) Suburban–On fringe or outskirts of urban area ( <b>urban</b> ) Medium size city or large town ( <b>urban</b> ) Small town or village ( <b>rural</b> ) Remote rural ( <b>rural</b> )

Table 2. Variables used to define high and low SES students

<b>Assessment</b>	<b>Population</b>	<b>Variable</b>	<b>Respondents</b>
LLECE 2013	Grades 3 and 6	Index of the family's socioeconomic status (isecf)	Parents
PASEC 2014	Grade 2	n/a	n/a
PASEC 2014	Grade 6	Socioeconomic index of the student's family (ses)	Students
PISA 2015/2018	15 year-olds	Index of economic, social and cultural status (escs)	Students
TIMSS 2015	4th grade	Index of home resources for learning (asbghrl)	Students
TIMSS 2015	8th grade	Index of home educational resources (bsbgher)	Students

Table 3. Methodology for calculating standard errors by assessment

Assessment	Method		Reference for formulas	Software routine
LLECE 2013	Linearized		StataCorp 2013	SVY module for Stata (StataCorp)
PASEC 2014	Jackknife	repeated	PASEC 2017	PV module for Stata (Macdonald 2008)
	replication			
PISA 2015/18	Balanced	repeated	OECD 2009	PV module for Stata (Macdonald 2008)
	replication			
TIMSS 2015	Jackknife	repeated	Foy & LaRoche (2016)	PV module for Stata (Macdonald 2008)
	replication			

## References

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