

ICILS TEACHER PANEL

User Guide for the International Database

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CHAPTER 1

ICILS Teacher Panel 2020

1.1 Main objectives and scope

The International Computer and Information Literacy Study (ICILS) Teacher Panel 2020 is an international comparative survey conducted in Denmark, Finland, and Uruguay in 2020. Building on existing data from ICILS 2018, teachers were surveyed again during the COVID-19 pandemic to measure changes in ICT equipment and use. Additional information was collected from school principals and ICT coordinators.

The importance of information and communication technology (ICT) for teaching and learning has been increasingly recognized in recent decades. During the COVID-19 pandemic, when school closures were widespread, the need for evidence on the use of computers and technology for learning and the determinants of ICT use became more urgent. During this period, many students worldwide were unable to attend school in person, heightening expectations that the use of computers and technology could effectively support student learning. However, the significance of digital learning extends beyond the pandemic, encompassing extreme weather conditions, strikes, and other events that have prevented, and will continue to prevent, children from attending school buildings and classrooms. Consequently, there is a great need for evidence on the effective use of ICT in education to guide schools and education systems in supporting digital distance learning.

1.2 ICILS 2018 as a baseline for an international teacher panel

Although the need for a panel study on changes in ICT resources and their use was evident, it was impossible to plan a study in advance because no one anticipated COVID-19 and the subsequent school closures. Our approach to circumvent this problem was to use existing data as a baseline measurement. From a comparative perspective, IEA's ICILS 2018 provides a unique database and infrastructure to construct international panel data on ICT in schools (for further information on ICILS, see the assessment framework, the international report, and the technical reports: Fraillon et al., [2014](#), [2019](#), [2020a](#), [2020b](#)).

To use results from ICILS 2018 as a baseline measurement, it was necessary to identify teachers and schools that had participated in 2018 for the ICILS Teacher Panel 2020 survey. The panel nature of this study at the teacher level necessitated contacting the same teachers who participated in the 2018 study. It was not necessary to have the same principals or ICT coordinators reporting from each school, as the focus was primarily on maintaining consistency in teacher participation to ensure the reliability and validity of longitudinal comparisons. Within the sample of teachers from ICILS 2018, each country had different strategies for contacting participants, given the limitations they may have faced due to data protection laws, the hierarchy of the education system, reliance on mail and email use, or other considerations.

The ICILS Teacher Panel 2020 included three instruments: a teacher questionnaire, an ICT Coordinator questionnaire, and a school principal questionnaire. Given the longitudinal nature of this study, many of the items on these three questionnaires were identical to the items from the previous ICILS 2018 study. With the present study being longitudinal, it was important to keep as many items as possible identical to their 2018 study counterparts to argue that the observed changes are attributable to the COVID-19 global pandemic. While no items were dropped, several items were added to collect specific information on the disruption caused by the COVID-19 pandemic.

CHAPTER 2

The ICILS Teacher Panel 2020 International Database File

2.1 The ICILS Teacher Panel 2020 database

Data collection for the ICILS Teacher Panel began in November 2020 and continued through the end of December 2020 in Finland and Uruguay, and through the end of March 2021 in Denmark. Three instruments were used to understand the disruption caused by the COVID-19 pandemic to normal schooling practices and to determine how this disruption affected the use of ICT resources for learning purposes. These instruments included a teacher questionnaire, an ICT coordinators questionnaire, and a questionnaire for school principals.

The ICILS Teacher Panel 2020 data, collected at both the teacher and school levels, are merged into the dataset **MERGEDTP**, combining data from the three participating countries.

All information related to the structure of the ICILS Teacher Panel 2020 data files, as well as the descriptive labels and response option codes for all variables, is contained in the codebook files ("ICILS Teacher Panel Codebook IDB PUF.xlsx").

2.2 Data format and records included

The merged ICILS Teacher Panel 2020 data (MERGEDTP) includes both teacher-level and school-level files, structured in a long format. The variable **YEAR** indicates the data collection year, distinguishing between 2018 for the ICILS 2018 study and 2020 for the ICILS Teacher Panel study. The variables **PARTT** and **PARTC** categorize participation status for teachers and schools, respectively. A value of 1 indicates participation in both study cycles, 2 denotes participation only in the 2018 study, and 3 signifies participation only in the 2020 study. For teachers who participated in both studies, each teacher contributes two rows to the dataset—one for responses collected in 2018 and another for those collected in 2020. Each teacher has a unique identification number (**IDTEACH**). Schools also have a unique identification number (**IDSCHOOL**), which is assigned to the teacher, principal and ICT coordinator. This long format facilitates panel analysis and comparison of responses across the two study periods, making it easier to track changes and trends over time.

2.3 Weighting and variance estimation variables

The ICILS Teacher Panel 2020 international database includes school-level and teacher-level estimation weights that are specifically adjusted for the panel study. The final adjusted and scaled weight for schools is denoted by **TOTWGTC**, while the equivalent weight for teachers is represented by **TOTWGTT**. In the ICILS Teacher Panel 2020 database, the original total weights from the ICILS 2018 study are relabeled as **Old_TOTWGTC** for schools and **Old_TOTWGTT** for teachers. Detailed procedures on adjusting these estimation weights to account for panel attrition in the ICILS Teacher Panel 2020 can be found in Chapter 7 of the report titled *Changes in Digital Learning During a Pandemic—Findings From the ICILS Teacher Panel* (Strietholt et al., 2021).

In the merged ICILS Teacher Panel 2020 data, these three values will be the same: the sum of **Old_TOTWGTT** when the database is filtered to **YEAR=2018**, the sum of **TOTWGTT** when the database is filtered to **YEAR=2018** and **PARTT=1**, and the sum of **TOTWGTT** when the database is filtered to **YEAR=2020** and **PARTT=1**.

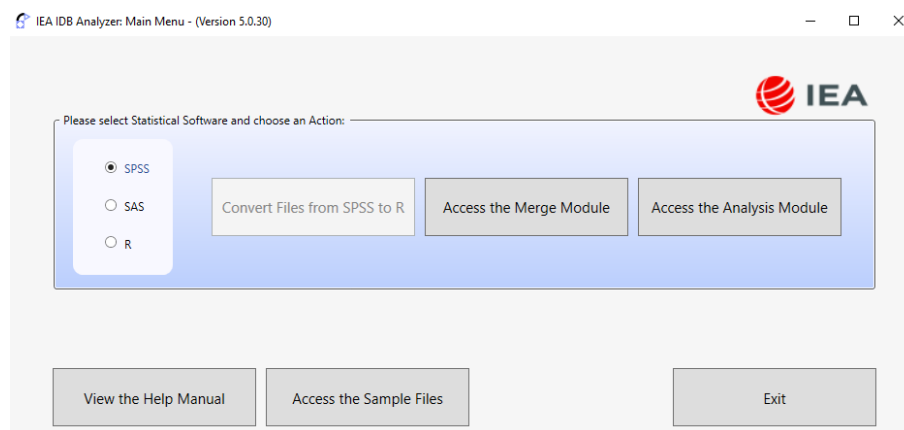
CHAPTER 3

Analyzing the ICILS Teacher Panel 2020 Data

3.1 IDB analysis module

For analyzing ICILS Teacher Panel 2020 data in the IEA IDB Analyzer, features specified for ICILS 2018 are utilized (Mikheeva and Meyer, 2020). The IEA IDB Analyzer comprises two integrated modules: the merge module and the analysis module. The merge module is typically used to create analysis datasets by combining data files from different types and countries and selecting subsets of variables. For ICILS Teacher Panel 2020 data, however, the merged data file is already provided, so the merge module is not required. Analyses can be performed directly in the analysis module using the merged ICILS Teacher Panel 2020 data.

Figure 3.1: IEA IDB Analyzer main window



3.2 Teacher level analysis on changes in the use of ICT

The ICILS Teacher Panel 2020 first reported findings from teacher surveys on ICT-related issues, such as resources at schools, attitudes toward digital learning, and the use of computers for teaching and learning, based on surveys conducted in 2018 and 2020. Panel data from Denmark, Finland, and Uruguay are used to investigate the changes that occurred during the COVID-19 pandemic. The focus is on teachers' familiarity with ICT, their views regarding its use for teaching and learning, and their perceptions of schools' ICT learning environments. Furthermore, the emphasis teachers place on developing students' CIL and CT and their actual use of ICT in lessons and lesson preparation is reviewed.

In this example, results presented in the ICILS Teacher Panel 2020 report (Strietholt et al., 2021, p. 14) are replicated. Teachers were asked to rate the frequency of their ICT use in various contexts: at school while teaching, at school for other work-related purposes, outside school for work-related purposes, and outside school for non-work-related purposes. Response options included "never," "less than once a month," "at least once a month but not weekly," "at least once a week but not every day," or "every day." To facilitate interpretation, the item responses have been dichotomized, with 0 for "Not every day" and 1 for "Every day." The results present the percentages of teachers who reported using ICT every day for these purposes in 2018 and 2020, along with the change in percentage points between these years.

Figure 3.2: Example of teacher-level analysis from the ICILS report

Table 3.2: Percentages of teachers who reported using ICT every day

Item	Denmark				Finland				Uruguay			
	18	20	Δ	r_{tet}	18	20	Δ	r_{tet}	18	20	Δ	r_{tet}
At school when teaching	73 (3.4)	88 (1.8)	16** (3.5)	.51** (.09)	58 (1.3)	70 (1.4)	12** (1.5)	.73** (.03)	18 (2.1)	28 (2.6)	10** (2.6)	.65** (.07)
At school for other work-related purposes	95 (1.3)	95 (1.2)	0 (1.7)	.18 (.17)	80 (1.1)	85 (1.1)	5** (1.4)	.50** (.05)	34 (3.1)	48 (3.6)	14** (3.6)	.35** (.08)
Outside school for work-related purposes	65 (3.4)	76 (3.2)	11** (2.6)	.67** (.06)	56 (1.8)	63 (1.8)	7** (1.9)	.61** (.03)	54 (3.3)	65 (3.1)	11** (2.9)	.61** (.05)
Outside school for non-work-related purposes	87 (1.8)	87 (1.6)	0 (2.1)	.59** (.08)	76 (1.2)	79 (1.2)	2 (1.5)	.58** (.04)	60 (3.0)	59 (3.2)	-1 (4.0)	.42** (.08)

Note: 18 = percentage of teachers who reported using ICT every day for the activity in 2018; 20 = percentage of teachers who reported using ICT every day for the activity in 2020; Δ = differences 2020 minus 2018 (because percentages are rounded to the nearest whole number, some differences may appear inconsistent); r_{tet} = tetrachoric correlation between agreements in 2018 and 2020 (not provided when the minimum cell frequency is less than 5); standard errors in parentheses. These results should be interpreted with caution, given the relatively low panel response rates. See Chapter 6 and Appendix A for details on the samples and nonresponse. * $p < .05$, ** $p < .01$.

In the merged ICILS Teacher Panel 2020 data (MERGEDTP), each teacher's responses from ICILS 2018 and 2020 are presented in two rows in long format. We focus on cases with valid responses in both ICILS 2018 and the ICILS Teacher Panel 2020. The PARTT variable categorizes participation status as follows: 1 indicates participation in both study cycles, 2 denotes participation only in the 2018 study, and 3 signifies participation only in the 2020 study. We filter the dataset to include only cases where PARTT=1. The data preparation steps in the SPSS environment are as follows (see Figure 3.3):

1. Load dataset: Open the dataset file named MERGEDTP.
2. Filter and select Variables: Filter the data to include only participants from both study cycles (PARTT=1). Retain the following variables: IDSCHOOL, IDTEACH, IDCNTRY, CNTRY, PARTT, TOTWGTT, JKZONET, JKREPT, YEAR, C_SCHSES_CAT, and IT2G06A.
3. Restructure data to wide format: Transform the data from long to wide format to accommodate only cases with valid IT2G06A data for both years (2018 and 2020).
4. Convert data back to long format: Revert the data to long format for subsequent analysis.
5. Dichotomize IT2G06A variable: Recode the IT2G06A variable into a new variable IT2G06A_R, dichotomizing it: 0 for 'Not every day' and 1 for 'Every day'.
6. Save the modified dataset: Save the processed dataset to a new file named MERGEDTP_T_NEW.

Figure 3.3: SPSS script for generating teacher-level data

```
* Encoding: UTF-8.
* Open the dataset.
GET FILE='D:\ICILS2020\Data\MERGEDTP.sav'.

* Filter for participants in both studies and retain necessary variables.
SELECT IF (PARTT = 1).
MATCH FILES /FILE=*
  /KEEP=IDSCHOOL IDTEACH IDCNTRY CNTRY PARTT TOTWGTT JKZONET JKREPT YEAR C_SCHSES_CAT
  IT2G06A.
EXECUTE.
```

Figure 3.3: SPSS script for generating teacher-level data (continued)

```

* Restructure data from long to wide format.
* Separate variables by YEAR for comparison purposes.
SORT CASES BY IDSCHOOL IDTEACH IDCNTRY CNTRY.
CASESTOVARS
  /ID=IDSCHOOL IDTEACH IDCNTRY CNTRY
  /INDEX=YEAR
  /GROUPBY=VARIABLE
  /SEPARATOR=_. /* Separator for wide format variable naming.
EXECUTE.

* Select cases with valid IT2G06A data for both years.
SELECT IF (NOT MISSING(IT2G06A_2018) AND NOT MISSING(IT2G06A_2020)).
EXECUTE.

* Revert data to long format for analysis.
VARSTOCASES
  /MAKE IT2G06A FROM IT2G06A_2018 IT2G06A_2020
  /INDEX=YEAR
  /KEEP=IDSCHOOL IDTEACH IDCNTRY CNTRY PARTT TOTWGT JKZONET JKREPT C_SCHSES_CAT
  /NULL=DROP.
VARIABLE LABELS IT2G06A 'ICT_usage_at_school_when_teaching'.
EXECUTE.

* Correct YEAR variable to match study years.
RECODE YEAR (1 = 2018) (2 = 2020).
VARIABLE LABELS YEAR 'Year_of_responses'.
VALUE LABELS YEAR
  2018 'ICILS_2018_study'
  2020 'ICILS_Teacher_Panel_(2020)_study'.
FORMATS YEAR (F4.0).
EXECUTE.

* Dichotomize the IT2G06A variable.
RECODE IT2G06A (1 2 3 4 = 0) (5 = 1) (ELSE = COPY) INTO IT2G06A_R.
MISSING VALUES IT2G06A_R (8, 9).
VARIABLE LABELS IT2G06A_R 'ICT_usage_at_school_when_teaching(recoded)'.
VALUE LABELS IT2G06A_R
  0 'Not_every_day'
  1 'Every_day'
  8 'Not_administered/missing_by_design'
  9 'Presented_but_not_answered/invalid'.
FORMATS IT2G06A_R (F1.0).
EXECUTE.

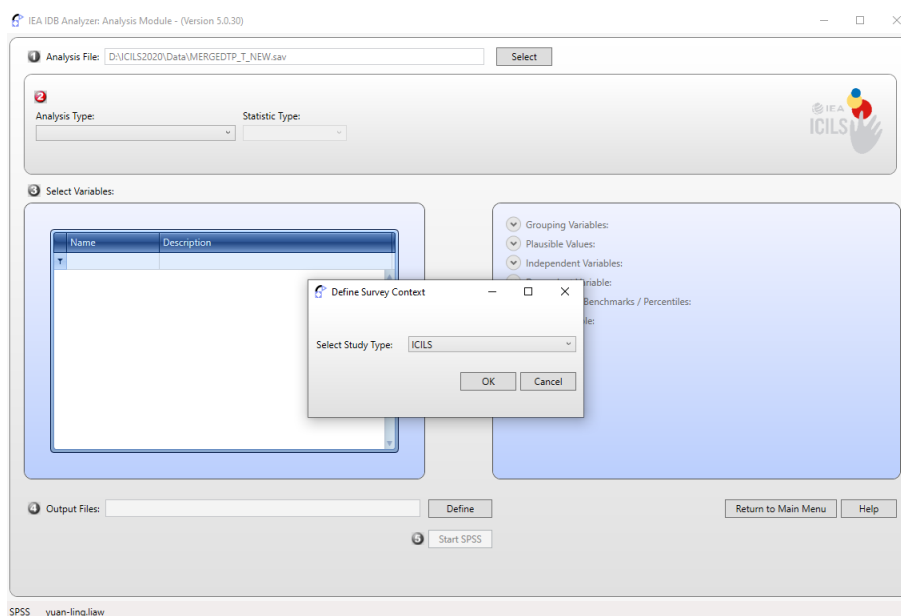
* Save the processed dataset to a new file.
SAVE OUTFILE='D:\ICILS2020\Data\MERGEDTP_T_NEW.sav'.
EXECUTE.

```

After creating the new data file for the analysis, the Analysis Module of the IEA IDB Analyzer enables the user to perform the analysis using the following steps (see Figure 3.4):

1. Open the Analysis Module of the IEA IDB Analyzer.
2. Select the new data file MERGEDTP_T_NEW as the Analysis File by clicking the Select button.
3. In the Define Survey Context box, select the study type as ICILS.

Figure 3.4: IEA IDB Analyzer setup for defining survey context



Once the study type is defined as ICILS, three analyses are available under Analysis Type: ICILS (Using Student Weights), ICILS (Using Teacher Weights), and ICILS (Using School Weights). Since we are using teacher questionnaire data, select ICILS (Using Teacher Weights) from the options (see Figure 3.5):

1. Select ICILS (Using Teacher Weights) as the Analysis Type.
2. Select Percentages and Means as the Statistic Type.
3. Select None Used as the Plausible Value Option.
4. The variable IDCNTY is selected automatically as Grouping Variables.
5. Select an additional variable YEAR as a Grouping Variable. The variable YEAR distinguishes between data collected in 2018 and in 2020.
6. Click the Analysis Variables field to activate it. Select IT2G06A_R from the list of available variables and move it to the Analysis Variables field.
7. The Weight Variable is automatically defined by the software. As this example analysis uses teacher questionnaire data, TOTWGTT is selected by default. The 75 replicate weights will also be involved in the analysis for computing the correct estimates of the standard errors, although the IEA IDB Analyzer interface does not indicate or list them individually.
8. Specify the name and the folder of the output files in the Output Files field by clicking the Define/-Modify button. The IEA IDB Analyzer will use this name and folder to create output files.
9. Press the Start SPSS button to create the SPSS syntax file. The file will open in an SPSS syntax window (see Figure 3.6). The syntax file will be executed by opening the Run menu of SPSS and selecting the All option.

Note that the IEA IDB Analyzer also displays a table average at the end of the results tables (Table Average). This corresponds to the average of the statistics calculated across the countries included in the analysis.

Figure 3.5: IEA IDB Analyzer setup for teacher-level analysis

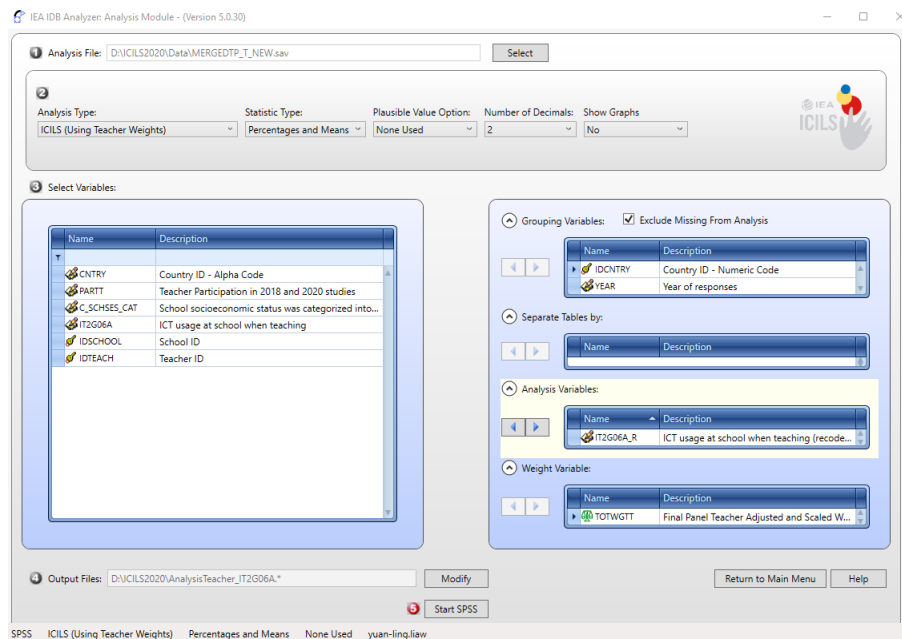


Figure 3.6: SPSS syntax editor of teacher-level analysis from IEA IDB Analyzer

* Script created using the IEA IDB Analyzer (Version 5.0.30).

* Created on 7/31/2024 at 2:47 PM.

* Press Ctrl+A followed by Ctrl+R to submit this analysis.

```
include file = "C:\Users\yuan-ling.liaw\AppData\Roaming\IEA\IDBAnalyzerV5\bin\Data\
  Templates\SPSS_Macros\JB_Gen.ieasps".
```

```
JB_gen  infile="D:\ICILS2020\Data\MERGEDTP_T_NEW.sav"/
        cvar=IDCOUNTRY YEAR /
        almvars=/
        xvar=IT2G06A_R /
        wgt=TOTWGT/
        jkz=JKZONET/
        jkr=JKREPT/
        jk2type=HALF/
        stratvar=JKZONET/
        nrwgt=75/
        nomiss=Y/
        method=JRR/
        viewcod=N/
        ndec=2/
        clean = Y/
        strctry = N/
        intavg = Y/
        graphs=N/
        selcrit = /
        selvar = /
        outdir="D:\ICILS2020"/
        outfile="AnalysisTeacher_IT2G06A".
```

The IEA IDB Analyzer generates output files in Excel and SPSS formats for all analysis types. These files are located in the folder specified in the Output Files field. For the Percentages and Means analysis type, the program also produces an Excel file with significance test results for differences in percentages as well as differences in means.

For example, in the file named AnalysisTeacher_IT2G06A_IT2G06A_R_by_YEAR_Sig.csv (see Figure 3.7), comparisons are made between teacher responses from the ICILS 2018 study (refgroup) and the ICILS Teacher Panel (2020) study (compgroup). The variable IT2G06A_R is dichotomized, where 0 represents “Not every day” and 1 represents “Every day”. The column labeled mnx shows the mean scores of teachers who responded Every day to the statement in 2018. The column labeled cmnx displays the corresponding mean scores of teachers who answered Every day in 2020. The column labeled mnxdiff indicates the difference between the mean scores for 2020 and 2018. These mean scores represent proportions of teachers and can be transformed to percentages when raw values are multiplied the by 100.

In 2018, the percentage of teachers reporting daily use of ICT at school while teaching was 73% in Denmark, 58% in Finland, and 18% in Uruguay. In 2020, these percentages increased to 88% in Denmark, 70% in Finland, and 28% in Uruguay. Statistically significant increases in daily ICT use at school were observed between 2018 and 2020, with increases of 16 percentage points in Denmark, 12 percentage points in Finland, and 10 percentage points in Uruguay.

To replicate the results for other variables included in Figure 3.2, simply replace IT2G06A with IT2G06B, IT2G06C, or IT2G06D and repeat all the steps starting with generating the teacher-level dataset (Figure 3.3) and the analysis (Figure 3.5).

Figure 3.7: Output for teacher-level analysis

IDCNTRY	dvar	groupvar	refgroup	compgroup	mnx	mnx_se	cmnx	cmnx_se	mnxdiff	mnxdiff_se	mnxdiff_t
Denmark	IT2G06A_R	YEAR	ICILS 2018 study	ICILS Teacher Panel (2020) study	0.725340707	0.033594529	0.881420912	0.01795338	0.156080205	0.035473917	4.399858228
Finland	IT2G06A_R	YEAR	ICILS 2018 study	ICILS Teacher Panel (2020) study	0.581145284	0.013412535	0.697179492	0.014460059	0.116034208	0.015358722	7.554939077
Uruguay	IT2G06A_R	YEAR	ICILS 2018 study	ICILS Teacher Panel (2020) study	0.178102722	0.021208744	0.276941935	0.026012157	0.098839214	0.026375075	3.747447708

3.3 Teacher level analysis on changes in inequality of opportunity

In this section, the analysis continues by using teacher questionnaire data to demonstrate whether inequality in educational opportunity changed between 2018 and 2020. To study the opportunity gap, teachers' SES groups were identified using the variable C_SCHSES_CAT, which dichotomizes teachers into those from socioeconomically advantaged or disadvantaged schools.

In Figure 3.8, the percentages of teachers in each group who used ICT every day for various purposes in Denmark, Finland, and Uruguay in 2018 and 2020 are shown. The results offer little evidence that the SES gap widened from 2018 to 2020; rather, the differences remained small in both years. The only deviation from this general pattern is related to the use of ICT *outside school for work-related purposes* in Uruguay. Here, teachers in high-SES schools were 14% more likely to report using ICT daily for work outside school in 2018, but by 2020 this difference had almost completely disappeared (4%). The reduction in the SES gap in this context is statistically significant.

Figure 3.8: Changes in SES gaps: teacher-level analysis from the ICILS report

Table 4.2: Changes in SES gaps in the percentages of teachers who reported using ICT every day

Item	Denmark			Finland			Uruguay		
	Gap 2018	Gap 2020	Δ in Gaps	Gap 2018	Gap 2020	Δ in Gaps	Gap 2018	Gap 2020	Δ in Gaps
At school when teaching	3 (6.0)	0 (3.6)	-3 (6.8)	0 (2.7)	1 (2.8)	1 (3.2)	5 (4.0)	6 (4.6)	1 (5.1)
At school for other work-related purposes	1 (2.4)	-4 (2.4)	-5 (3.4)	-1 (2.5)	3 (2.4)	4 (3.0)	4 (5.8)	4 (5.8)	0 (7.2)
Outside school for work-related purposes	14* (7.0)	10 (6.5)	-5 (5.4)	3 (3.9)	8* (3.4)	5 (3.7)	14* (6.3)	4 (6.5)	-10* (4.3)
Outside school for non-work-related purposes	5 (3.8)	3 (3.4)	-2 (4.0)	-2 (2.5)	3 (2.5)	5 (2.6)	11 (6.0)	4 (6.5)	-7 (7.2)

Note: Gap 2018 = percentage of teachers from high SES schools minus from low SES schools in 2018; Gap 2020 = percentage of teachers from high SES schools minus from low SES schools in 2020; Δ in Gaps = Gap 2020 minus Gap 2018 (because percentages are rounded to the nearest whole number, some differences may appear inconsistent); standard errors in parentheses. These results should be interpreted with caution, given the relatively low panel response rates. See Chapter 6 and Appendix A for details on the samples and nonresponse. *p < .05, **p < .01.

The SPSS syntax shown in Figure 3.9 performs a series of steps to prepare the dataset for analysis.

1. Load the dataset: Open the file named MERGEDTP_T_NEW.
2. Filter and select variables: Filter the cases to include only those where C_SCHSES_CAT is either 0 or 1, meaning that cases with missing information regarding school SES are removed.
3. Recode the YEAR variable: Recode the YEAR variable into a new variable, YEAR_R, assigning a value of 0 for 2018 and 1 for 2020.
4. Create an interaction term: Compute an interaction term called INTERACT, which is the product of YEAR_R and C_SCHSES_CAT.
5. Save the modified dataset: Save the processed dataset to a new file named MERGEDTP_T_NEW2.

Figure 3.9: SPSS script for generating teacher-level data for inequality of opportunity analysis

```
* Encoding: UTF-8.
* Open the dataset.
GET FILE='D:\ICILS2020\Data\MERGEDTP_T_NEW.sav'.

* Select cases with valid C_SCHSES_CAT (0 or 1).
SELECT IF (C_SCHSES_CAT = 0 OR C_SCHSES_CAT = 1).
EXECUTE.
```

Figure 3.9: SPSS script for generating teacher-level data for inequality of opportunity analysis(continued)

```

* Dichotomize the YEAR variable.
RECODE YEAR (2018 = 0) (2020 = 1) INTO YEAR_R.
VARIABLE LABELS YEAR_R 'Year_of_responses_(recoded)'.
VALUE LABELS YEAR_R
  0 'ICILS_2018_study'
  1 'ICILS_Teacher_Panel_(2020)_study'.
FORMATS YEAR_R (F1.0).
EXECUTE.

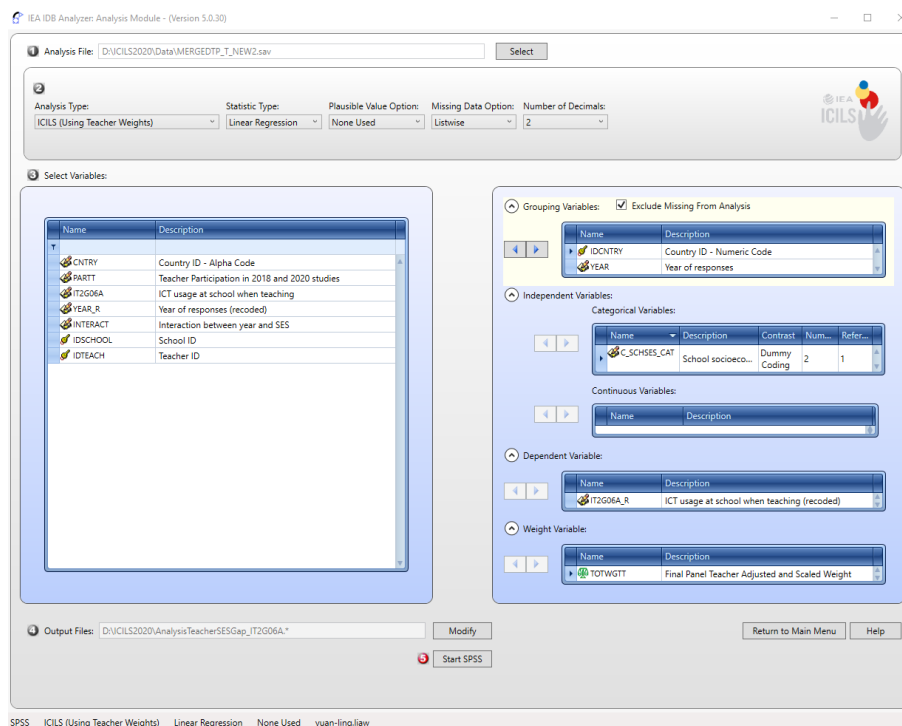
* Create an interaction term between YEAR_R and C_SCHSES_CAT.
COMPUTE INTERACT = YEAR_R*C_SCHSES_CAT.
VARIABLE LABELS INTERACT 'Interaction_between_year_and_SES'.
FORMATS INTERACT (F1.0).
EXECUTE.

* Save the processed dataset to a new file.
SAVE OUTFILE='D:\ICILS2020\Data\MERGEDTP_T_NEW2.sav'.
EXECUTE.

```

There are various methods to calculate the gap between teachers' responses from schools with higher SES and those from schools with lower SES in 2018 and 2022. In this instance, linear regressions are employed in the IEA IDB Analyzer, following these steps (see Figure 3.10):

Figure 3.10: IEA IDB Analyzer setup for inequality of opportunity analysis



1. Open the Analysis Module of the IEA IDB Analyzer.
2. Select the new data file MERGEDTP_T_NEW2 as the Analysis File by clicking the Select button.
3. In the Define Survey Context box, select the study type as ICILS.
4. Select ICILS (Using Teacher Weights) as the Analysis Type.
5. Select Linear Regression as the Statistic Type.
6. Select None Used as the Plausible Value Option.
7. The variable IDCNTY is selected automatically as Grouping Variables.
8. Select an additional variable YEAR as a Grouping Variable. The variable YEAR distinguishes between data collected in 2018 and in 2020.
9. Click the Categorical Variables field in the Independent Variables section to activate it and select the variable C_SCHSES_CAT as the independent variable.
10. Select IT2G06A_R as the Dependent Variable.
11. The generated SPSS syntax is shown in Figure 3.11 and the output can be retrieved from 'Analysis-TeacherSESGap_IT2G06A_Coef.csv' (Figure 3.12).

Figure 3.11: SPSS syntax editor of inequality of opportunity analysis from IEA IDB Analyzer

```
* Script created using the IEA IDB Analyzer (Version 5.0.30).
* Created on 7/31/2024 at 2:54 PM.
* Press Ctrl+A followed by Ctrl+R to submit this analysis.

include file = "C:\Users\yuan-ling.liaw\AppData\Roaming\IEA\IDBAnalyzerV5\bin\Data\
  Templates\SPSS_Macros\JB_RegG.ieasps".

JB_RegG      infile="D:\ICILS2020\Data\MERGEDTP_T_NEW2.sav"/
             cvar=IDCNTY YEAR /
             convar=/
             catvar=C_SCHSES_CAT /
             codings=D/
             refcats=1/
             ncats=2/
             dvar=IT2G06A_R /
             wgt=TOTWGTT/
             jkz=JKZONET/
             jkr=JKREPT/
             jk2type=HALF/
             stratvar=JKZONET/
             nrwgt=75/
             nomiss=Y/
             method=JRR/
             missing=listwise/
             viewprgs=Y/
             viewlbl=Y/
             qcstats=Y/
             newout=Y/
             intavg = Y/
             viewcod=N/
             ndec=2/
             clean = Y/
             strctry = N/
             selcrit = /
             selvar = /
             outdir="D:\ICILS2020"/
             outfile="AnalysisTeacherSESGap_IT2G06A".
```

Figure 3.12: Output for teacher-level SES analysis

AutoSave

Off

AnalysisTeacherSESGap_IT2G06A_Co...

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Yuan-Ling Liaw, Ph.D.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	IDCNTRY	YEAR	EqVar	B	b.se	b.t	xvar	dvar	weight	method	jk2type	missop	data			
1	Denmark	ICILS 2018 study	C_SCHSES_CAT_D2	0.033167917	0.059984256	0.552943714	C_SCHSES_CAT_d2	IT2G06A_R	TOTW6TT	JRR	HALF	LISTWISE	31			
2	Denmark	ICILS Teacher Panel (2020) study	C_SCHSES_CAT_D2	-0.001525412	0.035872011	-0.042523727	C_SCHSES_CAT_d2	IT2G06A_R	TOTW6TT	JRR	HALF	LISTWISE	31			
3	Finland	ICILS 2018 study	C_SCHSES_CAT_D2	0.001490557	0.026892465	0.055426573	C_SCHSES_CAT_d2	IT2G06A_R	TOTW6TT	JRR	HALF	LISTWISE	31			
4	Finland	ICILS Teacher Panel (2020) study	C_SCHSES_CAT_D2	0.011585331	0.028024477	0.41340043	C_SCHSES_CAT_d2	IT2G06A_R	TOTW6TT	JRR	HALF	LISTWISE	31			
5	Uruguay	ICILS 2018 study	C_SCHSES_CAT_D2	0.053936784	0.040083645	1.345605789	C_SCHSES_CAT_d2	IT2G06A_R	TOTW6TT	JRR	HALF	LISTWISE	31			
6	Uruguay	ICILS Teacher Panel (2020) study	C_SCHSES_CAT_D2	0.061282141	0.046238024	1.325362471	C_SCHSES_CAT_d2	IT2G06A_R	TOTW6TT	JRR	HALF	LISTWISE	31			

The linear regressions in the IEA IDB Analyzer are further used to calculate the difference between the SES gap in 2018 and the SES gap in 2022 (see Figure 3.13):

1. Open the Analysis Module of the IEA IDB Analyzer.
2. Select the new data file MERGEDTP_T_NEW2 as the Analysis File by clicking the Select button.
3. In the Define Survey Context box, select the study type as ICILS.
4. Select ICILS (Using Teacher Weights) as the Analysis Type.
5. Select Linear Regression as the Statistic Type.
6. Select None Used as the Plausible Value Option.
7. The variable IDCNTRY is selected automatically as Grouping Variables.
8. Click the Categorical Variables field in the Independent Variables section to activate it and select the variable YEAR, C_SCHSES_CAT, and INTERACT as the independent variables.
9. Select IT2G06A_R as the Dependent Variable.
10. The generated SPSS syntax is shown in Figure 3.14 and the output can be retrieved from 'Analysis-TeacherSESDiff_IT2G06A_Coef.csv' (Figure 3.15).

Figure 3.13: IEA IDB Analyzer setup for inequality of opportunity analysis

IEA IDB Analyzer: Analysis Module - (Version 5.0.30)

Analysis File: D:\ICILS2020\Data\MERGEDTP_T_NEW2.sav [Select]

Analysis Type: ICILS (Using Teacher Weights) | Statistic Type: Linear Regression | Plausible Value Option: None Used | Missing Data Option: Listwise | Number of Decimals: 2

Select Variables:

Name	Description
CNTRY	Country ID - Alpha Code
PARTT	Teacher Participation in 2018 and 2020 studies
IT2G06A	ICT usage at school when teaching
YEAR_R	Year of responses (recoded)
IDTSCHOOL	School ID
IDTEACH	Teacher ID

Grouping Variables: ☒ Exclude Missing From Analysis

Independent Variables:

Categorical Variables:

Name	Description	Contrast	Num.	Ref.
YEAR	Year of responses	Dummy Coding	2	1
INTERACT	Interaction bet...	Dummy Coding	2	1
C_SCHSES_CAT	School socioeco...	Dummy Coding	2	1

Continuous Variables:

Name	Description
------	-------------

Dependent Variable:

Name	Description
IT2G06A_R	ICT usage at school when teaching (recoded)

Weight Variable:

Name	Description
TOTW6TT	Final Panel Teacher Adjusted and Scaled Weight

Output Files: D:\ICILS2020\Analysis\TeacherSESDiff_IT2G06A_* [Modify]

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Start SPSS

SPSS ICILS (Using Teacher Weights) Linear Regression None Used yuan-ling.liaw

Figure 3.14: SPSS syntax editor of inequality of opportunity from IEA IDB Analyzer

```

* Script created using the IEA IDB Analyzer (Version 5.0.30).
* Created on 7/31/2024 at 2:52 PM.
* Press Ctrl+A followed by Ctrl+R to submit this analysis.

include file = "C:\Users\yuan-ling.liaw\AppData\Roaming\IEA\IDBAnalyzerV5\bin\Data\
  Templates\SPSS_Macros\JB_RegG.ieasps".

JB_RegG          infile="D:\ICILS2020\Data\MERGEDTP_T_NEW2.sav"/
cvar=IDCNTRY /
convar=/
catvar=YEAR INTERACT C_SCHSES_CAT /
codings=D D D/
refcats=1 1 1/
ncats=2 2 2/
dvar=IT2G06A_R /
wgt=TOTWGT/
jkz=JKZONET/
jkr=JKREPT/
jk2type=HALF/
stratvar=JKZONET/
nrwgt=75/
nomiss=Y/
method=JRR/
missing=listwise/
viewprgs=Y/
viewlbl=Y/
qcstats=Y/
newout=Y/
intavg = Y/
viewcod=N/
ndec=2/
clean = Y/
strctry = N/
selcrit = /
selvar = /
outdir="D:\ICILS2020"/
outfile="AnalysisTeacherSESDiff_IT2G06A".

```

Figure 3.15: Output for inequality of opportunity analysis

AnalysisTeacherSESDiff_IT2G06A.Co...													
Search													
File Home Insert Draw Page Layout Formulas Data Review View Automate Help													
A20													
	A	B	C	E	G	I	J	K	L	M	N		
	IDCNTRY	EqVar	b.se	b.t	xvar	dvar	weight	method	jk2type	missoptn	dat		
4	Denmark	INTERACT_D2	-0.034693329	0.067788868	-0.511785043	YEAR_d2 INTERACT_d2 C_SCHSES_CAT_d2	IT2G06A_R	TOTWGT	JRR	HALF	LISTWISE	31	
8	Finland	INTERACT_D2	0.010094774	0.031531998	0.320143798	YEAR_d2 INTERACT_d2 C_SCHSES_CAT_d2	IT2G06A_R	TOTWGT	JRR	HALF	LISTWISE	31	
12	Uruguay	INTERACT_D2	0.007345357	0.051421569	0.142845837	YEAR_d2 INTERACT_d2 C_SCHSES_CAT_d2	IT2G06A_R	TOTWGT	JRR	HALF	LISTWISE	31	

3.4 School level analysis

The ICILS Teacher Panel 2020 also reported findings from a principal survey on ICT-related issues, based on surveys conducted in 2018 and 2020. The focus is on school principals' use of ICT for various school-related activities, their views on using ICT to enhance educational outcomes, schools' expectations for ICT use by teachers, and teacher collaborations facilitated by ICT. Additionally, the priority given to different methods of integrating ICT in teaching and learning was assessed.

In this example, results presented in the ICILS Teacher Panel 2020 report (Strietholt et al., 2021, p. 30) are replicated. School principals were asked about their expectations for teachers to use ICT for collaboration with other teachers, parents, and students. The findings revealed the percentages of principals who reported that teachers are expected and required to use ICT for collaboration. In Denmark, no significant changes were observed between 2018 and 2020. However, in both Finland and Uruguay, there was a significant increase in the percentage of principals who expected and required teachers to communicate with students via ICT (an increase of 11 percentage points in Finland and 27 percentage points in Uruguay).

Figure 3.16: Example of school-level analysis from the ICILS report

Table 3.18: Percentages of principals who reported teachers are expected and required to use ICT for collaboration

Item	Denmark				Finland				Uruguay			
	18	20	Δ	r_{tet}	18	20	Δ	r_{tet}	18	20	Δ	r_{tet}
Collaborate with other teachers via ICT	74 (5.9)	68 (7.4)	-6 (7.7)	.51* (.21)	67 (4.2)	66 (3.7)	-1 (4.9)	.27 (.15)	11 (4.7)	20 (9.0)	9 (10.1)	.23 (.33)
Communicate with parents via ICT	98 (2.2)	98 (1.2)	0 (2.5)	- (.24)	94 (2.5)	91 (2.8)	-3 (3.8)	.03 (.23)	7 (3.9)	14 (6.5)	8 (7.5)	- (.24)
Communicate with students via ICT	90 (4.3)	89 (4.8)	-1 (5.0)	.53* (.24)	74 (3.9)	86 (3.1)	11* (5.0)	.18 (.21)	4 (3.0)	31 (9.4)	27** (9.0)	.50* (.24)

Note: 18 = percentage of principals who reported teachers are expected and required to use ICT in 2018; 20 = percentage of principals who reported teachers are expected and required to use ICT in 2020; Δ = differences 2020 minus 2018 (because percentages are rounded to the nearest whole number, some differences may appear inconsistent); r_{tet} = tetrachoric correlation between agreements in 2018 and 2020 (not provided when the minimum cell frequency is less than 5); standard errors in parentheses. These results should be interpreted with caution, given the relatively low panel response rates. See Chapter 6 and Appendix A for details on the samples and nonresponse. * $p < .05$, ** $p < .01$.

We first create school-level dataset from the merged ICILS Teacher Panel 2020 data (MERGEDTP), which is the merged file from teacher and school level data. The data preparation steps in the SPSS environment are as follows (Figure 3.17):

1. Load dataset: Open the dataset file named MERGEDTP.
2. Filter and select Variables: Filter the data to include only participants from both study cycles (PARTC=1). Retain the following variables: IDSCHOOL, IDCNTRY, CNTRY, PARTC, TOTWGTC, JKZONEC, JKREPC, YEAR, and IP2G11D.
3. Create school-level dataset: Retain the first record for each school.
4. Restructure data to wide format and select cases with valid IP2G11D data for both years (2018 and 2020).
5. Convert data back to long format: Revert the data to long format for subsequent analysis.
6. Dichotomize IP2G11D variable: Recode the IP2G11D variable into a new variable IP2G11D_R, dichotomizing it: 0 for "Expected but not required or Not expected" and 1 for "Expected and required".
7. Save the modified dataset: Save the processed dataset to a new file named MERGEDTP_C_NEW.

Figure 3.17: SPSS script for generating school-level data

```

* Encoding: UTF-8.
* Open the dataset.
GET FILE='D:\ICILS2020\Data\MERGEDTP.sav'.

* Filter for participants in both studies only and retain essential variables.
SELECT IF (PARTC = 1).
MATCH FILES /FILE=*
    /KEEP=IDSCHOOL IDCNTRY CNTRY YEAR PARTC TOTWGTC JKZONEC JKREPC IP2G11D.
EXECUTE.

* Sort cases by key identifiers to prepare for dataset restructuring.
SORT CASES BY IDSCHOOL IDCNTRY CNTRY YEAR PARTC TOTWGTC JKZONEC JKREPC.

* Create a school-level dataset by retaining the first record per school.
DATASET COPY temp. /* Save the processed dataset to a new file.
DATASET ACTIVATE temp.
MATCH FILES /FILE=* /BY IDSCHOOL IDCNTRY CNTRY YEAR PARTC TOTWGTC JKZONEC JKREPC /FIRST=
    first.
DATASET ACTIVATE main.
COMPUTE to_delete = (first = 0). /* Flag non-first records for deletion.
SELECT IF (to_delete = 0).
EXECUTE.
DELETE VARIABLES first to_delete. /* Remove temporary variables used for selection.
EXECUTE.

* Restructure data from long to wide format, separating variables by YEAR.
CASESTOVARS
    /ID=IDSCHOOL IDCNTRY CNTRY
    /INDEX=YEAR
    /GROUPBY=VARIABLE
    /SEPARATOR=_. /* Separator for wide format variable naming.
EXECUTE.

* Select cases with valid IP2G11D data for both years to ensure complete records.
SELECT IF (NOT MISSING(IP2G11D_2018) AND NOT MISSING(IP2G11D_2020)).
EXECUTE.

* Revert data to long format for analysis purposes.
VARSTOCASES
    /MAKE IP2G11D FROM IP2G11D_2018 IP2G11D_2020
    /INDEX=YEAR
    /KEEP=IDSCHOOL IDCNTRY CNTRY PARTC TOTWGTC JKZONEC JKREPC
    /NULL=DROP.
VARIABLE LABELS IP2G11D 'ICT_and_Teaching/Teachers_acquire_skills/Collaborating_with_other
    _teachers_via_ICT'.
EXECUTE.

* Correct YEAR variable to match study years.
RECODE YEAR (1 = 2018) (2 = 2020).
VARIABLE LABELS YEAR 'Year_of_responses'.
VALUE LABELS YEAR
    2018 'ICILS_2018_study'
    2020 'ICILS_Teacher_Panel_(2020)_study'.
FORMATS YEAR (F4.0).
EXECUTE.

```

Figure 3.17: SPSS script for generating school-level data (continued)

```

* Dichotomize the IP2G11D variable.
RECODE IP2G11D (1=1) (2=0) (3=0) (ELSE=COPY) INTO IP2G11D_R.
MISSING VALUES IP2G11D_R (8,9).
VARIABLE LABELS IP2G11D_R 'ICT_and_Teaching/Teachers_acquire_skills/Collaborating_with_
    other_teachers_via_ICT_(recoded)'.
VALUE LABELS IP2G11D_R
    0 'Expected_but_not_required_or_Not_expected'
    1 'Expected_and_required'
    8 'Not_administered/missing_by_design'
    9 'Presented_but_not_answered/invalid'.
FORMATS IP2G11D_R (F1.0).
EXECUTE.

* Save the processed dataset to a new file.
SAVE OUTFILE='D:\ICILS2020\Data\MERGEDTP_C_NEW.sav'.
EXECUTE.

```

The analysis followed similar steps as the procedures for teacher-level analysis. Since school questionnaire data is used, we selected ICILS (Using School Weights) as the Analysis Type (Figure 3.18).

1. Select ICILS (Using School Weights) as the Analysis Type.
2. Select Percentages and Means as the Statistic Type.
3. Select None Used as the Plausible Value Option.
4. The variable IDCNTRY is selected automatically as Grouping Variables.
5. Select an additional variable YEAR as a Grouping Variable. The variable YEAR distinguishes between data collected in 2018 and in 2020.
6. Select and move IP2G11D_R to the Analysis Variables field.
7. The generated SPSS syntax is shown in Figure 3.19 and the output can be retrieved from 'Analysis-Principal_IP2G11D_IP2G11D_R_by_YEAR_Sig.csv' (Figure 3.20).

Figure 3.18: IEA IDB Analyzer setup for school-level analysis

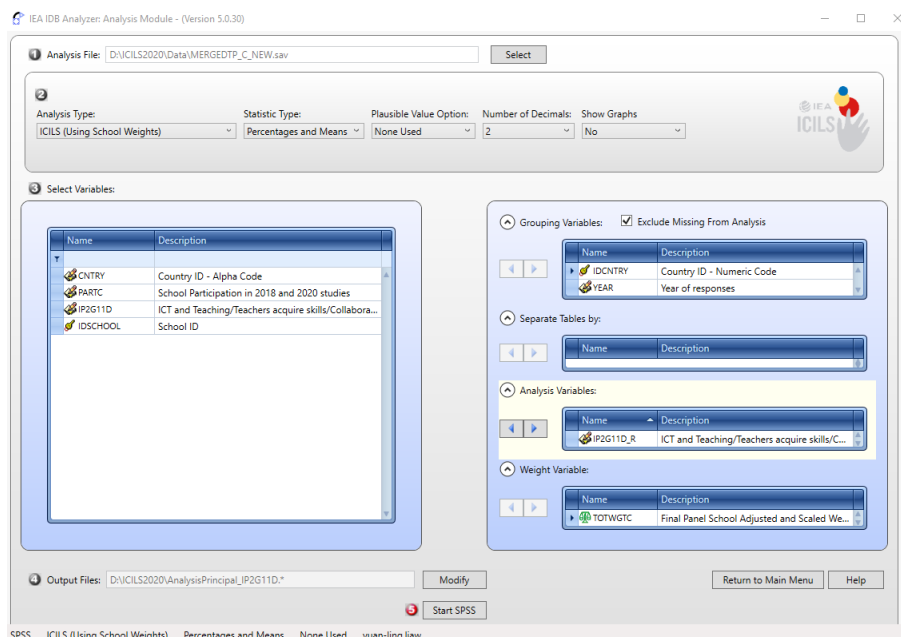


Figure 3.19: SPSS syntax editor of school-level analysis from IEA IDB Analyzer

```
* Script created using the IEA IDB Analyzer (Version 5.0.30).
* Created on 7/31/2024 at 2:48 PM.
* Press Ctrl+A followed by Ctrl+R to submit this analysis.

include file = "C:\Users\yuan-ling.liaw\AppData\Roaming\IEA\IDBAnalyzerV5\bin\Data\
Templates\SPSS_Macros\JB_Gen.ieasps".

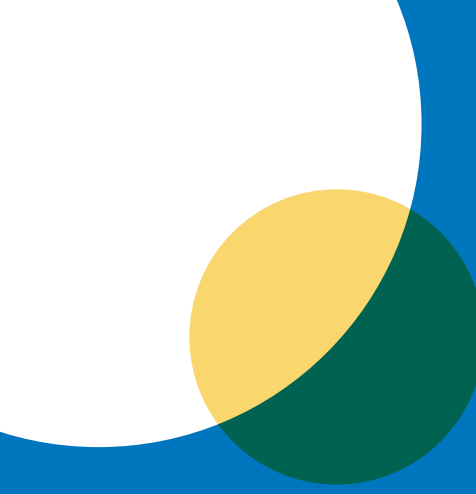
JB_gen   infile="D:\ICILS2020\Data\MERGEDTP_C_NEW.sav"/
         cvar=IDCNTRY YEAR /
         almvvars=/
         xvar=IP2G11D_R /
         wgt=TOTWGT/
         jkz=JKZONEC/
         jkr=JKREPC/
         jk2type=HALF/
         stratvar=JKZONEC/
         nrwgt=75/
         nomiss=Y/
         method=JRR/
         viewcod=N/
         ndec=2/
         clean = Y/
         strctry = N/
         intavg = Y/
         graphs=N/
         selcrit = /
         selvar = /
         outdir="D:\ICILS2020"/
         outfile="AnalysisPrincipal_IP2G11D".
```

Figure 3.20: Output for school-level analysis

	A	B	C	D	E	M	N	O	P	Q	R	S
	IDCNTRY	dvar	groupvar	refgroup	compgroup	mnx	mnx_se	cmnx	cmnx_se	mnxdiff	mnxdiff_se	mnxdiff_t
1	Denmark	IP2G11D_R	YEAR	ICILS 2018 study	ICILS Teacher Panel (2020) study	0.740462498	0.059029152	0.677813593	0.07352547	-0.062648905	0.076743786	-0.816338472
3	Finland	IP2G11D_R	YEAR	ICILS 2018 study	ICILS Teacher Panel (2020) study	0.6664039	0.041937729	0.655970057	0.036839963	-0.010433843	0.048846813	-0.21360365
11	Uruguay	IP2G11D_R	YEAR	ICILS 2018 study	ICILS Teacher Panel (2020) study	0.111982745	0.046590179	0.197362779	0.089957072	0.085380034	0.101095553	0.844514453

References

- Fraillon, J., Ainley, J., Schulz, W., Duckworth, D., & Friedman, T. (2019). *IEA International Computer and Information Literacy Study 2018 assessment framework*. Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-030-19389-8>
- Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2020a). *IEA International Computer and Information Literacy Study 2018 technical report*. Amsterdam, the Netherlands: International Association for the Evaluation of Educational Achievement (IEA).
- Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2020b). *Preparing for life in a digital world. IEA International Computer and Information Literacy Study 2018 international report*. Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-030-38781-5>
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- Mikheeva, E., & Meyer, S. (2020). *IEA International Computer and Information Literacy Study 2018 user guide for the international database*. International Association for the Evaluation of Educational Achievement.
- Strietholt, R., Fraillon, J., Liaw, Y.-L., Meinck, S., & Wild, J. (2021). *Changes in digital learning during a pandemic: Findings from the icils teacher panel*. International Association for the Evaluation of Educational Achievement.



The IEA International Computer and Information Literacy Study (ICILS) Teacher Panel is an international comparative study that investigates changes in the use of information and communication technology (ICT) in schools before and during the global pandemic. The ICILS Teacher Panel marks the first time in 40 years that IEA has conducted a panel study and collected longitudinal data. Building on ICILS as the baseline, the panel study collected longitudinal data on computers and technology use in education from school principals, ICT-coordinators, and teachers, in Denmark, Finland, and Uruguay.

The ICILS Teacher Panel explores differences among and within countries in the changes of ICT-related resourcing within schools and responses to issues such as, respondents' attitudes towards technology, the use of ICT in teaching and learning, and whether social inequality in educational opportunity increased during the COVID-19 pandemic. Schools that participated in ICILS 2018 were asked to support the collection of data from the same individual teachers that participated in ICILS 2018. In addition, the currently serving principals and ICT coordinators from those schools were invited to complete questionnaires to collect school-level information.

The international report first describes the responses to the COVID-19-related educational disruption in the participating countries at national level, followed by the analyses on changes in the use of ICT between 2018 and 2020, and changes in social inequality of educational opportunity. The report also provides a comprehensive account of the conceptual, methodological, and analytical implementation of the study. It details information on the methods and procedures including instruments and data collection, sample, computation of weights, and variance estimation. The results of the ICILS Teacher Panel will support policymakers and education systems to develop a better understanding of the effective use of information and communication technology in education to better support ICT-based remote teaching and learning.

