

# Global Teaching InSights

Technical Report

Section IV: Analysis

# **22 Teacher log characteristics**

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This chapter summarises the teacher log characteristics and score definitions. Opportunity-to-learn indicators, aggregation rules and teacher-level derived variables are also described.

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## Introduction

In order to fully understand the teaching experienced by students, Global Teaching InSights (results from the TALIS Video Study project, and is hereafter cited in this chapter as “the Study” or “GTI”) needed to assess how the focal unit on quadratic equations was enacted in each classroom from the first to the last lesson covering this topic. As the videos and teaching materials can only document four lessons, it is important to cover the full range of lessons through some other instrument. Based on experience from previous studies (Rowan, Camburn and Correnti, 2004<sup>[1]</sup>) it was decided to administer a teacher log.

Technically, the log was part of the Teacher Pre-Questionnaire. At the end of this questionnaire, the teacher was asked “to document the content you teach on quadratic equations between the Pretest and the Posttest.” The last sheet included a two-page table (for a cut-out, see Figure 22.1) with 26 rows. Teachers were instructed to cut out or copy the table, fill out one row for each lesson they would teach on quadratic equations, and return the table with their Post-Questionnaire.

In each line, teachers indicated the date and duration of the respective lesson and the strength of coverage for each of 10 subtopics, including four different mathematical methods of solving quadratic equations. Teachers were told: “The sub-topics listed in the table are neither comprehensive nor mandatory. They represent topics that have been mentioned by math education experts across countries. In all likelihood, some of the sub-topics are not taught in your country, or your <class>. For each lesson, put a 0, 1 or 2 to indicate whether each subtopic was not taught in the lesson, was taught as a minor focus or a major focus of the lesson.”

## Participation Rates, descriptives and missing data

Participation rates were between 98 and 100 % in six countries/economies. In BíoBio, Metropolitana and Valparaíso (Chile) (hereafter “B-M-V [Chile]”), 19 out of 98 teachers did not submit their teacher log, although they had valid pre- and post-questionnaire data. In Madrid (Spain), 29 out of 85 teachers did not submit their teacher log, and 12 of those did not have any valid questionnaire data. Another 21 teachers filled out just one line. This fact warrants severe concerns against opportunities to learn (OTL) data from the Madrid (Spain) sample.

**Table 22.1. Teacher participation and number of lessons documented per teacher**

	Number of teachers...		Number of lessons (= lines) per teacher				
	In the Study	With log data	Minimum	Q25	Median	Q75	Maximum
B-M-V (Chile)	98	79	2	7	10	13	25
Colombia	83	83	1	4	4	5	13
England	86	84	4	6	7	9	16
Germany*	50	50	4	9	11.5	14	19
K-S-T (Japan)	89	88	6	10	12	14	18
Madrid (Spain)	85	56	11	11	2	3	14
Mexico	103	102	1	5	7	10	14
Shanghai (China)	85	85	2	8	10	10	12

Notes: \*Germany refers to a convenience sample of volunteer schools.

K-S-T (Japan) refers to Kumagaya, Shizuoka and Toda (Japan).

Source: OECD, Global Teaching InSights Database.

Figure 22.1. Teacher log table



Please enter date and duration for each lesson on quadratic equations. In each column corresponding to a subtopic write 0, 1 or 2.

0 = this topic was not taught today

1 = this topic was a minor focus of instruction today

2 = this topic was a major focus of instruction today.

Keep this table until it is recollected with your Post-Questionnaire.

School ID: _____ Teacher ID: _____
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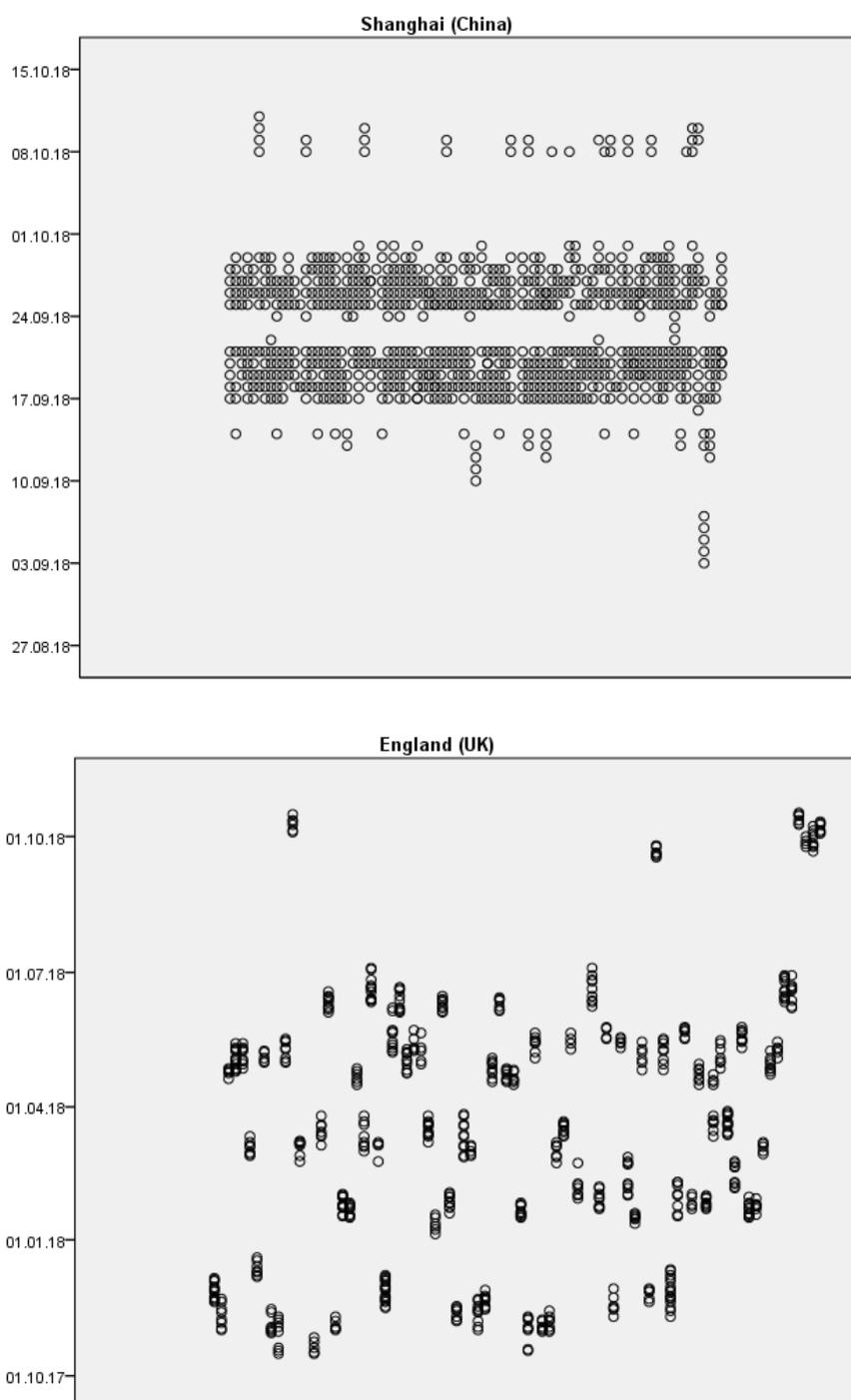
Date	Duration of this lesson (min)	Subtopics: 0 = not taught; 1 = minor focus; 2 = major focus									
		Handling algebraic expressions (working with brackets and terms)	Binomial formulae: $a^2-b^2$ or $a^2+2ab+b^2$	Introducing one form of a quadratic equation	Solving quadratic equations by ...				Discuss different cases of $ax^2+bx+c=0$ depending on values of a, b, c	Quadratic functions (definition, plotting and transforming graphs, etc.)	Real life applications
					completing the square	<factorizing>	quadratic formula $X = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$	finding roots in a graphical representation			

...

Source: OECD, Global Teaching InSights Database.

Based on the dates given, the Teacher Log allows for a documentation of when exactly the focal unit was implemented in each country/economy. Figure 22.2 shows two exemplary cases. Each “column” represents one teacher, and dots indicate individual lessons, with date visible on the vertical axis. In Shanghai (China), practically all teachers implemented the focal unit in parallel during the second half of September 2018. In England (UK), on the contrary, implementation could be scheduled anytime across the school year, from October 2017 to October 2018.

**Figure 22.2. Lesson dates provided in the teacher logs from two exemplary systems**



Source: OECD, Global Teaching InSights Database.

In total, teachers reported about 5,111 lessons (Table 22.2). There were many missing values for individual subtopics in the raw data. In almost every line (in 5,078 out of 5,111 lines), however, at least one subtopic was marked as covered (“1” or “2”). It is clear that teachers often did not indicate subtopics which were not covered in a given lesson: rather than marking the subtopic with a “0”, they often left the respective cell in the table blank.

The following rule was applied for data cleaning:

- If a subtopic rating was missing for any specific lesson, while there were valid ratings provided for any other subtopic in the same lesson, coverage was set to “0” for the missing subtopic.

Sometimes lesson duration was missing for individual lines in the teacher log, although it was specified for other lessons. The following replacement rule was applied:

- If lesson duration was missing for a line, the median of all valid lesson duration entries of the same teacher was used.

**Table 22.2. Distribution of lesson duration**

	Valid lines	Lesson duration (in minutes)					
		Mean	Median	SD	Skewness	Minimum	Maximum
B-M-V (Chile)	829	79.36	90	19.984	-0.782	40	135
Colombia	368	75.18	60	25.468	0.714	40	130
England (UK)	627	60.67	60	9.132	3.133	30	120
Germany*	566	69.29	90	22.179	-0.07	30	135
K-S-T (Japan)	1 058	49.87	50	8.831	9.178	20	150
Madrid (Spain)	136	54.15	55	3.016	0.088	50	60
Mexico	746	53.09	50	15.209	2.272	20	120
Shanghai (China)	776	40.00	40	0	.	40	40
<b>Total</b>	<b>5 106</b>	<b>59.05</b>	<b>50</b>	<b>20.06</b>	<b>1.231</b>	<b>20</b>	<b>150</b>

Notes: Statistics computed after filtering for missing and invalid data.

\*Germany refers to a convenience sample of volunteer schools.

K-S-T (Japan) refers to Kumagaya, Shizuoka and Toda (Japan).

Source: OECD, Global Teaching InSights Database.

## Opportunity-to-learn indicators

As there were 5 subtopics dealing with simple (“pure”, technical) algebra, an overarching index of the coverage of algebraic procedures in the respective lesson was computed as the maximum across the five individual variables. This index equals 2 if any algebra-related subtopic was reported as the “Major focus” of the lesson, and 0 if none of the algebra-related subtopics was covered at all. It equals 1 if any algebra-related subtopic was reported as “Minor focus”, and none as “Major focus”.

Similarly, in parallel to the opportunity-to-learn indices created from student and teacher post-questionnaires (see Chapter 18), indices for “reasoning”, “functions” and “applications” were created (see Table 22.3 for the definitions).

**Table 22.3. Definition of OTL indices on the lesson level**

Index	Meaning	Definition
Otl_functions	OTL for using quadratic functions	Maximum of t108, t106d: Quadratic functions; Finding roots in a graphical representation
Otl_reasoning	OTL for reasoning about different types of quadratic equations	= t107: Discuss different cases of $ax^2+bx+c=0$ depending on values of a, b, c
Otl_applied	OTL for applying quadratic equations to real world contexts	= t109: Real life applications
Otl_algebra	OTL for algebraic procedures	Maximum of t103, t104, t106a, t106b, t106c: Handling algebraic expressions; Binomial formulae; solving quadratic equations by completing the square/factorising/quadratic formula

Source: OECD, Global Teaching InSights Database.

### Aggregation rules and teacher-level derived variables

In order to derive class/teacher level indicators for individual subtopics, several aggregation functions (such as sum, mean, maximum, minimum; weighted by lesson duration or by strength of the focus or not at all) were tried. After some exploration, it was decided to use the weighted count of corresponding lessons as the class level indicator for each individual subtopic. In the teacher-level data set, the respective variables are identified by the subscript `_sum`. A lesson was counted with weight 1 if the subtopic was covered fully (marked as “2” in the teacher log), weight 0.5 if the subtopic had minor coverage (marked “1” in the teacher log), and weight 0 if the subtopic was not covered at all (marked “0” or left blank in the teacher log).

For OTL indices, which also take values of 0, 1, or 2 on the lesson level, the same aggregation rule was applied. Table 22.4 provides an overview of all derived variables included in the teacher-level file, and Table 22.5 provides descriptive statistics for OTL indices.

The `_sum` and OTL indices can roughly be interpreted as the number of lessons where the respective subtopic or kind of OTL is reported to be covered. It should be noted that these aggregated indices combine information on learning time (overall number of lessons in the focal unit) and content focus (coverage of a specific subtopic or type of OTL).

**Table 22.4. Derived variables included in the teacher file based on the teacher log**

Variable	Meaning
Lesson-length-total	Sum of lesson durations across all entries (in minutes)
N_Lessons	Number of entries (lines) in the teacher log
Begindate	Date of first entry in the teacher log
Enddate	Date of last entry in the teacher log
Unit_Duration	Number of days between first and last entry
<b>Weighted number of lessons covering individual subtopic</b> (lessons weighted .5 if the subtopic was a minor focus, 1 for major focus)	
TI03_sum	Handling expressions

Variable	Meaning
TI04_sum	Binomial formulas
TI05_sum	Introducing some type of quadratic equations
TI06a_sum	Solving quadratic equations by completing the square
TI06b_sum	Solving quadratic equations by factorising
TI06c_sum	Solving quadratic equations by using the quadratic formula
TI06d_sum	Solving quadratic equations by graphical representation
TI07_sum	Discussing different cases of quadratic equations
TI08_sum	Quadratic functions
TI09_sum	Applications
<b>Weighted number of lessons providing some kind of OTL</b> (lessons weighted .5 if the lesson-level OTL value was 1, and weighted 1 if the lesson-level value was 2)	
Otl_TL_functions	OTL for using quadratic functions (Teacher log)
Otl_TL_reasoning	OTL for reasoning about different types of quadratic equations (Teacher log)
Otl_TL_applied	OTL for applying quadratic equations to real world contexts (Teacher log)
Otl_TL_algebra	OTL for algebraic procedures (Teacher log)

Source: OECD, Global Teaching InSights Database.

**Table 22.5. Distribution of teacher level OTL measures**

		N Valid	Mean	Median	Std. Deviation	Skewness	Minimum	Maximum	Percentiles	
									25	75
B-M-V (Chile)	otl_TL_functions	79	3.50	3.00	2.99	0.62	0.00	12.00	0.00	5.00
	otl_TL_algebra	79	7.44	7.00	3.62	0.97	1.50	21.00	5.00	9.50
	otl_TL_reasoning	79	3.92	3.00	3.02	0.88	0.00	13.00	1.50	6.00
	otl_TL_applied	79	3.02	2.00	2.79	1.09	0.00	12.00	1.00	5.00
Colombia	otl_TL_functions	83	1.94	2.00	1.68	2.13	0.00	10.50	1.00	2.50
	otl_TL_algebra	83	3.52	3.50	1.81	3.02	1.00	13.00	2.67	4.00
	otl_TL_reasoning	83	2.29	2.00	1.54	2.33	0.00	11.00	1.50	3.00
	otl_TL_applied	83	1.42	1.00	1.52	1.58	0.00	6.50	0.00	2.00
England (UK)	otl_TL_functions	84	2.34	2.00	1.78	1.10	0.00	9.00	1.00	3.00
	otl_TL_algebra	84	6.35	6.00	1.91	0.56	1.50	12.00	5.00	7.38
	otl_TL_reasoning	84	2.10	1.75	1.81	0.87	0.00	7.00	0.50	3.00
	otl_TL_applied	84	0.85	0.50	0.93	0.98	0.00	3.50	0.00	1.50
Germany*	otl_TL_functions	50	5.22	5.29	2.62	0.10	0.00	12.00	3.38	7.08
	otl_TL_algebra	50	8.77	9.00	2.90	0.44	4.00	15.83	6.50	10.50
	otl_TL_reasoning	50	3.30	3.26	2.07	0.42	0.00	8.00	1.44	4.58
	otl_TL_applied	50	3.04	2.75	2.06	0.21	0.00	7.00	1.26	4.62
K-S-T (Japan)	otl_TL_functions	88	0.26	0.00	0.83	3.33	0.00	4.00	0.00	0.00
	otl_TL_algebra	88	8.08	8.00	2.47	0.12	3.00	15.00	6.50	9.88
	otl_TL_reasoning	88	0.91	0.50	1.11	1.32	0.00	4.00	0.00	1.00
	otl_TL_applied	88	3.61	3.50	1.69	0.36	0.50	8.50	2.00	4.50

		N Valid	Mean	Median	Std. Deviation	Skewness	Minimum	Maximum	Percentiles	
									25	75
Madrid (Spain)	otl_TL_functions	56	1.56	1.00	1.67	3.11	0.00	10.50	0.50	2.00
	otl_TL_algebra	56	2.28	2.00	1.97	3.35	0.50	13.00	1.00	3.00
	otl_TL_reasoning	56	1.25	1.00	1.85	4.36	0.00	12.50	0.13	1.50
	otl_TL_applied	56	0.82	0.25	1.16	1.96	0.00	5.50	0.00	1.00
Mexico	otl_TL_functions	102	1.91	1.00	2.58	1.94	0.00	13.00	0.00	3.00
	otl_TL_algebra	102	5.69	5.00	3.00	0.81	0.00	13.50	4.00	7.00
	otl_TL_reasoning	102	2.97	2.50	2.41	1.08	0.00	13.00	1.50	4.50
	otl_TL_applied	102	2.91	2.25	2.40	1.31	0.00	12.00	1.00	4.00
Shanghai (China)	otl_TL_functions	85	0.22	0.00	0.57	3.38	0.00	3.00	0.00	0.00
	otl_TL_algebra	85	6.71	7.00	1.60	-1.18	1.00	9.50	6.00	7.75
	otl_TL_reasoning	85	4.36	4.00	2.11	0.26	0.00	9.00	2.50	6.00
	otl_TL_applied	85	1.81	1.00	1.89	2.04	0.00	11.00	0.50	2.75

Notes: \*Germany refers to a convenience sample of volunteer schools.

K-S-T (Japan) refers to Kumagaya, Shizuoka and Toda (Japan).

Source: OECD, Global Teaching InSights Database.

## References

Rowan, B., E. Camburn and R. Correnti (2004), "Using teacher logs to measure the enacted curriculum: A study of literacy teaching in third-grade classrooms", *The Elementary School Journal*, Vol. 105/1, pp. 75-101.

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