WG/GAML/11

SDG INDICATOR 4.a.1 (SCHOOL ENVIRONMENT): METHODOLOGICAL NOTE

SDG 4.a.1: Proportion of schools with access to: (a) electricity; (b) the Internet for pedagogical purposes; (c) computers for pedagogical purposes; (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single-sex basic sanitation facilities; and (g) basic hand-washing facilities (as per the WASH indicator definitions)

Abstract:

This note reviews LLECE 2013, PASEC 2014, PISA 2018 and TIMSS 2015 to assess the ability of cross-national assessment to report indicators for SDG 4.a.1. Of these cross-national learning assessments for this data, only LLECE 2013 and PASEC 2014 collected data on drinking water and electricity; LLECE 2013 and PISA 2018 also collected data on computers and internet usable by students and TIMSS 2015 collected data on computers used in math and science instruction. No survey collects data on single-sex sanitation facilities or hand washing facilities (that conform to WASH).

Background

Basic school infrastructure is currently collected through EMIS surveys as well as school surveys including the World Bank's Service Delivery Indicators. The UNESCO Institute of Statistics reports SDG 4.a.1 indicators derived primarily from national EMIS data collection on the selected infrastructure sub-indicators. Core infrastructure indicators are also collected through various national school surveys and as part of cross-national initiatives including the World Bank's Service Delivery Indicator programme. Cross-national assessments also report availability of key school infrastructure related to SDG 4.a.1, particularly the regional assessments including LLECE and in Sub-Saharan Africa, PASEC and SACMEQ.

Of the reviewed cross-national learning assessments for this data, only LLECE 2013 and PASEC 2014 collected data on drinking water and electricity; LLECE 2013 and PISA 2018 also collected data on computers and internet, while TIMSS 2015 collected data on computers used in science and math instruction. While TIMSS and PISA provide indices of the availability of school resources, these are largely derived from questions about teacher and school director's opinions about the adequacy of resources. PISA collects data on the number of computers in each school for educational purposes and the number with internet connections. TIMSS asks students' science and mathematics teachers whether there are computers available for use during their respective math and science classes. This can be aggregated to a variable indicating whether the school has computers available for pedagogic use. LLECE 2013 school directors asks about the availability of computers with and without internet for student use and, along with PASEC 2014, asks about the availability of drinking water and electricity (**Tables 1 and 2).**

Table 1. Data collection related to school environment indicators

Assessment	Target population	Data collected on the following						
		electricity	internet for pedagogical purposes	computers for pedagogical purposes	adapted infrastructure for students with disabilities	basic drinking water	single-sex basic sanitation facilities	basic hand-washing facilities
PISA 2018	secondary schools with 15 year-old students		X	X				
TIMSS 2015	schools with 8th grade; schools with 4th grade							
PASEC 2014	schools with 2nd grade; schools with 6th grade	X				X		
LLECE (TERCE) 2013	schools with 3rd grade; schools with 6th grade	X	X	X		X		

Main methodological issues

1. Advantages and disadvantages compared to EMIS-derived indicators: Indicators derived from cross-national assessments only include data for schools attended by the student population being targeted by the assessment. For example, LLECE 2013 and PASEC 2014 would only provide indicators for primary school and not secondary. For PISA 2018, indicators would be available only for secondary schools that have 15 year-old students. This may not be clearly upper or lower secondary but a subset of these schools in some cases. The advantage, however, is that these assessments generally include both public and private schools. EMIS data may only include public schools. Finally, EMIS data is population-based and the resulting indicators are not estimates while cross-national surveys are estimates of the indicator which have a confidence interval and, consequently, less certainty about the actual value of the indicator. In some cases, large confidence intervals may limit the comparability of indicator values across time or countries.

2. Lack of inclusion of basic infrastructure questions in TIMSS and PISA: Surveys that are designed for high or upper middle income country contexts generally would not include questions related to basic infrastructure including water and electricity. TIMSS and PISA derive indices of the availability of school infrastructure based on the opinions of shortages of teachers and school directors. These data are difficult to interpret and do not conform to the SDG 4.a.1 definition. Finally, as noted above, none of the reviewed surveys collect data on hand-washing facilities or single-sex sanitation facilities; though, these could be easily added to future rounds of PASEC and LLECE given their current questions on school facilities.

3. Internet and computers and pedagogic use: PISA 2018 asks whether there are computers available for student use for educational purposes while LLECE 2013 asks whether there are computers with and without internet connections for use by students although for educational purposes is not specified. TIMSS 2015 asks whether there are computers available for use during math or science instruction. Even if computers are available for educational purposes, whether they are actually used for pedagogy is not clear from the questionnaires. For example, having one computer for students to use for educational purposes may not conform to the spirit SDG 4.a.1 indicator on availability of computers for pedagogic purposes.

Proposed indicators

Indicator: Indicators could be derived for the following sub-indicators of SDG 4.a.1: (a) electricity; (b) the Internet; (c) computers for educational purposes; and (e) basic drinking water. However, the coverage for electricity and drinking water is limited to LLECE and PIRLS data.

Definition and methodology: The indicators would be defined as the proportion of schools with the available infrastructure item. For each infrastructure item, a binary variable for each school would be calculated based on whether the school reports having the infrastructure.

Surveys and target populations: For sub-indicators (b) and (c), estimates would be available using LLECE, PASEC, PISA, and TIMSS; for (a) and (e), estimates would be available using PASEC and LLECE alone.

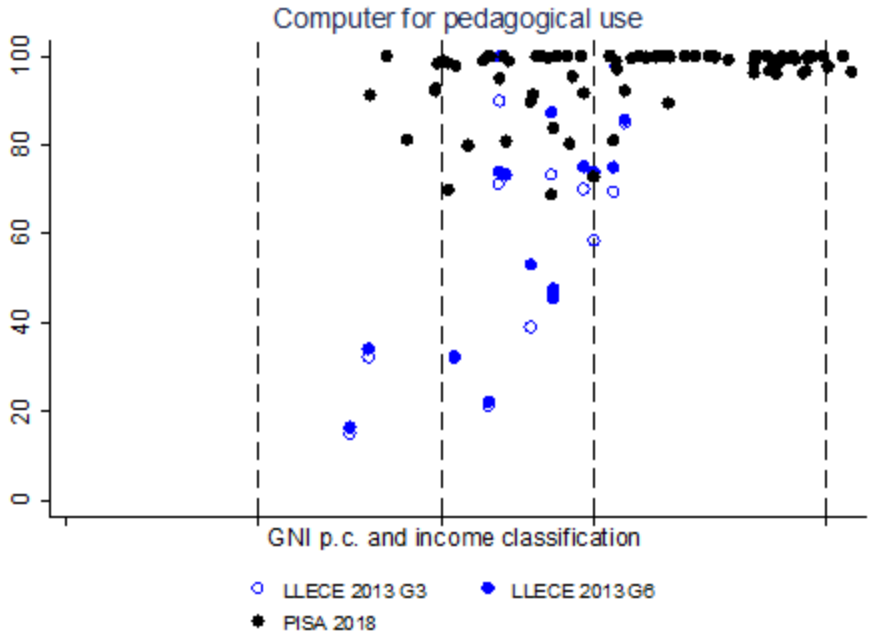
Cross survey comparability

Comparability and cross-survey reliability: Generally, the questions are closely matched for basic infrastructure across surveys, and as depicted in **Figures 1 and 2**, there is little systematic difference in indicator values across surveys, conditional on GDP per capita. For the availability of computers and internet for pedagogic purposes differs for PISA from LLECE and TIMSS. LLECE and PISA ask very similar questions about the number of computers available at the schools. TIMSS reports a range of percentages that resembles LLECE but the question only allows to identify whether a school has computers for use in the sampled math or science classes; this may underestimate whether schools have computers available if they were only available to older children in the school or for subjects other than mathematics and science, though this latter possibility is not likely.

Table 2. School questionnaire items related to SDG 4.a.1

Survey	Population	Questionnaire item	SDG 4.a.1 sub-indicator
LLECE 2013	schools with 3rd grade students; schools with 6th grade students	¿Con cuáles de estos servicios cuenta la escuela? Luz eléctrica. Sí / No Agua potable. Sí / No	Electricity and basic drinking water
		¿Cuántos computadores hay en la escuela para uso de los estudiantes? Con conexión a Internet: No hay / Entre 1 y 10 / Entre 11 y 20 / Entre 21 y 30 / Más de 30 Sin conexión a Internet: No hay / Entre 1 y 10 / Entre 11 y 20 / Entre 21 y 30 / Más de 30	Internet for pedagogical purposes; computers for pedagogical purposes
PASEC 2014	schools with 2nd grade; schools with 6th grade	65.Is there in the school…? Electricity: yes/no Piped-in water: yes/no Another source of drinking water (well, borehole…): yes/no	Electricity; drinking water
PISA 2018	secondary schools with 15 year-old students	The goal of the following set of questions is to gather information about the student-computer ratio for students in the <national modal grade for 15-year-olds> at your school. (Please enter a number for each response. Enter "0" (zero) if there are none.) At your school, what is the total number of students in the <national modal grade for 15-year-olds>? Approximately, how many computers are available for these students for educational purposes? Approximately, how many of these computers are connected to the Internet/World Wide Web?	Internet for pedagogical purposes; computers for pedagogical purposes
TIMSS 2015 4th and 8th grades	Math and science teachers' classes of 4th grade and 8th grade students (can be aggregated to school level)	Do the students in this class have computers (including tablets) available to use during their mathematics lessons? Yes / No Do the students in this class have computers (including tablets) available to use during their science lessons? Yes / No	Computers for pedagogic use

Fig. 1. Percent of schools which have computers and internet available for pedagogical use



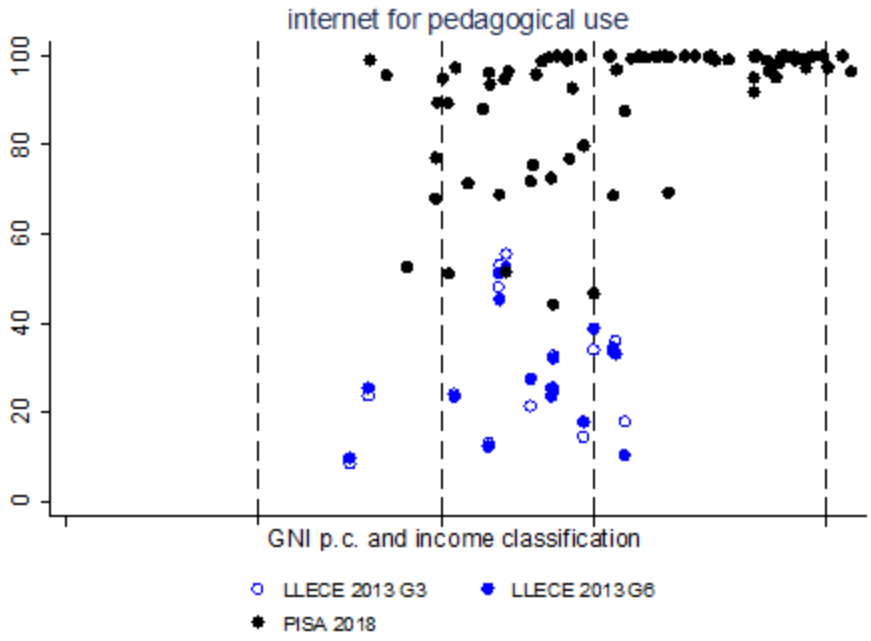


Fig. 2. Percent of schools which have drinking water and electricity