Global Teaching InSights

A VIDEO STUDY OF TEACHING








OECD

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Foreword

Never has the importance of teachers been so clear. Many of us remember a teacher who transmitted a passion for knowledge, pushed us to develop our talents and skills, and equipped us with a compass to find our views and values. It is in the classroom that many of our hopes and dreams first took root. The Covid-19 pandemic has reiterated that the impact of teachers goes far beyond the classroom, and that teachers play a central and frontline role in our societies.

Nevertheless, we still know very little about what constitutes impactful teaching. We have only scratched the surface of what quality teaching looks like and what practices make a difference to student outcomes. By looking directly into the classroom, Global Teaching InSights has aimed to address these critical questions that lie at the heart of our future efforts to improve education.

The Study has trialled new research methods to provide a fairer and fuller account of the complexities and nuances of teaching in different classrooms. It is the first international study of teaching to draw upon a wide range of measures, including observing lessons, examining teaching materials, asking teachers and students, and measuring student outcomes, in order to build a picture of teaching that is as comprehensive as possible.

Across the eight participating countries and economies, the findings show that teachers are likely to manage the classroom well, provide students with some social-emotional support and deliver instruction of reasonable quality. There are notable differences, however, in teaching and students' learning opportunities across schools which suggests that we can still do more to support every teacher to raise the quality and equity of our education systems.

As we look for ways to support the teaching profession, this report can provide areas for professional dialogue and growth. In particular, it can inform important discussions on ways to strengthen instruction in the classroom. For example, this study finds that students have many opportunities to practice different methods and skills, but the level of cognitive challenge of the tasks could be raised to help them develop a stronger understanding of the underlying rationale behind these and how they can be applied.

The Study also shows areas where we can further empower teachers to experiment. If you step into a classroom today, you are likely to see an orderly classroom with the teacher leading it from the front. There are times when such a classroom structure can be very effective and beneficial, but there may also be times when more innovative structures are needed to help students develop important skills that the world demands of young people today, such as agency, collaboration and responsibility. Similarly, other than for communication purposes, technology remains surprisingly absent from lessons even if it has transformed almost every aspect of our modern lives.

The considerable differences observed in teaching approaches between countries, even if the Study only looked at one topic of mathematics, exemplify the considerable promise of learning from each other. After all, classrooms and schools are united by many common challenges and the expertise of the teaching profession is one of its greatest and most untapped resources. To facilitate peer learning across borders, the OECD has just launched the Global Teaching InSights initiative, which showcases the findings of the

Study through classroom videos and provides an open platform for dialogue, learning and collaboration around teaching at a global scale.

There is no better moment than now for such a global conversation. The Covid-19 pandemic has forced school closures and disrupted our long held notions of learning and education. Even more, it has shaken societies around the world to their very foundations. It has highlighted that we must strive to build societies that are strong and adaptive, who have the creativity and the cohesion to rebuild in the wake of crises. At the end, the strength of a society rests upon the quality of the skills and knowledge of its citizens, and ultimately the teachers who are at the frontline helping students to create a world that is better and fairer than before.

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The project, which was initially referred to as the Teaching and Learning International Survey (TALIS) Video Study, was steered by members of the OECD Education Policy Committee and TALIS Governing Board; and the report was prepared in close collaboration with participating countries and economies, whose feedback and review of findings is gratefully acknowledged as having enriched this volume. The project is referred to as "Global Teaching InSights (GTI)" or "the Study" throughout this report. Likewise, the guidance of the Technical Advisory Group (TAG) in ensuring the study's soundness is greatly appreciated. The authors also wish to express gratitude to other experts and organisations who provided insightful comments during critical stages of production, including Education International and Teach for All.

Annex A provides a comprehensive list of the various bodies as well as experts who have contributed their expertise over the course of this study.

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Reader's guide

The Study

The project underlying the analysis presented here, which was initially referred to as the Teaching and Learning International Survey (TALIS) Video Study, is referred to as "Global Teaching InSights (GTI)" or "the Study" throughout this report.

Data

The data referred to in this volume are presented in the chapter annexes and are available on the Study's website (http://www.oecd.org/education/school/talisvideostudy.htm), along with the full international dataset, associated codebooks and a User Guide. For further details, including additional tables and analyses, see the *Global Teaching Insights Technical Report*[1]. Likewise, a selection of classroom videos and teaching materials from the Study have been made available on the Global Teaching InSights online community platform (globalteachinginsights.org).

Country coverage

This publication features data from participating schools, teachers and students in eight countries and economies: Bíobio, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]"), Colombia, England (UK), Germany*, Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), Madrid (Spain), Mexico and Shanghai (China).

While we refer to the countries and economies throughout the report, the Study is not representative of teaching in each country or economy, and is not a cross-country/economy ranking of the quality of teaching. Therefore, there are no international averages reported.

When referring to data from B-M-V (Chile), England (UK), K-S-T (Japan), Madrid (Spain) and Shanghai (China) throughout the report, we indicate the nation in brackets, although the sample was taken specifically from these sub-economies. In Germany, participating schools came from 7 of the 16 Laender (Baden-Württemberg, Hesse, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saxony-Anhalt and Schleswig-Holstein), at the initiative of the DIPF. Throughout the report, this will be signalled by an asterisk appearing next to Germany*.

As a rule, a stratified, two-stage probability design was used to identify the sample of schools to be invited to participate in the Study in every country/economy. In schools that accepted the invitation, a sample of teachers and students were invited to participate, and once they accepted, the relevant schools, teachers and students were included in the Study. Important deviations from this rule were K-S-T (Japan) and Germany*, which are represented by selective groups of teachers only. In Germany, teachers were recruited through specific professional networks without any randomisation, which resulted in a strong

over-representation of high track schools (Gymnasium). In K-S-T (Japan), all schools in the three cities were invited and the sample includes university-affiliated schools.

In Madrid (Spain), the Teacher Log only contained information about more than one lesson for 35 out of the 85 participating classrooms. Also, students' pre-tests and pre-questionnaires cannot be reliably linked to their post-tests and post-questionnaires, thus their comparison was not feasible.

In tables, countries and economies are ranked in alphabetical order.

Reporting student, teacher and school data

Within the schools selected by the sampling plan, only teachers who taught the focal unit of quadratic equations were considered to be eligible for the Study, and only the classes in which those teachers taught the focal unit were eligible for the study. In most cases, these classes were in the equivalent of grade level 8 or 9 in ISCED level 2 schools, with an average of 26 students per class. In this report, the terms “students” and “teachers” are used as shorthand for the classes and their associated teachers that were randomly selected from the list of eligible classes and teachers. Random selection within schools did not apply in Germany*, K-S-T (Japan) and Shanghai (China).

Participation in the study was voluntary. Analyses discussed in the report include all students who actively consented to at least one data collection instrument (questionnaire, test, or video) on the roster and resolution forms provided by the countries/economies, and the corresponding schools and teachers.

Data underlying the figures

The Study results are based on student and teacher pre- and post-questionnaires, student pre- and post-tests, teacher logs, video observations, and teaching materials. Independent observers rated videos and teaching materials on the basis of a set of underlying codes designed to capture aspects of each analytic domain considered in the study. No data imputation from administrative data or other studies is conducted.

Information gathered from various sources may differ. They represent different perspectives (e.g. student, teacher, independent observer) and have their own affordances and constraints. Together they provide a more complete picture of teaching quality.

Rounding figures

Because of rounding, some figures in tables may not add up exactly to the totals. Totals, differences and averages are always calculated on the basis of exact numbers and are rounded only after calculation.

All percentages in this publication have been rounded to the nearest 1%, while all other figures have been rounded to the nearest hundredth (two decimal places).

Note that in figures such as density plots, curves may be sensitive to kernel smoothing, so readers should focus on the overall shape of these figures rather than small features that represent small numbers of classrooms.

Abbreviations used in this report

DIPF	Deutsches Institut für Internationale Pädagogische Forschung, Leibniz Institute for Research and Information in Education
IC	International Consortium
ISCED	International Standard Classification of Education
PISA	Programme for International Student Assessment
TALIS	Teaching and Learning International Survey
GTI	Global Teaching InSights

Further documentation

For further information on the Study's assessment instruments and the methods used, see the *Global Teaching Insights Technical Report*.

StatLinks

This report has StatLinks at the bottom of tables and graphs. To download the matching Excel® spreadsheet, just type the link into your Internet browser, starting with the http://dx.doi.org prefix, or click on the link from the e-book version.

Notes

[1] OECD (2020), *Global Teaching InSights: Technical Report*, OECD Publishing, Paris, http://www.oecd.org/education/school/global-teaching-insights-technical-documents.htm

Executive summary

Around the world, researchers, policy-makers, parents and children all agree that teachers matter for student outcomes. However we are only beginning to understand what makes a difference in terms of quality teaching. By directly observing teaching in the classroom, the *OECD Global Teaching InSights: A video study of teaching* looked into classroom management, social-emotional support and instructional practices in the classroom, as well as students' opportunities to learn the content specified in the curricula and how all of these aspects of teaching related to student learning and student non-cognitive outcomes.

The Study has a unique methodology. To obtain direct evidence from the classroom, about 700 teachers and 17 500 students from eight countries and economies were videotaped in two lessons from the unit of quadratic equations in secondary school Mathematics. The teaching materials were also collected, and both were coded following common and standardised protocols. Before and after the unit, teachers and students filled out questionnaires on their beliefs, practices and perspectives, and students also took tests to measure their learning gains.

The findings provide an overall picture of teaching quality observed across all participating countries/economies. Within a 1 (low) to 4 (high) observation score, teachers managed the classroom well (mean scores between 3.49 and 3.81), gave students moderate levels of social and emotional support (mean scores between 2.62 and 3.26), and provided them with reasonable instructional quality (mean scores between 1.74 and 2.24).

Classrooms were well managed and organised

Whole class instruction (frontal teaching) was observed in over 88% of lesson segments in each country/economy. Teachers often switched efficiently between speaking to the class from the front of the room to supervising students as they worked individually at their desks. However, student collaboration – whether in pairs or in small groups of three or more students – occurred in less than 22% of lesson segments across participating countries/economies.

Teachers' managed their classrooms well in this context. The average classroom had very well-organised and efficient routines in place. Teachers sometimes or frequently engaged in monitoring student behaviour. When disruptions occurred, virtually all teachers handled them quickly and effectively, and while students' focus on mathematics was interrupted momentarily, significant learning time was not lost. In questionnaires, teachers and students agreed that classrooms were very well-managed.

Students received some social-emotional support

Classrooms were respectful, with few negative interactions such as threats or degrading comments, but nine out of ten classrooms observed were not frequently warm and encouraging. Nearly all teachers surveyed believed that they provided students with support for learning and had a good relationship with

them. Most students also agreed, but teachers tended to perceive the social-emotional environment more positively than students.

One notable area for greater attention is how teachers dealt with student errors. Student mistakes provide rich learning opportunities – both for understanding the subject matter more deeply and for developing persistence. Yet, in less than half of countries/economies teachers tended to work with students to help them better understand their errors and persist with their mathematical struggle. Teachers in most participating countries/economies tended to ignore students' errors or treat them superficially, thus students had fewer opportunities to develop persistence.

The quality of instructional practices varied

The detail and depth of classroom discourse varied within and across countries/economies. Students were regularly asked to recall information and state answers, or to summarise and apply rules and procedures. Sometimes students participated in the classroom discourse by contributing detailed thinking. However, with the exception of Shanghai (China) and K-S-T (Japan), lengthier, deeper explanations were observed in less than 25% of lessons.

Teachers regularly assessed and responded to students' thinking. During lessons, teachers asked questions that elicited a moderate amount of student thinking. Feedback interactions between students and teachers were brief and focused on the accuracy of answers and procedures. Few teachers (between 2 and 18% per country/economy) provided feedback that was thorough and focused on why students' thinking was correct or incorrect.

Students had limited opportunities to connect the mathematics to real world contexts or to explore patterns in the mathematics. For example, student understanding, handling or application of quadratic equations was sometimes supported by graphs or drawings, but students rarely made connections among the different representations or aspects of the mathematics.

Students had frequent opportunities to develop mathematical fluency through repetitive practice. However, while there were exceptions, teaching materials and classroom interactions did not require students to engage frequently in cognitively demanding activities. Students seldom used multiple approaches to solve problems, articulated the rationale for mathematical procedures and processes, or used technology to enhance their conceptual understanding of the mathematics. For example, students did not use technology during the lessons observed in four out of five classrooms in all countries/economies but Germany* (56%).

The same topic was taught in very different ways

There was no common approach to teaching quadratic equations neither between nor within countries. The amount of time that should be spent on the topic according to curricula and textbooks varied from 6 to more than 15 lessons, pointing to differences in teaching and learning expectations between countries. The actual time spent on the topic as reported by teachers was generally lower than the intended one and varied considerably across classrooms.

There were also differences in the mathematical methods students learned. Most students used graphical representations in addition to the algebraic formulae and procedures to solve quadratic equations, except for students in K-S-T (Japan) and Shanghai (China). There were also differences in when specific methods were introduced, e.g., at the beginning of the unit or as an application in the end of the unit.

Teaching made a difference to students' mathematics-related interest, self-efficacy and achievement

Social-emotional support and classroom management were significant predictors of student personal interest and self-efficacy towards mathematics in half of the countries/economies, even after accounting for students' pre-unit scores and other background characteristics. The quality of instruction was associated with student achievement in five countries/economies, but this relationship was only significant in one country when accounting for students' background and prior achievement.

Moving forward to improve education across the world

Supporting every teacher to improve their practice is important for raising students' cognitive and non-cognitive outcomes, and approaches targeted to the largely varying needs of teachers might be more effective in doing so. The Study reveals that there is a world of difference in how just one topic is taught, and highlights how much researchers, policy-makers, teachers and educators alike stand to gain from looking outwards in efforts to further understand teaching and learning.

1 The rationale of the Study

V. Darleen Opfer

This chapter outlines why taking steps to better understand teaching and learning is critical to strengthening education policy and practice. It presents the rationale for the present Study and how it relates to existing research in education. The chapter also discusses the unique features of the Study and why they can help build a deeper understanding of teaching across multiple countries and economies.

Teaching quality is the most important school level variable in determining the success of an education system (OECD, 2005[1]; OECD, 2019[2]). Over many decades, a rich body of evidence has developed showing the significant and unparalleled influence that teachers have on students in schools (Darling-Hammond, 1999[3]; Day et al., 2006[4]; Hattie, 2008[5]; Hanushek, 2011[6]). Understanding the relationship between teaching and learning can provide insights to help raise student outcomes and to promote high quality, impactful teaching practices that ensure every child has the learning tools needed to succeed in school and life.

Deepening our understanding of what drives student outcomes

Empirical research has long tried to understand how to improve student outcomes. The relationship between student learning and a host of school and home variables has been investigated, with debate centred for many decades on disentangling the effect that schools play in student achievement compared to students' home environment and interaction with their peers (Coleman, 1966[7]; Good, Wiley and Florez, 2009[8]; Hanushek, 1972[9]; Muijs et al., 2014[10]; Murnane, 1975[11]; Reynolds et al., 2014[12]; Summers and Wolfe, 1977[13]). It has taken time for the central role of teachers to emerge (Good, Wiley and Florez, 2009[8]; Hanushek and Rivkin, 2010[14]; Rivkin, Hanushek and Kain, 2005[15]) and to shift the focus to the malleable characteristics of successful teaching practices.

A particularly important contribution to the debate has been the examination of teachers' impacts on students' test scores through so-called "value-added models" (Hanushek, 1972[9]; Rockoff, 2004[16]; Rivkin, Hanushek and Kain, 2005[15]; Kane and Staiger, 2012[17]; Kane and Staiger, 2008[18]). These models use statistical methods to measure changes over time in student achievement in standardised assessments, taking into consideration student characteristics and other variables that could influence student outcomes.

Value-added models have provided strong evidence that substantial variations in student outcomes are partly due to differences in teaching quality, with some teachers, so-called "high-quality teachers", contributing substantially more to student achievement than others (Chetty, Friedman and Rockoff, 2014[19]; Hanushek, 1992[20]; Rockoff, 2004[16]). For example, they have found that a high-quality teacher may yield as much as 1.5 years of gain in student achievement in a single academic year compared to those with lower quality teaching (Hanushek, 1992[20]; Hanushek and Rivkin, 2010[14]).

However, these models also have limitations. One limitation is that they do not fully or sufficiently capture the impact teachers have on students. Researchers have suggested that looking at teachers' effects using only test scores may be too narrow and that the full contribution of teachers to students may be partly missed (Chamberlain, 2013[21]; Jackson, 2018[22]). For example, more recent research has considered how teaching is associated with students' acquisition of valuable non-cognitive outcomes such as social social-emotional competencies (Jackson, 2018[22]).

A further and even more important limitation is that value-added models do not explain the processes by which value was added (Goe and Stickler, 2008[23]). They indicate which teachers yielded higher-than-predicted increases in student achievement scores, but do not provide the education community with information on what to improve (Fenstermacher and Richardson, 2005[24]; Pianta and Hamre, 2009[25]). Finally, both educational researchers and statisticians continue to urge caution about the use of such measures given the ongoing precision and validity concerns.

Moreover, research has not been able to identify a single, clear and conclusive profile for a high-quality teacher. Teacher's observable characteristics – education, experience and certification - have not proven strong predictors of student outcomes. Rivkin et al. (2005[15]), for example, find strong evidence that characteristics such as a master's degree seem to have no relationship with student outcomes. Even though experience has been widely shown to be important, studies also consistently find that the returns from additional years of experience reduce significantly after the first few years of teaching (Boonen

et al., 2014[26]; Chetty, Friedman and Rockoff, 2014[19]; Clotfelter, Ladd and Vigdor, 2007[27]; Hanushek, 2011[6]; Rivkin, Hanushek and Kain, 2005[15]). Teacher certification is associated with higher student achievement (Carr, 2006[28]; Darling-Hammond and Bransford, 2005[29]), yet the relationship between the level of qualification and teaching is not simply cumulative. Also, these limitations are compounded with the fact that transforming teachers' attributes and characteristics remains, at best, difficult and costly.

Identifying what works in the classroom

Students enter education with a host of background characteristics that will shape their learning trajectory, but when they leave, some students will have higher learning outcomes than others because their schools, teachers and classroom experience have enhanced these learning trajectories in different ways (Chetty, Friedman and Rockoff, 2014[19]; Rivkin, Hanushek and Kain, 2005[15]). While earlier research failed to identify teacher attributes and characteristics which sufficiently explain this effect, an increasing body of research is looking into what occurs in the classroom, thus shifting the research question from *why* a particular teacher is a high-quality one to *how* teachers interact with students in high-quality classrooms.

The complex and context-based nature of teaching makes the understanding of what works in the classroom challenging. Teaching is dynamic and complex. A teacher must make a host of rapid decisions in the classroom, analysing and evaluating each specific learning episode and connecting their interpretation with their technical knowledge of how learning unfolds (OECD, 2019[30]). Teaching is never a linear process; instead, many teaching practices typically occur simultaneously, each of which is hard to disentangle and isolate individually (Leinhardt and Greeno, 1986[31]; Pollard, 2010[32]; Reynolds, 1999[33]).

The intrinsic complexity of teaching is further compounded by the context in which it takes place. Teaching is situated in a specific temporal, social and cultural context. In the classroom, the process of instruction can vary tremendously from day to day (Rowan and Correnti, 2009[34]; Schweig, Kaufman and Opfer, 2020[35]) and the quality of student-teacher interactions can vary within groups of students, from student to student (Reinholz and Shah, 2018[36]; Schweig, 2016[37]). Teachers need to accommodate the diversity of the class in terms of student learning pace, prior achievement and socio-economic background, among other factors. Similarly, their teaching choices need to align with a range of system-level factors such as curriculum content, instructional goals and pedagogical models (Guerriero, 2017[38]; Shulman, 1987[39]).

Efforts thus far to explain teaching have often rested upon indirect measures of teaching, such as questionnaires where teachers and students report on the presence or frequency of different teaching practices (Goldhaber, Gratz and Theobald, 2017[40]; Hill, Kapitula and Umland, 2011[41]). These have a distinct practical value in terms of implementation and cost-effectiveness. For example, large-scale surveys such as the Programme for International Student Assessment (PISA) or the OECD's Teaching and Learning International Survey (TALIS) have allowed policymakers and researchers to develop a reasonable sense of what teaching practices are typically deployed in different classrooms (OECD, 2019[42]; OECD, 2019[2]).

A growing consensus on what constitutes 'quality' or 'effective' teaching has steadily emerged over the years (Ball and Forzani, 2011[43]; Kyriakides and Creemers, 2008[44]; Good and Lavigne, 2017[45]; Good, Wiley and Florez, 2009[8]). For instance, researchers have shown using large-scale international assessments of student achievement and teacher reports of classroom practice that there is a positive relationship, in several countries between an orderly environment and student achievement, the clarity of instruction, formative assessment and other teaching practices (Le Donné, Fraser and Bousquet, 2016[46]; Martin, 2013[47]; Kyriakides and Creemers, 2008[44]; Wang and Degol, 2016[48]). Similarly, meta-analyses have attempted to identify patterns in terms of what teaching practices may be consistently impactful and thus worth increasing in terms of frequency and quality (Hattie, 2008[5]).

Another line of inquiry to understand teaching has been analysing the frequency and quality of learning experiences that are presented to students in the classroom. Learning takes place through interactions between teachers and students, but also when there is interaction between students and the learning content. Often referred to as students' opportunity to learn , studies have highlighted such opportunities as having large impacts on student achievement, both within and between countries (Cogan and Schmidt, 2015[49]; Kurz, 2011[50]; OECD, 2010[51]; Schmidt, Cogan and Houang, 2011[52]; Schmidt, Zoido and Cogan, 2014[53]). Furthermore, following measures developed in PISA, the presentation of content in the classroom has also been a valuable lens for examining equity in education (OECD, 2010[51]). Researchers have shown that unequal opportunities to learn subject matter may exacerbate achievement gaps between students, for instance (Kuger, 2016[54]; Patall, Cooper and Allen, 2010[55]; OECD, 2010[51]).

Nevertheless, indirect classroom measures can only go so far towards building a deep understanding of teaching and learning. Researchers' efforts to generalise them conclusively across a range of educational contexts and settings have continued to encounter challenges, such as the lack of a shared technical language, the difficulty of finding an appropriate and consistent grain size when articulating practices, and questions over the contextual specificity of particular practices.

Additionally, indirect measures do not yield a complete picture of classroom teaching. Using teachers' self-reports to measure teaching can be challenging because frequently these reports reflect responses that teachers consider socially desirable (Little, Goe and Bell, 2009[56]; Van de Vijver and He, 2014[57]; OECD, 2018[58]). It is also not possible to guarantee how teaching practices will be interpreted in questionnaires between different teachers and students, particularly when working across cultures or contexts (Braeken and Blömeke, 2016[59]; Fischer, Praetorius and Klieme, 2019[60]; Scherer, Nilsen and Jansen, 2016[61]). Vieluf et al. (2012[62]), for example, have found that questionnaire scales were non-equivalent across some countries and settings. Goe and Stickler (2008[23]) also note that there may be variation in how some teaching practices are defined as a measure on paper, how teachers interpret them conceptually and how they are actually operationalised in classrooms. More generally, teachers find it difficult to talk about pedagogies, methods and practices (Mesiti and Clarke, 2017[63]; Pollard, 2010[32]). Teaching is a complex act that requires both conscious and unconscious actions and thus offering a detailed and accurate account of the processes of teaching is not straightforward (OECD, 2019[2]).

Looking directly into how teaching and learning unfolds

Exploring direct measures of teaching has a lot of potential for building a more detailed understanding of teaching and learning. Researchers have drawn upon classroom observation as a measurement tool for decades, with a particular focus on specific teacher behaviours (Brophy, 1986[64]; Brophy and Good, 1986[65]; Cochran-Smith and Lytle, 1990[66]) and qualitative analysis of interactions (Gudmundsdottir, 1991[67]).

A particularly strong interest in recent years in the potential of observation to support teacher evaluations (Darling-Hammond et al., 2012[68]; Isoré, 2009[69]) and to facilitate deeper professional learning (Allen et al., 2011[70]; Archer et al., 2016[71]; Blazar, 2015[72]; Downer et al., 2012[73]; Guerriero, 2017[38]; OECD, 2019[30]) has led to a significant growth in research studies and the codification of new observational methodologies (Pianta and Hamre, 2009[25]; Taut and Rakoczy, 2016[74]).

Researchers have developed different frameworks that facilitate the observation of teaching and evaluation of its quality (Danielson, 2007[75]; Pianta and Hamre, 2009[25]; Praetorius et al., 2018[76]; Taut et al., 2016[77]). Empirical studies have taken these frameworks and investigated their effectiveness, with a reasonable consensus emerging that three broad dimensions covering classroom management, social-emotional support, and processes for engaging and supporting learners can be helpful lenses for understanding the quality of classroom teaching (Klieme, Pauli and Reusser, 2009[78]; Lipowsky et al., 2009[79]; Pianta and Hamre, 2009[80]; Tschannen-Moran and Woolfolk Hoy, 2001[81]).

One area of particular interest for researchers has been trying to develop standardised classroom observation protocols that can yield a more accurate and complete picture of teaching whilst avoiding other sources of variance. Driven by the widespread interest in observational measures for policy decisions, the validity, reliability and generalisability of different frameworks of teaching quality has been subject to much debate (Pianta and Hamre, 2009[80]). Whilst it is challenging to isolate the quality of teaching from other sources of variation, such as the observer, researchers have identified strategies that can help to ascertain reliable measurements of teaching quality (Taut and Rakoczy, 2016[74]). In particular, the Measures of Effective Teaching (MET) project demonstrated that it was possible to use a combination of measures to identify more effective teaching (Kane et al., 2013[82]).

Researchers have drawn particular attention to the benefits of observation by video. Video recordings are detailed in what they capture but also flexible in terms of analysis, facilitating multiple viewings or slow-motion analysis, for instance (Fischer and Neumann, 2012[83]; Hiebert et al., 2003[84]; Janik and Seidel, 2009[85]; Tschida, 2017[86]). At the national level, several video studies have been conducted in different forms. A research study in Chile using lessons teachers had submitted for their teacher evaluations showed moderate effect sizes for correlations between observed variables and growth of student outcomes (Taut and Sun, 2014[87]). Norway implemented a video study linked to PISA, analysing lessons in reading, mathematics and science (Klette, 2009[88]), whilst several video studies have been implemented in Germany, including studies with a focus on specific units of content in mathematics and science (Klieme, Pauli and Reusser, 2009[89]; Seidel, Prenzel and Kobarg, 2005[90]). In the United States, video-based research has gained increasing attention as well, as exemplified by the aforementioned Measures of Effective Teaching (MET) project, which worked with over 3 000 teachers (Kane et al., 2013[82]; Bill & Melinda Gates Foundation, 2010[91]).

Nevertheless, looking directly into classrooms remains generally complex, costly and intrusive. Research methods to refine observation systems and to isolate teacher variation from other sources are hindered by how difficult it is to gain access to the classroom. While there is variation between countries, there is not an international culture of observation in education. Even with the advent of new technologies, filming the classroom remains costly and logistically challenging. Further, researchers must be sensitive to working with children as well as concerns around data protection. The classroom space remains primarily unseen and thus unknown on an international scale.

Teaching materials (e.g. lesson plans, in-class assignments and student homework assignments) can provide a window into classroom practice without being as intrusive and labour-intensive as observation. There has been promising recent research on the possibilities of making reliable judgments about instructional quality in several subjects based on these materials (Borko, Stecher and Kuffner, 2007[92]; Martínez, Borko and Stecher, 2012[93]; Matsumura et al., 2002[94]; Matsumura et al., 2006[95]; Stein and Lane, 1996[96]).

Looking into the complexity of classroom teaching at a global scale

If measuring something as complex and context-based as teaching is challenging, doing so through direct classroom measures at an international scale is even harder. There is evidence that a great deal of variation in teaching is likely to exist across countries (Hanushek, 2011[97]; Rozman and Klieme, 2017[98]; OECD, 2014[99]; OECD, 2016[100]; OECD, 2019[2]). For instance, there is considerable variation in the way formative assessment is implemented in mathematics classrooms and how it relates to teacher-directed and student-oriented instruction (Fischer, He. and Klieme, 2020[101]).

The most extensive effort to understand international variation in teaching through direct measures has been the Trends in International Mathematics and Science Video Study (TIMSS). The initial TIMSS Video Study, conducted in 1995, was the first time teaching was investigated and compared across countries using video technology (Stigler et al., 1999[102]). The second study in 1999 built on the first,

expanding to seven countries and working with randomly selected and nationally representative classrooms (Hiebert et al., 2003[84]).

The direct measures of classroom practice in the first and second TIMSS Video Studies gave researchers a unique window into the classroom. They allowed researchers to observe commonalities across different classrooms, such as the instructional organisation of the classroom for seatwork or discussions, as well as differences in terms of how time was allocated to new content or to reviewing content (Roth et al., 2006[103]). In turn, the TIMSS studies stimulated a rich body of research exploring patterns of teaching at a national and international level (Givvin et al., 2005[104]). Researchers have also debated different mechanisms that may exist behind patterns, such as national cultures that produce "scripts" (Stigler and Hiebert, 2000[105]) which were questioned in later studies or global dynamics that cut across countries and promote a degree of uniformity in teaching (LeTendre et al., 2001[106]).

Video methodology has also received some continued interest at an international level (Praetorius et al., 2019[107]). For instance, the Learner Perspectives Study (LPS), combined video recordings with extensive interviews of teachers and students and pointed to considerable cross-country differences in mathematics teaching practices (Clarke, Emanuelsson and Jablonka, 2006[108]). The LPS also explored teaching practices, many of which are also considered in the present Study, with more depth than the TIMSS Video Study or other video studies. However, the LPS looked at a very small, select sample of mathematics classrooms and is thus unable to provide the valuable comparative breadth that TIMSS offered. Indeed, most studies that have drawn upon video measures tend to have the limitation of being either confined to one country or small in scale (Table 1.1).

How classroom teaching around the world varies remains largely unexplored. Looking outwards can, therefore, allow education systems to consider themselves in the light of classrooms elsewhere, showing what is possible and fostering a better understanding of how different teachers address similar problems. Most importantly, by providing an opportunity for policy makers and practitioners to look beyond classroom practices that are evident, and thus reflect on some of the paradigms and beliefs underlying them, they hold out the promise of facilitating educational improvement.

The Study

The *OECD Global Teaching InSights: A video study of teaching* report (hereafter referred to as "the Study" or "GTI") aims to move the education community towards a more detailed and robust understanding of teaching and learning. The Study's overarching goal and rationale is to trial new methodologies to deepen understanding of teaching and learning at an international scale. Concretely, the Study is designed to:

- understand which aspects of teaching are related to student learning and student non-cognitive outcomes
- observe and document how the teachers from participating countries and economies teach
- explore how various teaching practices are inter-related, and how contextual aspects of teaching are related to the student and teacher characteristics.

The Study covers eight countries and economies and involves around 700 teachers and 17 500 students from across these participating systems. The Study offers a window into the classrooms of Biobío, Metropolitana and Valparaíso (Chile), Colombia, England (United Kingdom), Germany*[1], Kumagaya, Shizuoka and Toda (Japan), Madrid (Spain), Mexico and Shanghai (China). These eight countries/economies feature a rich variety of classroom settings, pedagogical traditions, system-level policies and student achievement levels that contribute to the Study helping to build a deeper understanding of teaching at a global level.

This innovative OECD study is a significant international effort. It involves national experts in each participating system from different fields, including pedagogy, mathematics, survey methods and video observation. Moreover, an international consortium of research organisations has implemented the Study, led by the RAND Corporation, and including Educational Testing Services (ETS) and the Leibniz Institute for Research and Information in Education (DIPF). A Technical Advisory Group of 16 leading international experts in the measurement of teaching has also supported the work throughout its four-year span.

The Study serves as a unique opportunity for policymakers, researchers and teachers themselves to understand teaching within different countries, and compare patterns between them. It is able to describe classroom teaching in considerable detail across a range of settings thanks to its design and methodology, providing a rich learning opportunity for the education community at scale.

Through its detailed and multi-faceted analysis of teaching across these participating countries and economies, the Study is able to identify both common and differing patterns in teaching and learning. It offers a point of comparison for the findings from international surveys such as TALIS and PISA. The Study's findings can stimulate an increasingly nuanced discussion around teaching practices and student outcomes among educators, policymakers, researchers and the general public.

The Study is not a global assessment of teachers or a ranking of countries' teaching quality. Nor is it a comprehensive study of the "state of teaching". Rather, the Study is focused on capturing, through new research methods, the richness, the complexity and the variety of teaching around the world to better understand teaching and learning. Its design and application of new ways of measuring teaching and learning will allow the Study to make a valuable contribution to research across multiple contexts at scale.

Breaking new methodological ground to build a deeper understanding of teaching

Opening up the "black box" of teaching, demands innovative and pioneering methods to navigate its innate complexity. The Study therefore builds on the important work of previous video studies and, as illustrated in Table 1.1, at the same time also breaks new ground in its methodology.

A particularly important element of the Study is a pre/post design aimed to measure the impact of the teaching practices observed on student outcomes. International studies of teaching and learning such as the TIMSS Video Studies and the LPS were unable to connect teaching practices to student learning as they did not measure student outcomes (Table 1.1). Before and after the focal content is taught, the Study captures student outcome measures - including non-cognitive outcomes, such as students' self-efficacy and interest in mathematics - and surveys both teachers and students on their contexts and perceptions.

The Study's use of a focal content is also significant. A limitation of the TIMSS Video Studies was that teachers were free to follow any goal and curricula, meaning that content varied greatly and thus comprehending differences in teaching methods was far harder (Table 1.1). The Study focuses on a single common secondary mathematics topic (quadratic equations) to enhance the comparability across countries and its potential to capture the relationship between teaching and learning.

Notably, the Study also draws on multiple measures of teaching, such as the collection and scoring of classroom teaching materials as well as videos, to help yield a more rounded, detailed picture of teaching. In particular, common observation codes and common teaching material codes are used across participating countries/economies. Each participating country/economy was responsible for training raters through a train-the-trainer model and scoring videos and materials. In doing so, the Study showed that an observational study can be implemented at a truly international scale.

Chapter 2 provides further details on the design and methodological features of the Study. Overall, it contributes to the research community's understanding of how to use multiple measures at an international level. It investigates the feasibility of various procedures for capturing teaching practices, such as video and teaching material-based observations, across a diverse range of countries and economies. In addition, the Study can provide important perspectives on the validity of self-reported data because it collects both survey and video data, offering a rich opportunity for triangulation.

Table 1.1. Key features of international video studies in education

Study name	Countries involved	Pre/Post design	Number of lesson videos	Number of teachers per country	Common evaluation method	Common topic	Teaching materials	Student Questionnaires	Teacher Questionnaires	Teacher Log
GTI	8	X	2	85	X	X	X	X	X	X
TIMSS 1997	3		1	70-100	X				X	
TIMSS 1999	7		1	70-100	X				X	
IPN Study	1	X	2	50	X	X		X	X	
CPV Study	1		2	25 - 40	X					
Pythagoras	2	X	3	20	X	X		X		
LPS	14		10	3			X			
PISA + Study	1		6 9	6	X		X			
GestePro	1		6	7						
Tiberghien										
OuIP	3	X	3	30 50	X			X	X	
STAAR	1		Lessons throughout year	8	X		X			
MET	1	X	4	3 300	X			X		

Note: GTI (Global Teaching InSights) refers to this Study.
Source: OECD, Global Teaching InSights Database.

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Notes

[1] Germany* refers to a convenience sample of volunteer schools.

2 Understanding and measuring mathematics teaching practice

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The Study has unique aspects that differentiate it from other international studies of teaching. This chapter describes the aspects of teaching that were measured in the Study, how the samples of teachers and classrooms were obtained in each country or economy, and how the Study was fielded. The chapter concludes with a discussion of the limitations of the Study that should be taken into account when considering the Study's results and implications.

As described in Chapter 1, understanding teaching quality is a complex undertaking. Teaching is heavily influenced by context due to differences in curriculum content, school, student background, preferences for pedagogical methods and instructional goals. Previous single-method, large-scale international studies have been limited in their ability to understand teaching and how it varies within and between countries and economies. In particular, it has been difficult to understand how these variations are related to differences in student outcomes.

Researchers have long recognised the potential of video observation, especially when paired with other measures, to deepen understanding of what teaching looks like and how the practices and interactions being used are associated with student outcomes. The Study uses video observation, along with multiple other measures, to provide policymakers and practitioners with information about the practices employed in their countries and economies. It uses unique methods that build on previous video and large-scale studies.

The remaining sections of this chapter describe the methods used to understand teaching in participating countries/economies. An explanation of how the samples of teachers and classrooms were obtained and a description of how the Study was fielded are then also provided. The chapter concludes with a discussion of the limitations of the Study that should be taken into account when considering the implications of results.

The unique methodology of the Study

The Study has unique aspects that set it apart from other international studies of teaching. As set out in Chapter 1, these design features enhance its potential to make a significant contribution to the field. Notable methodological features include:

- *Common Measurement Tools*: The Study developed and fielded common sets of measures for analysing video-recorded teaching practices and classroom teaching materials. Unlike many studies of teaching and learning, the protocols developed for the Study draw on multiple perspectives from participating countries and available research literature regarding which constructs are worth measuring and what quality looks like on those constructs.
- *Common Focal Topic*: The Study focused on the teaching and learning of a single common secondary mathematics topic across all countries and economies. The targeted focus on a common topic supports the understanding of classroom teaching and learning practices across countries/economies by removing differences resulting from variations in the content matter. For example, if the Study did not narrow to a focal topic and two countries had different relationships between questioning practices and students' interest in mathematics, it would be impossible to rule out the hypothesis that different subject matter (not questioning) shaped students' different levels of interest. After mapping mathematics curricula, quadratic equations was chosen as the focal topic because it is taught in all the participating countries/economies at a similar age, grade, level, has a well-defined starting point that introduces a core mathematical concept and allows for rich mathematical activities (e.g. application, modelling and transfer), for deep mathematical thinking (e.g. argumentation, proof) and for working with different representations (see the *Global Teaching InSights Technical Report*, hereafter referred to as the Technical Report).
- *Pre/Post Design*: The Study captured student outcome measures before and after students' learning of the focal content, which allowed analyses to control for students' prior knowledge and dispositions.
- *Standardised Procedures*: The Study used standardised and replicable procedures for data collection, training and certifying video observers and teaching materials raters, and for coding videos and teaching materials in every country/economy. These standard procedures are important because, in studies without such standardisation, it can be challenging to determine whether differences across countries are real or merely the result of variation in implementation.

The data collected

The aim was to recruit 85 teachers and their students in each participating country or economy. This number was determined through power analyses informed by existing research to be able to detect a relationship between teaching practices and student outcomes. All data related to that teacher and his or her teaching were collected from one class or section of students. The following are the types of data that were collected:

- *Video-Recorded Lessons*: Two lessons focused on quadratic equations were video-recorded for each teacher. Following data collection, these video-recorded lessons were scored using the Study's observation codes (see below) by two observers. Video-recorded lessons were scored by observers in the same country/economy as the teacher.
- *Teaching materials*: Classroom artefacts or instructional materials (hereafter referred to as teaching materials) from the unit on quadratic equations were collected from each lesson that was video-recorded as well as the next day's lesson on quadratic equations. The teaching materials collected included lesson plans, visual aids, handouts, textbook pages and student assignments from each of these lessons, as well as the subsequent local examination that included quadratic equations. The teaching materials collected for a lesson were considered a set. Each set was coded by two raters.
- *Student Achievement Pre- and Post-Test*: Achievement tests were constructed using items submitted by countries and economies. Using these items, common tests were developed and administered in all participating countries/economies. Detailed information on test construction and item function can be found in the Technical Report. The tests were administered to all students in the selected class or section for each participating teacher. The pre-test was to be conducted within two weeks before the start of the quadratic equation unit. The post-test was to be conducted within two weeks of the conclusion of the quadratic equation unit. The pre-test covered general mathematical topics and the post-test was specific to the domain of quadratic equations to provide a more precise estimate of the knowledge and understanding of the subject.
- *Student Pre- and Post-Questionnaire*: Students in the targeted classroom or section completed two questionnaires: one before the quadratic equation unit and one after. These questionnaires covered information on student background, lesson context, teaching and learning processes, and student dispositions (sometimes labelled non-cognitive outcomes of student learning). Measures included, family wealth, learning time both within and out of school, students' perception of and participation in classroom activities, and their self-efficacy beliefs related to mathematics. The questionnaires were developed, primarily, using items from TALIS and PISA and with input from participating countries and economies. Detailed information about questionnaire development is available in the Technical Report.
- *Teacher Pre- and Post-Questionnaire*: The teacher questionnaires covered teacher background and education, teachers' beliefs, teachers' motivation, teachers' perception of the school environment, the selected class, the selected unit, including lesson goals, teaching practices used, and teachers' judgment of the effectiveness of the unit and if the video-recorded lessons were representative of typical instruction. Items for the teacher questionnaires were primarily drawn from TALIS with input from the Technical Advisory Group and countries/economies. Information about the development of the teacher questionnaires can be found in the Technical Report.
- *Teaching Log:* Attached to the teacher's pre-questionnaire was a teaching log. Teachers were instructed to keep the log and complete it each time they taught quadratic equations throughout the unit. The teaching log was used to document the number and length of lessons in the quadratic equation unit, and the mathematics content covered during each lesson in the unit.

The conceptualisation of teaching

In preparation for the development of the Study measurement instruments, a conceptualisation of quality mathematics teaching was developed, resulting from the integration of three bodies of knowledge: country and economy conceptualisations, TALIS and PISA frameworks, and a review of international literature on teaching. At a broad level, these multiple views of quality teaching were similar; however, at the detailed level, they regularly emphasised different practices and defined those practices somewhat differently. In general, these differences were resolved through iterative discussions with participating countries/economies and technical experts until a set of six domains that captured teaching in ways that aligned with all three bodies of knowledge was agreed upon.

Findings presented in this report are organised by three broad analytic domains of teaching: classroom management, social-emotional support and instruction. Instruction is comprised of four subdomains: discourse, quality of subject matter, student cognitive engagement, and assessment of and responses to student understanding (see the Technical Report for additional details about the creation of the analytic domains). While survey items, mostly adapted from PISA and TALIS, could be used to measure aspects of each domain in the student and teacher questionnaires, new coding rubrics needed to be developed and implemented for observations and teaching materials.

Observation codes

Each analytic domain is further operationalised in the observation codes into components and indicators depending on whether and how the valued teaching practices could be seen and evaluated by an observer (Table 2.1). The codes captured behaviours that were observable during lessons and about which observers could make inferences without significant additional information from other sources (e.g. an interview with the teacher or the entire quadratic equations unit plan). The domains, indicators and components are described in greater detail in the Technical Report.

Table 2.1. Study domains, components and indicators

Study domains	Subdomains	Components	Indicators
Classroom management		Routines	Time on task
		Monitoring	Activity structure and frequency
		Disruptions	Time of lesson
Social-emotional support		Respect	Persistence
		Encouragement and warmth	Requests for public sharing
Instruction	Discourse	Nature of discourse	Discussion opportunities
		Questioning	
		Explanations	
	Quality of subject matter	Explicit connections	Explicit learning goals
		Explicit patterns and generalisations	Accuracy
			Real-world connections
			Connecting mathematical topics
			Mathematical summary
			Types of representation
			Organisation of procedural instruction
	Student cognitive engagement	Engagement in cognitively demanding subject matter	Metacognition
		Multiple approaches to/perspectives on reasoning	Repetitive use opportunities

Study domains	Subdomains	Components	Indicators
		Understanding of subject matter procedures and processes	Technology for understanding Classroom technology Student technology Software use for learning
	Assessment of and responses to student understanding	Eliciting student thinking Teacher feedback Aligning instruction to present student thinking	

Source: OECD, Global Teaching InSights Database.

Teaching material codes

Unlike the video observations of classroom lessons, which offer insight into all six domains, classroom teaching materials offer a more limited profile of teaching. A pilot sample of nearly 1 000 teaching materials provided by the participating countries/economies was reviewed to determine which of the domains could potentially be measured in teaching materials. The review yielded information about the qualities and characteristics of the teaching materials likely to be available during the Main Study. The review also reinforced the general conception that teaching materials, which are static, are not well suited to providing information about real-time interactions among teachers and students during a lesson. As a consequence of the review, teaching material rating was narrowed to a subset of four domains of teaching. The logic of this decision is summarised in Table 2.2.

Table 2.2. Domains of teaching rated in teaching materials

Domain	Rated	Explanation
Classroom management	No	Management plans were extremely rare in all countries/economies. Other planning documents, assignments and worksheets reveal little about whether enacted classroom routines were efficient or optimised student opportunities to learn.
Social-emotional support	No	Teaching materials do not yield information about student-teacher interactions as they unfold in classroom settings, about whether teachers and students communicate respectfully, or warmly, and whether teachers communicate caring, support and encouragement.
Quality of subject matter	Yes	Teaching materials provide evidence that planned activities had clearly stated learning objectives and that materials were free of mathematical errors.
Discourse	Yes	Questions or tasks that appear in teaching materials provide evidence of planned opportunities for students to explain why mathematical procedures work, why expressions are equivalent, why mathematical relationships are true, or why quantitative reasoning is justified or valid.
Student cognitive engagement	Yes	Questions or tasks that appear in teaching materials provide evidence of planned opportunities for students to use multiple approaches to solve problems, develop fluency with procedures, or explore mathematical concepts and relationships using technology.
Assessment of and responses to student understanding	Yes	Teaching materials provide evidence of planned opportunities for students to assess their own understanding of the content that was studied or to reflect on their own learning of the content.

Source: OECD, Global Teaching InSights Database.

Design principles for observation and teaching material codes

Specific high-level design principles guided iterative rounds of evidence-centred code development to ensure the Study observation and teaching material codes could be meaningfully applied across participating countries and economies. Observation and teacher material scores were developed to support the following claim: In the lesson, there was quality, nature, or presence of a specific teaching practice. For example, one such claim might be "In lesson X, there was a moderate level of questioning that requires students to explain their thinking." It is important to note that the foundational claim was not that certain practices were better than other practices, but rather that scores conveyed the quality, nature or presence of a specific practice.

This very basic claim – that codes specified the quality, nature or presence of a specific practice – required four design principles. Codes were collaboratively developed to reflect global conceptions of teaching quality and to capture variation in teaching within the eight participating countries/economies. The understanding and application of the codes also had to be scalable so that they could be used in a train-the-trainer model of implementation. This meant the codes had to be defined and operationalised in standardised ways so that bilingual observers could apply them. And finally, to support standardised application across countries/economies, codes had to focus on behaviours or aspects of teaching that are observable on video or present in teaching materials. Four cycles of iterative development with country/economy experts over roughly two years of development activities resulted in the final codes for the Study. In each iterative development cycle, codes were drafted and tested on pilot Study classroom videos and teaching materials; then refined and shared with external experts and countries/economies, and again revised, retested and refined further. Two codes (i.e. components related to risk-taking and clarity) did not work well in all countries and are not included in this report. All codes tested are detailed in the Technical Report.

Training

Once the codes were finalised, training materials for both the observation and teaching material codes were developed in English. Four major principles guided the development of the training materials: i) coherent structure to ensure the scoring scales were consistent within and across countries/economies; ii) equitable country/economy representation so that the observers developed a broad understanding of how teaching and learning looked globally; iii) robustness to educate bilingual observers who had a mathematics background in quadratic equations but were not mathematics experts; and iv) explicitness to be effective in a face-to-face train-the-trainer approach. Master observers from each country/economy were trained together during two weeks of face-to-face sessions and the master observers then trained the country-level observers face-to-face in their own countries/economies. Quality control rating processes of certification, calibration, validation and double-rating were put in place to ensure reliability and validity. These processes are described in the Technical Report.

Calculating classroom-level scores

Calculation of observation scores: Because observers are prone to many types of errors when rating human performance, the Study divided observations into shorter segments for rating; this decreased the cognitive demand on observers and provided information on how teaching varies within lessons. Observers paused the lesson video and rated it every 16 minutes (components) or 8 minutes (indicators). These procedures produced multiple sets of component or indicator ratings commensurate with the length of the lesson. In addition, each video and each set of teaching materials was rated independently by two observers.

The multiple sets of observation ratings were then averaged to get an observation component score for a particular classroom by:

1. averaging the two observers' segment-level ratings for each segment to obtain segment averages
2. averaging over the segment averages for all segments associated with a lesson to obtain a lesson average (if a teacher only had one lesson, this score was used as the classroom-level score)
3. averaging the two lesson averages for a teacher to obtain the classroom-level score.

Indicators were rated on various scales, some of which were less amenable to the approach described above for components. The Technical Report (Chapter 17) provides a complete description of indicator aggregation methods.

Calculation of teaching materials scores: Because many individual teaching materials provided scant information about students' learning experiences and increased burden on raters, the Study used the lesson as the unit of rating. All teaching materials associated with a lesson were rated as a set. Each set of teaching materials were scored by two raters. Component scores for teaching materials for a teacher were subsequently created by:

1. averaging the two raters' scores for the set of teaching materials associated with a single lesson
2. averaging the component scores across all teaching materials sets for a teacher.

The one exception to this rule is the examination or test that covers quadratic equations. Country/economy experts reported that these local examinations usually occur after the unit is completed and they would not be associated with any specific day. Thus, the decision was to rate them separately, while the number of components were reduced to those for which there was likely to be evidence in the unit test.

The sample

To understand the relationship between teaching practices and student achievement and non-cognitive outcomes, the Study needed to obtain a diverse sample of teaching practices. To achieve that goal, the Study developed a stratified, two-stage probability sampling design. With the exception of Germany*[1] (which did not participate in TALIS 2018), each country and economy was provided with a list of 100 schools (and another 200 backup schools) that were randomly selected from the school rosters used for TALIS 2018. However, final samples were not fully representative in four countries/economies as detailed below. In most of the countries, schools were ISCED level 2, where the focal topic was taught. Schools in Biobío, Metropolitana and Valparaíso (Chile) (hereafter “B-M-V [Chile]”) were ISCED level 3 because quadratic equations are taught at that level.

Countries and economies approached schools about participation. If a school declined participation, then countries/economies attempted to recruit the first backup school and then the second until all backup schools were exhausted. Once a school agreed to participate, schools provided a list of teachers who taught quadratic equations. From that list, three teachers were randomly selected. Countries were to approach teachers for participation, one at a time, in the order they were selected. Once a teacher initially agreed to participate, consent forms to be video-recorded were sent home with students. The teacher and at least 15 students, or 50% of the class, had to consent for the teacher to remain in the Study. If that threshold was not met, the country/economy went to the next teacher on the list and started the process over again. If the country/economy exhausted the list of three teachers without reaching the consent threshold, they were to move on to the first backup school for the originally selected school. They were to repeat this recruitment process until they obtained 85 teachers in 85 schools.

Recruitment of schools and teachers was challenging for most of the countries and economies. As a result, sampling deviations occurred in order to obtain a sample as large as required for the Study while still trying to achieve a diversity of teaching practice. Table 2.3 summarises the types of sampling deviations by countries and economies in the Study. Further information on sampling deviations, consent rates and characteristics of participating schools, teachers and students is available in the Technical Report.

Table 2.3. Sampling deviations

	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico[1]	Shanghai (China)
Sample non-representative			X	X	X	X		
Sampling in selected regions only				X				
Selected regions excluded							X	
Sometimes recruited target and replacement schools simultaneously			X			X		
Recruited teachers across two school years		X	X	X				
Sometimes recruited more than one teacher per school			X	X	X	X		
Additional sample schools required	X							
Did not use the list of schools from TALIS 2018				X	X	X		
Did not follow the teacher random sampling plan				X	X	X		X

Notes: 1. Schools from Oaxaca, Mexico did not participate in the Study. Schools were selected in all other regions.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

As Table 2.3 illustrates, B-M-V (Chile), Colombia, Mexico and Shanghai (China) followed the original sampling plan with some fidelity. England (UK), Germany*, Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), and Madrid (Spain) had sampling deviations of different levels of significance, which reflected the difficulty they faced in recruiting schools and teachers. Notably, Japan sampled within three major cities (Kumagaya, Shizuoka and Toda) and University-affiliated schools only, and Germany* used a convenience sample of volunteering schools mostly from the high ability track (Gymnasium) from seven different states (Baden-Württemberg, Hesse, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saxony-Anhalt and Schleswig-Holstein). As the school year drew close, England (UK) started approaching all three teachers in a school at the same time until a teacher was recruited. These difficulties translated into differences in the number of participating teachers and schools which ranged from 103 teachers and schools in Mexico to 38 schools and 50 teachers in Germany* (see the Technical Report).

The number of sampling deviations raised concerns about whether the samples are similar to the diverse population of teachers and students in each country or economy. To determine whether that is the case, the Study samples of teachers and students were compared to PISA 2018 students and TALIS 2018 teachers. Annex 2.A, Table 2.A.1 shows the comparison between the students in the Study and the students in PISA 2018. As PISA is a representative study of 15 year old students, and the Study targeted those grade levels where quadratic equations are taught, differences in student age and grade level are mainly design-based. Differences in gender, immigrant status and parental education, however, might indicate some selectivity in sampling.

The Study averaged far fewer students participating per country/economy (2 118 students) than participated, on average, in PISA 2018 (7 595 students). However, Annex 2.A, Table 2.A.1 illustrates that the students who participated in this Study are roughly similar to those that participated in PISA 2018. The Study's sample of students is one year younger than students in PISA in six out of eight countries/economies. Also, the Study's sample of students has more variation in age than is found in the PISA sample, but less variation in grade level for most countries/economies, because the PISA sample is age-based, while the Study's sample was classroom-based. More students with an immigrant background participated in PISA 2018 than in the present Study in England (UK) and Germany*. Finally, the years of parental education differ by over a year between the Study's sample of students and the PISA 2018 sample in Germany* and Shanghai (China).

The samples of teachers for the Study differed in gender distribution and experience across participating countries and economies. For example, Table 2.4 shows that the sample in Shanghai (China) was mostly female, whereas Colombia and K-S-T's (Japan) sample was mainly male. The Study's sample of England (UK) had less experienced teachers than most other countries/economies, while the sample of Shanghai (China) had the most experienced teachers. Finally, Table 2.4 shows how successful the countries and economies were at meeting the targeted teacher numbers for the Study.

Table 2.4. Gender, preparation and experience of teachers in the Study by country and economy

	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
Female	53%	29%	58%	46%	21%	56%	38%	77%
Prepared through a mainstream teacher education programme	92%	88%	88%	92%	99%	78%	60%	92%
Experience 0-2 years	3%	8%	12%	10%	2%	7%	8%	6%
Experience 3-9 years	37%	31%	41%	30%	26%	35%	35%	19%
Experience 10+ years	60%	60%	47%	60%	72%	59%	57%	75%
Number of Teachers	98	83	85	50	89	59	103	85

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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When the teachers in the Study are compared to the sample of mathematics teachers in lower secondary education that participated in TALIS 2018, differences are also found in some countries. Annex 2.A, Table 2.A.2 shows that differences existed both in Colombia and Mexico between participating teachers in the Study and the TALIS 2018 samples in terms of gender and education. In both countries, there were more female teachers in the TALIS 2018 sample than in this Study's sample. In Colombia, the TALIS 2018 sample of teachers has more education than teachers in this Study's sample. For example, there are fewer teachers with only an undergraduate degree and more teachers with a Master's degree in the TALIS 2018 sample. In Mexico, the Study's sample of teachers has more education than the TALIS 2018 sample, with fewer teachers having an undergraduate degree only. Otherwise, few differences are observed between the teachers participating in this Study and those that participated in TALIS 2018.

In addition to differences in teacher characteristics across participating countries and economies, the characteristics of the schools in which the teachers are employed also had many variations. Table 2.5 presents the features of the schools where the Study teachers taught. For example, more than

a quarter of B-M-V's (Chile) sample was private schools, whereas both England (UK) and K-S-T (Japan) had no private schools in their sample. Virtually all of B-M-V (Chile) and Madrid (Spain)'s schools were in urban areas, while only 34% of Germany*'s and 40% of Shanghai (China)'s were urban schools. School size also varied across countries and economies both in the number of teachers in the school and the sizes of the student body. Schools in England (UK) were the largest in the Study and schools in K-S-T (Japan) were the smallest (among countries/economies where data were available).

Table 2.5. Study sample: School characteristics

	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
Private school	28%	18%	0%	5%	0%	9%	16%	12%
Urban school	99%	78%	56%	34%	71%	100%	95%	40%
Average number of teachers in school			92		23	37	29	74
Average number of students in school	1 064	502	1 336		394			
Number of schools	98	83	78	38	73	55	103	85

Notes: Grey cells indicate missing data.
Summary calculated based on non-missing values in schools with the teacher and student data.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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The fielding procedures and outcomes

The Study is a landmark study that required complex data collection. The greatest challenges faced by the countries/economies related to conducting video-based research on teaching, coordinating the complex scheduling and data collection, managing privacy requirements associated with video-recordings and negotiating agreements to share information across countries/economies. This is discussed in greater detail in the Technical Report.

The National Project Managers were responsible for tracking consent and ensuring data were collected using required standardised procedures. They were also charged with applying quality control standards to both videos and teaching materials. Once all data were collected, country/economy researchers entered test and questionnaire data. They also recruited, screened, hired and trained observers, rated the videos and teaching materials using the procedures outlined above, and submitted those ratings. Observers/raters were assigned to rate the videos and teaching materials using an assignment tool. No observer was permitted to rate a teacher's videos more than once. Observers in some countries did rate teaching materials and a video from the same teacher.

In part, due to the burden of the data collection and the coordination demands of the Study, there were some deviations from the established fielding procedures. Deviations from fielding procedures tended to be singular events (e.g. a fire alarm during a lesson) and rare. These events are described in the Technical Report and, for the most part, did not substantially impact the quality of the data. The exception was Madrid (Spain), which had significant fielding deviations that may have impacted the quality of the data. In particular, the Teacher Log only contained information about more than one lesson for 35 out of

the 85 participating classrooms. Also, students' pre-tests and pre-questionnaires cannot be reliably linked to their post-tests and post-questionnaires, thus their comparison was not feasible (see the Technical Report).

Caveats and limitations

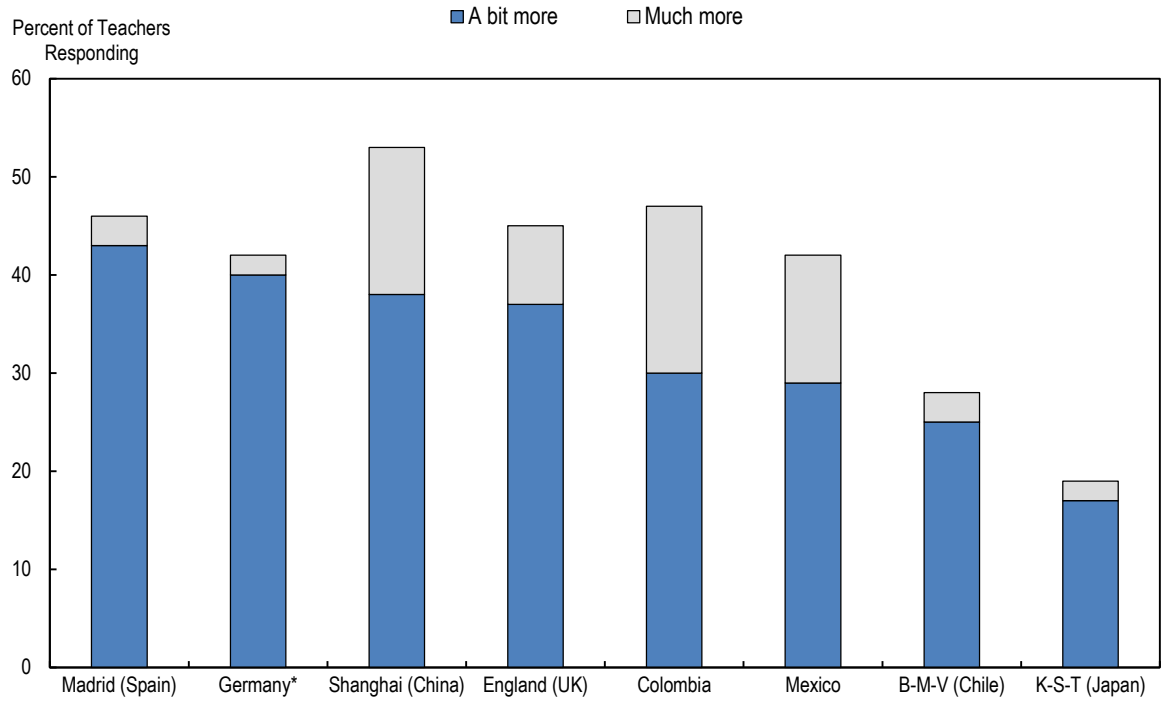
The present Study was an ambitious one designed to capture international variation in teaching and to investigate the relationship between different teaching practices and student learning across a range of contexts and countries. At the same time, the Study sought to pioneer new research methodologies that could advance researchers' understanding of how to measure something as complex as teaching. Inevitably, there were tensions between trying to understand the complex nature of teaching and the scale that is feasible in international studies. As a result, the methodological decisions made for the Study may create concerns about the reliability and validity of its findings.

One area of concern when using observational measures to research teaching is how many lessons need to be observed to produce a reliable measure of teaching quality that, when paired with other data, can detect a relationship between teaching and student outcomes. The Study observed two lessons of each teacher, in line with what is viewed as best practice amongst researchers. For example, Taut and Rakoczy (2016[1]) found that the number of observers and the number of components per observation dimension had the most significant impact on reliability rather than additional lessons. Similarly, Ho and Kane (2013[2]) found that having a second observer had twice the gains in reliability than having an observer watch an additional lesson from a teacher, in particular when the second observer rates a different lesson than the first observer. Thus, while the Study was limited to two observations per teacher, its decision to double rate lessons and assign observers in such a way that no observer saw the same teacher twice, considerably increased the reliability of observation scores. The potential for excessive observer cognitive demand was handled by segmenting lessons into segments. Indeed, the Study reached a level of quality control in its video ratings comparable to other major national studies, even when working at an international level. For example, average observer-to-observer agreement for component scoring was 50-56% for an exact match and 86-92% for an adjacent match. For indicators, observer-to-observer agreement was even higher with 88-91% with an exact match and 98-99% with an adjacent match (Technical Report).

A further area of concern surrounds whether lessons that are videotaped result in student or teacher behaviour being affected such that typical lessons are not captured. The Study asked students and teachers whether they perceived any difference between videotaped and regular lessons. There were significant differences between countries on the percentage of teachers who prepared more carefully for videotaped lessons. For example, in K-S-T (Japan) only 19% of the participating teachers said they had prepared a bit more or much more carefully, whereas, in Shanghai (China), it was 53% of responding teachers (Figure 2.1).

Students reported that practices such as providing a clear structure, managing the class so no time was wasted and giving social-emotional support happened more often than normal though differences were not significant in all countries/economies. While there is evidence from both teachers and students that the videotaped lessons may have differed in some ways from typical lessons in the unit, previous research on this issue indicates this may not significantly influence conclusions drawn from videotaped lessons (Praetorius, McIntyre and Klassen, 2017[3]).

Figure 2.1. Teachers who responded that they had carefully developed materials for the videotaped lessons "a bit more" or "much more"



Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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A third area of concern for a study like the present one may be the concentration on a focal topic. In the TIMSS Video Study, Stigler and colleagues (1999[4]), argued for trying to sample lessons that covered a broad array of topics as they deemed identifying a single topic for comparability practically impossible. Meanwhile, a focus on mathematics and in particular quadratic equations may mean that the Study is unable to observe certain teaching practices that are more prevalent in other subjects or that manifest in a different way. For example, a teacher may provide explanations differently when teaching a different topic. They may also use a different questioning strategy to engage students.

However, uncovering relationships between teaching and student learning may be facilitated by focusing on a single topic. Since the TIMSS Video Study 1999 was conducted, studies have highlighted the importance of exposure to curricular content and its correlation with student outcomes on international assessments, and in particular with regard to mathematics learning (Kuger et al., 2017[5]; Schmidt et al., 2015[6]). Moreover, video-based studies have also shown that a focus on a single topic can clarify differences in teaching quality in cross-country comparisons. Focusing on a single topic can make observational measures more 'instructionally sensitive' (Popham, 2007[7]) and allow for alignment between measures of teaching quality and student outcome measures. Nevertheless, in practice, countries differ in the details of how the content is implemented, as shown in Chapter 6 of this report, which might cause variations in the level of alignment of the topic across countries. Also as shown in Chapter 6, countries/economies varied significantly in the length of time spent teaching quadratic equations with some teaching as few as 6 lessons and others teaching more than 15.

Despite the Study's carefully considered design, when reading the findings presented forthwith, it is important to be mindful of some of the limitations of the study. Notably, the Study is not a cross-country/economy ranking of the quality of teaching. Judgements about how the quality of teaching in one country directly compares to the quality in another need to be undertaken with a lot of caution. Despite similarities with the PISA and TALIS samples, important sampling deviations occurred in some countries/economies (Table 2.3). Furthermore, whilst the survey and test measures of the Study reach similar levels of comparability as in PISA or TALIS, more direct measures of teaching remain innately difficult to standardise to the same degree. As outlined previously, the Study established extensive quality control measures for video and teaching material rating and reached solid standards of quality control, but comparability across countries cannot be perfectly established and some measures of teaching such as "respect" or "encouragement and warmth" may vary in their meaning between countries.

Despite all these caveats and limitations, the Study provides a unique depiction of teaching at an international scale. It points towards patterns of teaching and many interesting cases of variation within countries/economies, which may vary further or differently with larger samples of teachers and which serve as potential avenues for future research and dialogue.

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Annex 2.A. Chapter tables

Annex Table 2.A.1. Comparison of student characteristics in this Study and in PISA 2018

	B-M-V (Chile)		Colombia		England (UK)		Germany*		K-S-T (Japan)		Madrid (Spain)		Mexico		Shanghai (China)	
	GTI	PISA	GTI	PISA	GTI	PISA	GTI	PISA	GTI	PISA	GTI	PISA	GTI	PISA	GTI	PISA
Female mean percentage	48%	50%	53%	51%	54%	51%	53%	47%	50%	51%	51%	49%	52%	52%	47%	48%
Age mean	16.58	15.81	15.81	15.84	14.78	15.76	14.98	15.83	14.80	15.78	13.78	15.86	14.73	15.85	13.61	15.77
Age standard deviation	0.72	0.28	1.08	0.29	0.62	0.22	0.78	0.29	0.36	0.29	0.51	0.29	0.47	0.29	0.43	0.29
Grade level mean	10.80	9.79	8.99	9.67	8.83	11.11	8.99	9.39	9.00	10.00	8.02	9.73	8.84	9.83	8.00	9.63
Grade level standard deviation	0.45	0.59	0.13	1.02	0.59	0.16	0.46	0.68	0.00	0.00	0.29	0.54	0.53	0.48	0.03	0.55
Immigrant mean percentage	3%	3%	0%	2%	16%	21%	16%	22%	1%	0%	17%	16%	2%	1%	0%	0%
Parents' years of education mean	14.31	13.61	11.66	11.97	14.23	14.10	15.81	13.04	13.49	14.34	14.50	14.49	12.99	12.06	14.32	12.54
Parents' years of education standard deviation	3.06	2.65	3.57	3.59	2.13	2.29	2.53	3.21	1.26	1.86	2.87	2.59	3.18	3.52	2.82	3.17

Notes: GTI (Global Teaching InSights) refers to this Study.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 2.A.2. Comparison of this Study's teacher characteristics to TALIS 2018 mathematics teacher characteristics

	B-M-V (Chile)		Colombia		England (UK)		Germany*		K-S-T (Japan)		Madrid (Spain)		Mexico		Shanghai (China)	
	GTI	TALIS	GTI	TALIS	GTI	TALIS	GTI	TALIS	GTI	TALIS	GTI	TALIS	GTI	TALIS	GTI	TALIS
Female mean percentage	53%	59%	29%	40%	58%	55%	46%	NA	21%	23%	56%	56%	38%	47%	77%	70%
Age mean[1]	42.17	40.58	41.81	44.27	35.59	39.49	42.74	NA	40.52	42.05	42.98	45.64	41.13	41.69	38.61	39.40
Age standard deviation	12.29		10.19		8.40		12.02		10.85		8.709		9.934		8.60	
Percentage with doctoral degree	0%	1%	0%	0%	1%	0%	6%	NA	0%	0%	9%	NA	4%	1%	0%	0%
Percentage with master's degree	16%	15%	44%	61%	24%	24%	94%	NA	7%	11%	91%	NA	38%	29%	14%	14%
Percentage with Technical School degree	0%	5%	1%	2%	1%	1%	0	NA	0%	1%	0%	NA	0%	0%	0%	1%
Percentage with undergraduate degree	84%	79%	53%	35%	74%	74%	0	NA	93%	86%	0%	NA	58%	67%	86%	86%

Notes: GTI (Global Teaching InSights) refers to this Study.
The TALIS sample includes students from multiple subjects, while the current Study's sample includes only students in mathematics classes.
1. Teacher age in TALIS represents the age of all teachers, not just mathematics teachers, because only categorical characteristics are available for mathematics teachers.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934186201

Notes

[1] Germany* refers to a convenience sample of volunteer schools.

3 Classroom management

Courtney A. Bell, Katherine E. Castellano and Eckhard Klieme

Strong classroom management allows teachers and students to be focused on learning and use time efficiently. This chapter describes the quality of observed classroom management practices as well as how classroom activities were structured and where in the lesson instructional time was lost. It also describes teachers' and students' perceptions of classroom management practices.

Classroom management refers to the range of structures and practices that help teachers manage classrooms successfully, facilitate high levels of student attention for mathematics and avoid disruptions. Teachers use varied practices that range from overt to subtle in order to manage the classroom. A teacher reminding students of the classroom rules is more overt. While a teacher leading whole group work while also moving to stand next to a student who appears ready to disrupt the room with off-task behaviour is more subtle. Student grouping structures are another way teachers manage classrooms to achieve instructional goals. For example, a teacher who is knowledgeable about the relationships among students might deliberately separate students who tend to "chat" with one another for pair-based work. Teachers' classroom management practices allow them to use time effectively and those practices have frequently been related to student achievement (Baumert et al., 2010[1]; Kane and Staiger, 2012[2]; van Tartwijk and Hammerness, 2011[3]).

Classroom management is not just about what teachers do. Students also contribute to managing the classroom through their behaviour. If, for example, there is a loud noise in the hallway while a teacher is explaining something, students might react in different ways. On the one hand, they might laugh or ask what is happening or become distracted; on the other hand, they might ignore the noise and continue listening to the teacher. Thus, students' and teacher's behaviours together will determine if the noise causes the teacher and students to interrupt the lesson or simply causes the teacher to repeat her explanation. To understand classroom management, it is important to take account of both teacher and student behaviours.

This chapter reports findings on the observed quality of classroom management; including the extent to which lessons were focused on mathematical learning, the prevailing types of activity structures, and teachers' use of routines, monitoring of the class and handling of disruptions. It also reports on teachers' and students' perceptions on how well classrooms are managed and the disciplinary climate in class.

Key findings

- Across countries/economies, most of the lesson time observed was spent on mathematics learning. In general, more learning time was lost at the start of lessons and to a lesser degree at the end of lessons. The large proportion of lesson time spent on mathematics is consistent with the high quality of teacher and student management practices observed.
- The vast majority of countries'/economies' classroom lessons were characterised by organised and efficient routines, frequent teacher monitoring of the whole class, and disruptions that were managed quickly and effectively.
- Whole group instruction (frontal teaching) was observed in over 88% of lesson segments in all countries/economies; often in combination with individual seatwork activities in England (UK), Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), and Shanghai (China). In contrast, student collaboration – either in small groups of three or more students or pairs of students – was used in less than 22% of lesson segments across participating countries/economies.
- When students and teachers were asked about their perceptions, they generally reported high levels of teacher awareness, efficient handling of disruptions and a high disciplinary climate. However, students in most countries/economies perceived more noise and disorder than their teachers.

Classrooms were well-managed

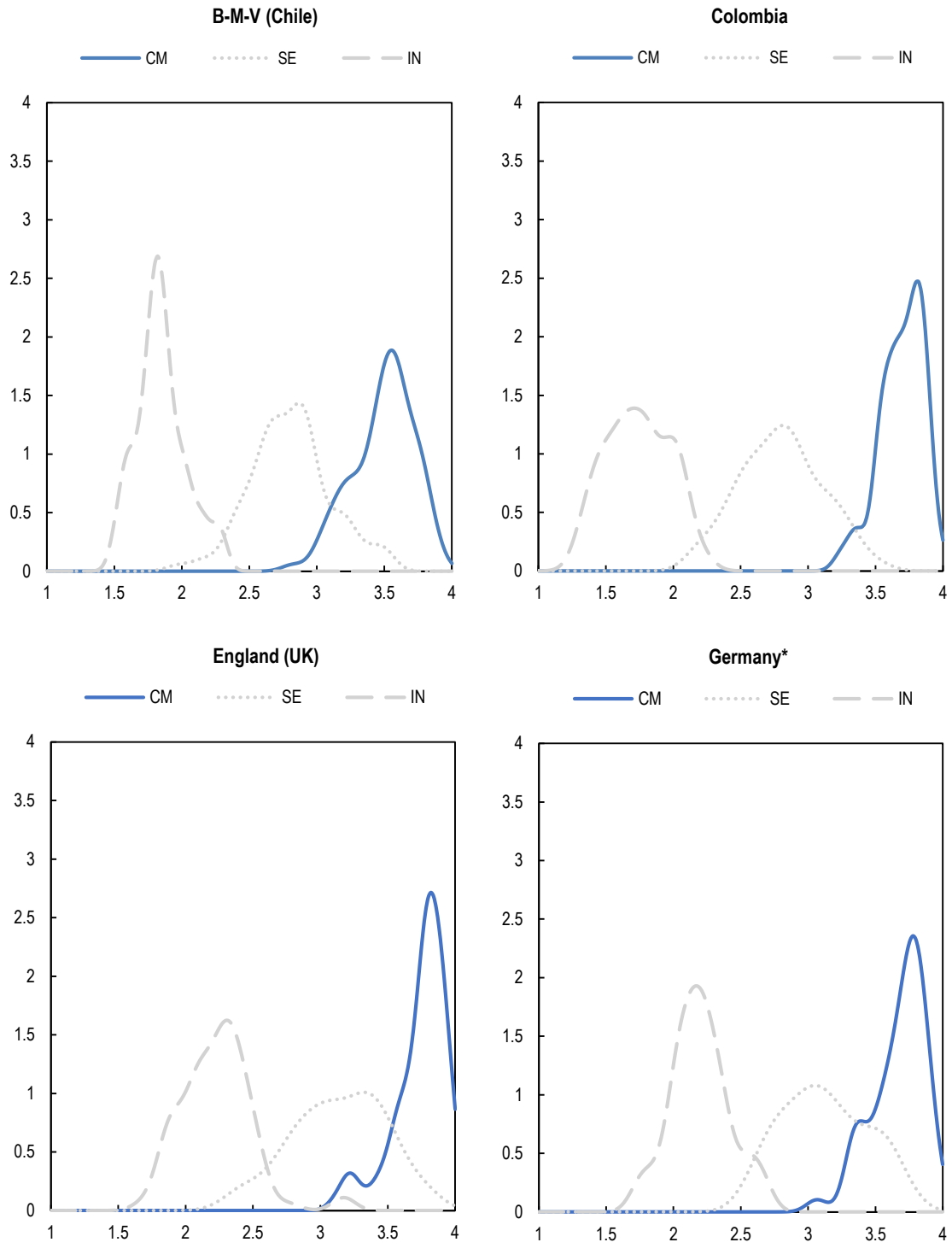
To measure the quality of classroom management, observers holistically noted how teachers handled disruptions, the efficiency and organisation of classroom routines, and the degree of classroom monitoring carried out by the teacher. These are aggregated into an overall classroom management domain score, which ranges from 1 (lowest presence or quality) to 4 (highest presence or quality) (for the domain aggregation method see Chapter 2).[1]

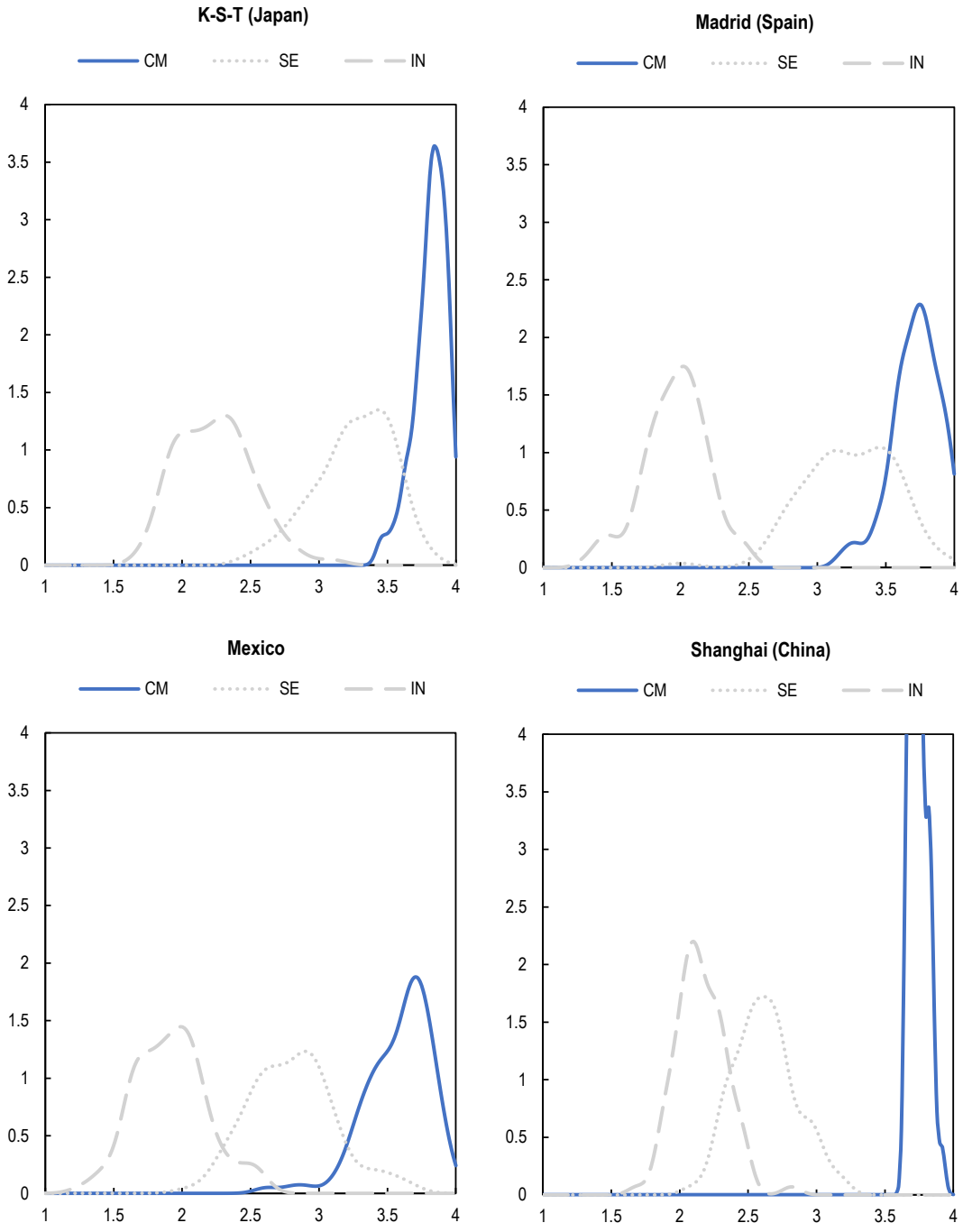
The vast majority of classrooms observed in every country/economy were well managed. Furthermore, classroom management practices were the strongest teaching practices, when compared to social-emotional and instructional practices (Figure 3.1). On average, teachers had organised and efficient routines in place, frequently engaged in monitoring, and handled disruptions quickly and effectively. All country/economy means are equal or above 3.49: K-S-T (Japan) (3.81), Shanghai (China) (3.75), England (UK) (3.74), Madrid (Spain) (3.72), Colombia (3.70), Germany*[2] (3.67), Mexico (3.58), and Biobío, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]") (3.49). Annex 3.A, Tables 3.A.1 and 3.A.2 show descriptive statistics for each country/economy.

Most countries/economies had uniformly high levels of classroom management, with most or all classrooms scoring between a 3 and 4. There was, however, a small amount of variation within countries/economies. Variation within countries/economies is shown in Figure 3.1, which plots classrooms' mean classroom management score in a density curve. The figure shows that all countries/economies have peaked-shaped curves, meaning classrooms were similar to one another. B-M-V (Chile)'s classrooms had some variation in the mean scores (a distribution concentrated between 3 and 4) and Shanghai (China)'s classrooms had very little variation in mean scores (a distribution concentrated between 3.5 and 4). In K-S-T (Japan) and Shanghai (China) no classrooms had a mean score of 3; almost every classroom's mean was above 3.5 in each of those countries/economies. High levels of classroom management practices are consistent with patterns found in other observational research (e.g. (Kane and Staiger, 2012[2])).

Figure 3.1 Observed quality of classroom management

Distribution of classrooms by the mean classroom domain score





Notes: The classroom management (CM) domain score (blue solid line) for each classroom is the mean over three components: routines, monitoring and disruptions. SE and IN refer to the domain score for social-emotional support and instruction, respectively.
The density curves for instruction (grey dashed line) and social-emotional support (grey dotted line) are included for reference.
This figure is a smoothed histogram of classroom scores using an interval size of 0.02 score points. The y-axis is density. The more peaked the curve is, the more classrooms have mean scores concentrated around a few score points (i.e. the more densely populated is that range under the curve). The long flat lines at zero in most countries/economies show that no classrooms had a mean score of 1 or 2.
The density curves are meant to convey the general shape of the distributions.
The classroom management curve for Shanghai (China) is truncated at y=4.0; it peaks at a density of 5.94 for the classroom mean score of 3.74.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ordered alphabetically.
Source: OECD, Global Teaching InSights Database.

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Little time was spent on non-mathematics tasks

One of the main reasons it is important to manage classrooms efficiently is so that students can spend as much time as possible learning mathematics and developing valuable social-emotional skills. Research shows that lesson time can have a significant impact on student academic outcomes (Schmidt, Zoido and Cogan, 2014[4]). Opportunity to learn is discussed from a curricular perspective in Chapter 6 of this report. Here we consider how time is spent on mathematics during the observed lessons.

The mean lesson length was slightly less than 55 minutes (see Annex 3.A, Table 3.A.5). But lesson length varied by country/economy: Germany* (65 minutes), Colombia (63 minutes), B-M-V (Chile) (62 minutes), Mexico (55 minutes), England (UK) (54 minutes), K-S-T (Japan) (50 minutes), Madrid (Spain) (47 minutes) and Shanghai (China) (42 minutes). Within a country/economy, lessons were sometimes quite a bit longer or shorter than the mean; for example, lesson length ranged from 46 to 80 minutes in Colombia.

During a lesson, teachers and students regularly need to accomplish tasks that might not be strictly mathematical – marking down which students are absent, talking with students about their weekend activities, or moving chairs around to get into small project groups. Not all of this type of off-task behaviour from mathematics is "lost" time. During conversations about students' weekend activities, for example, teachers convey their interest and care for students thereby developing and maintaining the social relationships that support students' development.

Observers noted each 8-minute segment in terms of how much time was focused on non-mathematical tasks. Ratings ranged from 1 (four or more minutes out of eight were spent on non-mathematical tasks) to 4 (0-30 seconds was spent on non-mathematical tasks).

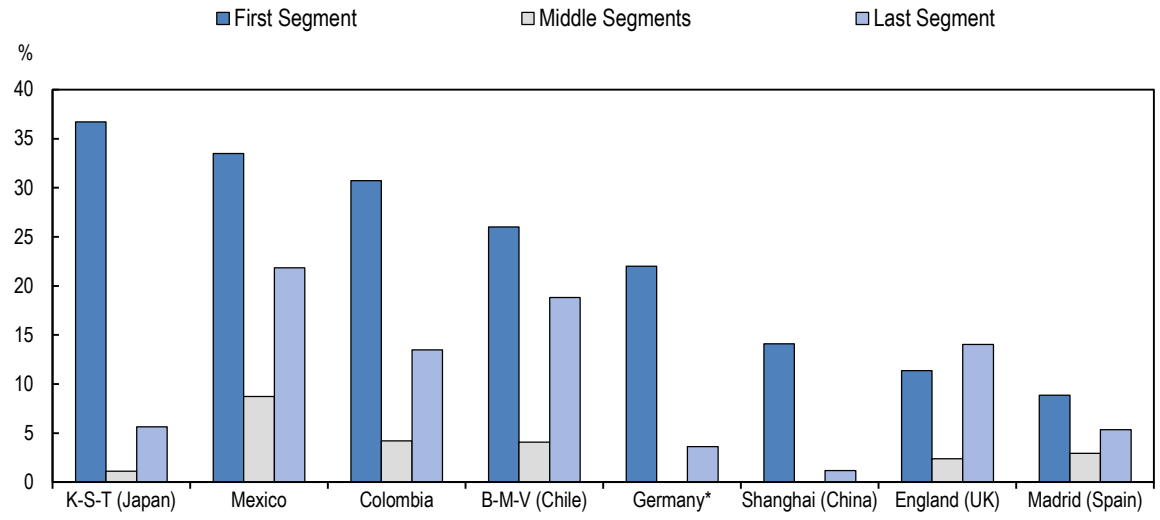
Teacher and student time was generally spent on mathematics. All countries/economies had extremely high mean time-on-task lesson ratings. Observers noted ranges of time off-task in segments and therefore calculations of the time off-task in a lesson can only be reported in ranges. To further understand where lesson time was off-task, a lesson analysis was carried out. Lesson segments were grouped into three groups: the first, middle and last. All middle segments were averaged together to produce a "middle segments" mean score. For each kind of segment, the proportion of lessons that had a mean lower than 3.5 was calculated. A mean rating lower than 3.5 means that more than 30 seconds per segment was spent on non-mathematical tasks and that the individual segment spent more time on them than the mean country/economy. All country/economy means were over 3.71 of 4 (see Annex 3.A, Tables 3.A.8 and 3.A.9), suggesting that observers assigned most segments a rating of four, zero to 30 seconds lost in the segment.

With one exception, non-mathematical tasks were most frequent during the first segments of lessons (Figure 3.2). Between 9 and 37% of lessons had at least one observer noting that more than 30 seconds of the first 8-minute segment was not focused on mathematics (K-S-T [Japan] [37%], Mexico [33%], Colombia [31%], B-M-V [Chile] [26%], Germany* [22%], Shanghai [China] [14%], England [UK] [11%], Madrid [Spain] [9%]). In England (UK), non-mathematical tasks were most frequent in the last segments of the lesson (14%).

During the last segments of lessons, a smaller proportion, between 1% and 22% of lessons, spent more than 30 seconds on non-mathematical tasks, depending on the country/economy. The middle segments of lessons were the most focused on mathematical tasks; 0-9% of lessons spent more than 30 seconds per segment on non-mathematical tasks.

Figure 3.2. Observed time lost to non-mathematical tasks across lessons

Percentage of first, middle and last lesson segments that devoted more than 30 seconds to non-mathematics tasks



Notes: The raw time-on-task indicator score is based on observers' video ratings of 8-minute segments that range between 1 and 4 with 1 indicating 50% or more of the segment time is devoted to non-mathematical tasks to 4 indicating less than 7% of segment time is spent on non-mathematical tasks.
Classrooms were counted as devoting less than 30 seconds to non-mathematical tasks if the segment mean was less than 3.5 across observers (and segments for the middle segment mean only).
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the proportion of segments that devote more than 30 seconds to non-mathematics tasks in the first segment.
Source: OECD, Global teaching InSights Database.

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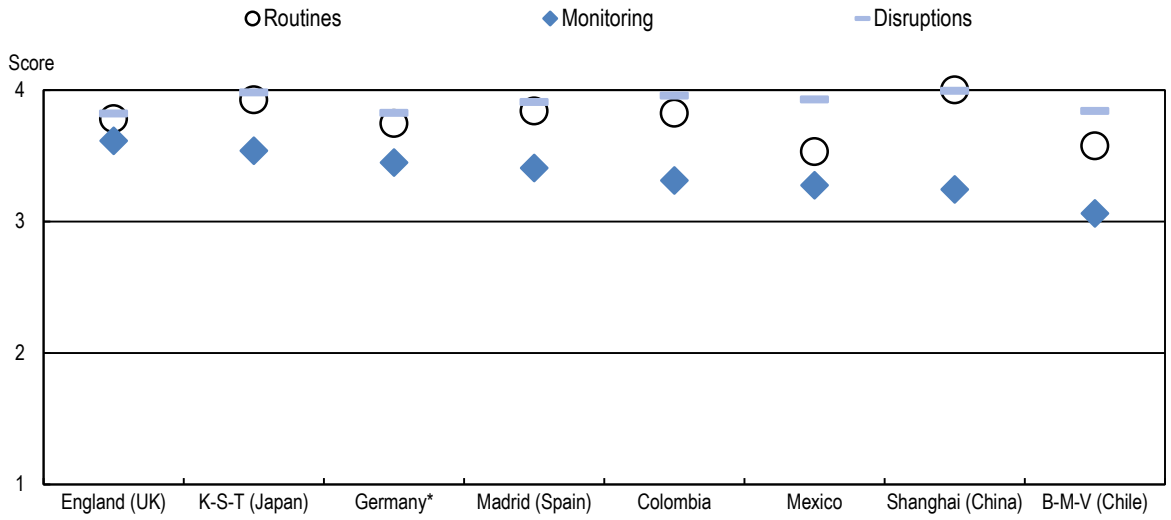
Nearly all classrooms had few disruptions and well-organised routines

All lessons face disruptions - there are loud noises coming from the hallway, power point projectors or smartboards do not work properly, students misbehave. Teachers address these disruptions through their actions, but students also determine whether these disruptions distract them from the mathematics or are ignored. Longer and more sustained disruptions are harder for everyone to ignore and potentially decrease learning time more than shorter disruptions.

Observers noted whether disruptions occurred and how the teacher handled them. The highest rating on the holistic four-point scale meant that either there were no disruptions, or the teachers and class handled them quickly and effectively. Virtually all classrooms in every country/economy received high ratings (above 3.8 out of 4) (Figure 3.3). This means that when disruptions occurred, teachers handled them quickly and effectively, and while students' focus on mathematics was interrupted momentarily, significant learning time was not lost.

Figure 3.3 Observed handling of disruptions and use of routines and monitoring

Mean classroom scores for routines, monitoring and disruptions



Notes: The raw score is based on observers' video ratings that range between 1 and 4. For routines, a 1 indicates that a small proportion of routines are organised and efficient and a 4 indicates all routines are organised and efficient. For monitoring, a 1 indicates there was little or no evidence of monitoring and a 4 indicates frequent monitoring of the entire classroom. For disruptions, a 1 indicates ineffective and inefficient handling of disruptions, while a 4 indicates effective and efficient handling of disruptions.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score for monitoring.
Source: OECD, Global Teaching Insights Database.

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In addition to disruptions threatening to reduce learning time, organisational tasks also can reduce learning time. Each day students and teachers carry out common, repetitive organisational tasks – taking attendance, asking questions of the teacher, passing out books or calculators, or transitioning between whole group and individual work. These tasks can also reduce available learning time. Routines are pedagogical strategies teachers use to carry out these organisational tasks efficiently and minimise the amount of time that is lost to non-mathematical tasks.

Observers noted the organisation and efficiency of classroom routines on a four-point holistic scale. A 1 on the scale means that routines were inefficient and often disorganised. A 4 means that all routines were efficient and organised. Efficiency refers to the use of time.

The average classroom observed had well-organised and efficient routines in place. The mean score was very high in all countries/economies: Shanghai (China) (4.00), K-S-T (Japan) (3.92), Madrid (Spain) (3.84), Colombia (3.82), England (UK) (3.78), Germany* (3.74), B-M-V (Chile) (3.57) and Mexico (3.53).

It is also noteworthy that there was little variation across classrooms within countries/economies. All classrooms in K-S-T (Japan) and Shanghai (China), and nearly all of them in Colombia (95%), Madrid (Spain) (94%), England (UK) (93%) and Germany* (88%) had consistently well-organised and efficient routines (score above 3.5) (see Annex 3.A, Tables 3.A.1 and 3.A.2). However, this was the case in only the majority of classrooms in B-M-V (Chile) (69%) and Mexico (64%). In these classrooms, teachers and students carried out routines, such as transitioning between activities or getting the teacher's attention, quickly and with little guidance.

Teachers sometimes monitored classrooms

Effective monitoring can prevent disruptions before they arise and support students by focusing their attention on learning. Monitoring is the idea of noticing what is happening in the whole classroom by, for example, looking out across the students from the front of the room, walking between students' desks as they work independently and noticing when a small group's noise level seems to be getting louder than is appropriate for the mathematics they are working on. If most students are focused on learning, then teachers may not need to constantly keep an eye on them.

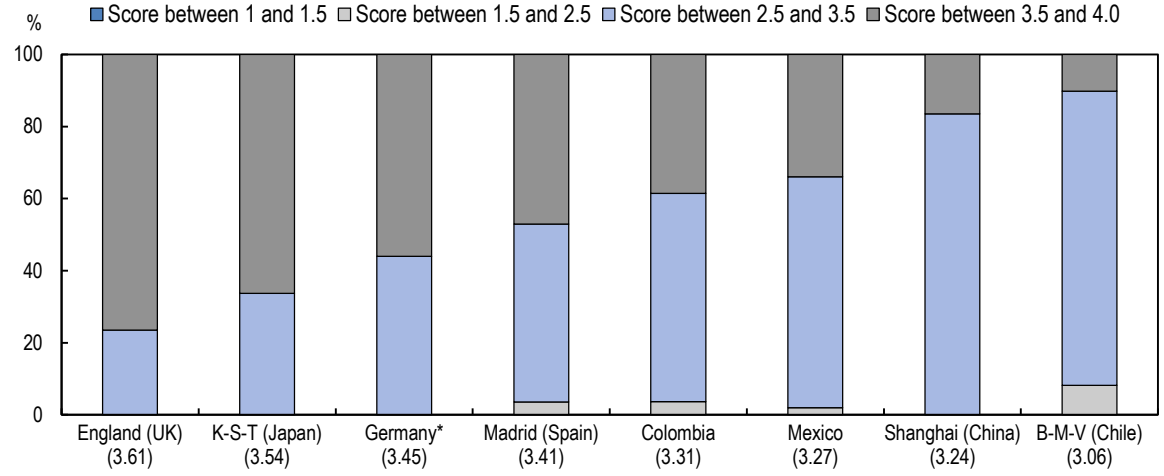
Observers noted the quality of monitoring on a holistic four-point scale. They focused on the teacher's physical proximity to students, scanning of the whole classroom, facing the students, calling on a range of students and noticing students' progress through tasks. The lowest levels of monitoring (score of 1) means that there was no evidence that the teacher engaged in monitoring behaviours, while teachers who frequently and consistently did so were rated at the highest level (score of 4).

Teachers sometimes or frequently engaged in monitoring students' behaviours in the average classroom observed and did so with few to no inconsistencies. The mean score was above 3 in all countries/economies: England (UK) (3.61), K-S-T (Japan) (3.54), Germany* (3.45), Madrid (Spain) (3.41), Colombia (3.31), Mexico (3.27), Shanghai (China) (3.24) and B-M-V (Chile) (3.06).

Not all teachers within each participating country/economy engaged in monitoring with the same frequency (Figure 3.4). For example, teachers in Germany* and Madrid (Spain) were equally divided between frequently and sometimes. It is worthwhile to note that occasional monitoring (score between 1.5-2.5) was observed in none or very few classrooms, meaning that keeping an eye on students is a very common strategy teachers used to maintain a productive learning environment.

Figure 3.4. Observed use of monitoring in classrooms

Percentage of classrooms that had a mean monitoring score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw score is based on observers' video ratings that range between 1 and 4 with 1 indicating little or no evidence of monitoring to 4 indicating frequent monitoring of the entire classroom.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score for monitoring.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934186277

Frontal teaching prevails in almost all classrooms

The classroom can take many shapes, from students sitting silently in rows and waiting to be called on by the teacher to groups or U-shaped arrangements of desks and students raising their hands to volunteer. A large body of literature has underlined the importance of effectively managing these classroom structures and transitions for student learning (Allen et al., 2013[5]; Hochweber, Hosenfeld and Klieme, 2014[6]; OECD, 2018[7]).

The structure of the classroom is often influenced by the activities of the lesson. Teachers might ask students to listen as a whole group or ask them to work individually, in pairs or in groups on a lesson problem. Different activity structures are not universally better or worse, rather they have different affordances, constraints and expectations for students and teachers. Further, more than one activity structure is frequently used in rapid succession (e.g. going from whole group to individual seat work and back to whole group). Teachers work with students to create a well-managed classroom within and across those activity structures. To measure what structures are most commonly used, observers recorded the two predominant activities in each 8-minute segment of the lesson.

Whole group instruction (frontal teaching) – a teacher standing at the front of the room in front of a group of students – was observed in over 88% of the lesson segments on average (Figure 3.5). It is worthwhile to note that this structure is prevalent across classrooms within countries/economies. Nine of every ten classrooms made use of it in at least 69% of the lesson segments observed (see Annex 3.A, Table 3.A.7).

Individual seatwork activities was the second most used structure. Students worked individually in a large proportion of lesson segments in England (UK) (84%), K-S-T (Japan) (77%), Shanghai (China) (68%), and in a smaller proportion in B-M-V (Chile) (48%), Mexico (38%), Germany* (36%), Madrid (Spain) (31%) and Colombia (22%).

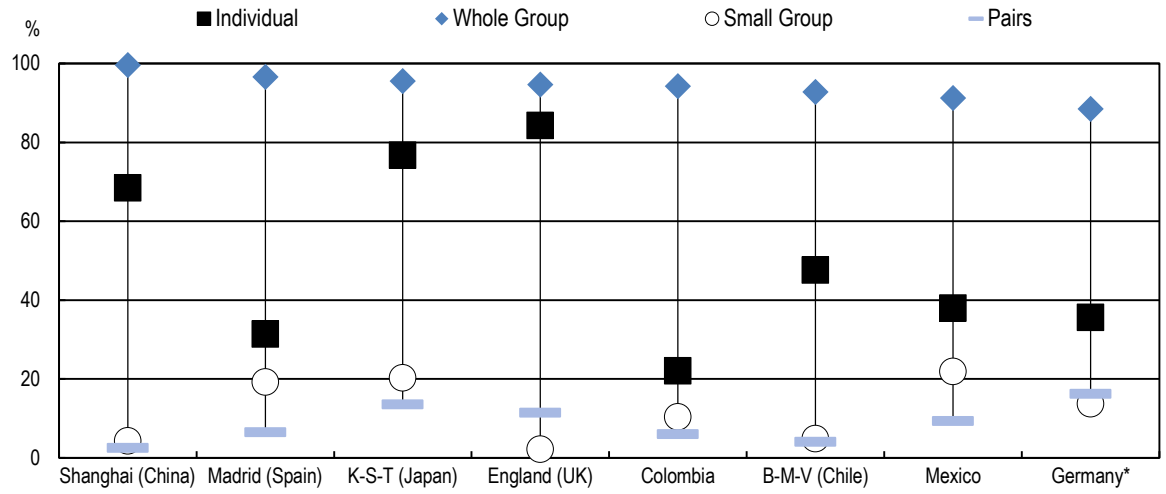
Student collaboration – either in pairs or in small groups of three or more students – was used in less than 22% of lesson segments in all countries/economies. In B-M-V (Chile) and Shanghai (China), students were almost never seated in small groups or pairs.

Classrooms within the same country/economy did not always use similar student groupings. For example, in K-S-T (Japan), nine in ten classrooms used whole group in almost all (89%) segments recorded (see Annex 3.A, Table 3.A.7). But there was variation in the additional structures used in the same segment as the whole group structure. In half of the classrooms, students worked in pairs for at least 8% of segments, small groups for at least 17% of segments and individually in 82% of segments.

Each activity structure has different affordances and constraints. When students are in a whole group setting, teachers may call on individual students in order to learn what they think. This structure has both the affordance and constraint that the rest of the students listen to those individual students while they speak. This format quickly and efficiently provides the same information to all students, but it also means one person at a time is speaking. Whole group instruction has been criticised for decades with some arguing it does not engage students as well as other methods (Kelly and Turner, 2009[8]). When students are working individually, the teacher might circulate among them, and stop to review and provide feedback on a single student's work. This practice is defined by both the benefit and constraint that only one student at a time has the teacher's attention. Pairs and small groups benefit from the fact that students are more able to discuss ideas and compare thinking with a classmate, but they have the constraint that students have to work together equitability to realise the potential impact of those learning opportunities (Boaler and Staples, 2008[9]).

Figure 3.5 Observed use of different activity structures

Mean proportion of the lesson segments using the following activity structures: individual, whole group, small group and pairs



Notes: The raw indicator score is based on observers' video ratings that range between 1 and 4 with 1 indicating no use and 4 indicating use for the entire segment.
To determine the proportion of lesson segments for which each activity structure was used, ratings were dichotomised into no use (original rating of 1) and any use (original ratings of 2, 3 or 4).
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom proportion of the lesson segments using whole group.
Source: OECD, Global Teaching InSights Database.

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Teachers were slightly more positive than students about their management of the classroom

Students and teachers were asked about their perceptions of the quality of classroom management during the teaching of quadratic equations. In particular, they were asked on their level of agreement on a four-point scale with statements related to the disciplinary climate in the class, teachers' efficiency in handling disruptions and teachers' awareness of students' attentiveness. Overall, students and teachers had positive views about how classrooms are managed across countries/economies (Table 3.1).

Table 3.1 Teacher and student perceptions on classroom management

Percentage of teachers and students who agreed or strongly agreed with statements on disciplinary climate, teacher's handling of disruptions and teacher's awareness of inattentive behaviour

	There was much disruptive noise in this classroom		The teacher reacted to disruptions in such a way that the students stopped disturbing lessons		The teacher was immediately aware of students doing something else	
	Teachers	Students	Teachers	Students	Teachers	Students
B-M-V (Chile)	20	45	93	79	85	82
Colombia	5	43	87	80	92	80
England (UK)	10	23	94	72	88	67
Germany*	14	30	94	78	96	60
K-S-T (Japan)	1	17	51	75	91	69
Madrid (Spain)	10	44	93	81	88	78
Mexico	9	43	78	82	90	82
Shanghai (China)	1	19	98	92	94	87

Notes: In the Teacher Questionnaire, "The teacher" was replaced by "I".
In the Student Questionnaire, "The teacher" was replaced by "Our teacher".
Response scale: Strongly disagree – Disagree – Agree – Strongly agree.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934186315

Teachers were very positive about how they handled disruptions and were aware of inattentive students (Table 3.1). In Germany* and Shanghai (China), between 94% and 98% of the teachers agreed or strongly agreed with the respective statements. In most other countries/economies, agreement rates were around 90%. In K-S-T (Japan) and Mexico, however, only 51% and 78 % of the teachers, respectively, agreed or strongly agreed with the statement "I reacted to disruptions in such a way that students stopped disturbing learning".

In most countries/economies, students were more sceptical than teachers when judging classroom management practices. They were more likely to report that there was much disruptive noise, and they were relatively less positive than their teachers on teachers' awareness of inattentive students and their handling of disruptions.

This gap between teachers' and students' views existed in every participating country/economy. The difference is particularly large in England (UK) and Germany* on the handling of disruptions and awareness of inattentive students. In B-M-V (Chile), Colombia, Madrid (Spain) and Mexico, nearly half of students believe that there is much disruptive noise, compared to one in five or less of their teachers.

Teachers and students of the same classroom had similar views

To compare the views of teachers and students of the same classroom, an index for the frequency of perceived disruptions was created. This index summarises their views on the following statements: "When the lesson began, our mathematics teacher (I) had to wait quite a long time for us (these students) to quiet down"; "We (I) lost quite a lot of time because of students interrupting the lesson"; and "There was

much disruptive noise in the classroom". Both the index for teachers and students range from 1 to 4. High values indicate fewer, or less disruptions, hence more efficient classroom management.

When students reported that classrooms had relatively few disruptions, their teacher also tended to do so, and vice versa. The teacher index and the student index were strongly correlated in Germany* (0.66) and England (UK) (0.63), moderately in K-S-T (Japan) (0.49) and B-M-V (Chile) (0.44), and less but still significantly in Colombia (0.35), Shanghai (China) (0.32) and Mexico (0.26). The correlation was statistically not significant in Madrid (Spain) (0.17).

A visibly well-managed classroom was perceived by teachers and students as so

Do teachers and students act differently when they know that they are being observed? It is possible that when a video-recording device is present, teachers and students are on their "best behaviour". There is mixed evidence on this point (Curby et al., 2016[10]; Praetorius, McIntyre and Klassen, 2017[11]), though where such effects are found they are not large.

In the Study, students were asked whether their teacher's classroom management during the videotaped lessons differed from regular lessons. Although students on average reported a tendency towards better classroom management for videotaped lessons in all countries and economies, the difference was perceived as being very small (see Chapter 2 for details).

The fewer disruptions students and teachers reported from all lessons on quadratic equations, the fewer disruptions were seen by observers in most countries/economies. As student and teacher judgements referred to the whole unit, not just the two videotaped lessons, this alignment provides further evidence against the assumption of "cheating" when teachers and students know that they are being recorded.

Student reports on disruptions[3] were significantly correlated with video ratings on disruptions in all countries/economies except Madrid (Spain). Correlations between observers' ratings and student reports were highest in England (UK) (0.62) and Germany* (0.55), followed by B-M-V (Chile) (0.35), K-S-T (Japan) (0.28), Mexico (0.26), Colombia (0.10) and Shanghai (China) (0.09). Similarly, teacher reports and video ratings on disruptions were significantly correlated in Madrid (Spain) (0.52), Germany* (0.43), England (UK) (0.38) and B-M-V (Chile) (0.22).

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Annex 3.A. Chapter tables

Annex Table 3.A.1. Components of classroom management (percentiles)

Based on observers' mean classroom video ratings

	Domain	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Classroom Management	Routines	98	3.57	0.32	2.65	3.13	3.33	3.63	3.85	3.94	4.00
Colombia	Classroom Management	Routines	83	3.82	0.17	3.08	3.63	3.70	3.88	3.94	4.00	4.00
England (UK)	Classroom Management	Routines	85	3.78	0.20	3.00	3.50	3.67	3.83	3.94	4.00	4.00
Germany*	Classroom Management	Routines	50	3.74	0.25	2.90	3.43	3.60	3.83	3.92	4.00	4.00
K-S-T (Japan)	Classroom Management	Routines	89	3.92	0.11	3.58	3.75	3.83	4.00	4.00	4.00	4.00
Madrid (Spain)	Classroom Management	Routines	85	3.84	0.19	3.08	3.67	3.75	3.92	4.00	4.00	4.00
Mexico	Classroom Management	Routines	103	3.53	0.36	2.09	3.05	3.25	3.58	3.84	3.92	4.00
Shanghai (China)	Classroom Management	Routines	85	4.00	0.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
B-M-V (Chile)	Classroom Management	Monitoring	98	3.06	0.38	1.95	2.50	2.75	3.11	3.35	3.48	3.95
Colombia	Classroom Management	Monitoring	83	3.31	0.40	1.81	2.80	3.00	3.38	3.63	3.70	4.00
England (UK)	Classroom Management	Monitoring	85	3.61	0.29	2.63	3.23	3.42	3.67	3.83	3.92	4.00
Germany*	Classroom Management	Monitoring	50	3.45	0.30	2.50	3.12	3.20	3.53	3.67	3.75	3.92

	Domain	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
K-S-T (Japan)	Classroom Management	Monitoring	89	3.54	0.30	2.58	3.17	3.33	3.58	3.83	3.83	4.00
Madrid (Spain)	Classroom Management	Monitoring	85	3.41	0.42	2.00	2.92	3.13	3.42	3.75	3.88	4.00
Mexico	Classroom Management	Monitoring	103	3.27	0.40	2.00	2.68	2.92	3.33	3.65	3.75	3.96
Shanghai (China)	Classroom Management	Monitoring	85	3.24	0.19	3.00	3.00	3.00	3.25	3.42	3.50	3.75
B-M-V (Chile)	Classroom Management	Disruptions	98	3.84	0.18	3.30	3.58	3.68	3.90	4.00	4.00	4.00
Colombia	Classroom Management	Disruptions	83	3.96	0.07	3.67	3.86	3.92	4.00	4.00	4.00	4.00
England (UK)	Classroom Management	Disruptions	85	3.82	0.23	2.92	3.53	3.67	3.92	4.00	4.00	4.00
Germany*	Classroom Management	Disruptions	50	3.83	0.18	3.10	3.65	3.74	3.88	3.98	4.00	4.00
K-S-T (Japan)	Classroom Management	Disruptions	89	3.98	0.05	3.67	3.92	4.00	4.00	4.00	4.00	4.00
Madrid (Spain)	Classroom Management	Disruptions	85	3.91	0.13	3.38	3.75	3.83	4.00	4.00	4.00	4.00
Mexico	Classroom Management	Disruptions	103	3.93	0.15	3.17	3.75	3.88	4.00	4.00	4.00	4.00
Shanghai (China)	Classroom Management	Disruptions	85	3.99	0.02	3.85	4.00	4.00	4.00	4.00	4.00	4.00
B-M-V (Chile)	Classroom Management	Domain Mean	98	3.49	0.23	2.82	3.18	3.29	3.53	3.69	3.77	3.91
Colombia	Classroom Management	Domain Mean	83	3.70	0.16	3.23	3.52	3.56	3.72	3.84	3.86	4.00
England (UK)	Classroom Management	Domain Mean	85	3.74	0.20	3.11	3.48	3.61	3.79	3.89	3.92	4.00
Germany*	Classroom Management	Domain Mean	50	3.67	0.19	3.07	3.37	3.52	3.73	3.82	3.86	3.94
K-S-T (Japan)	Classroom Management	Domain Mean	89	3.81	0.12	3.44	3.64	3.72	3.83	3.92	3.94	4.00

	Domain	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Classroom Management	Domain Mean	85	3.72	0.18	3.17	3.51	3.61	3.75	3.86	3.93	4.00
Mexico	Classroom Management	Domain Mean	103	3.58	0.24	2.61	3.28	3.40	3.64	3.78	3.83	3.94
Shanghai (China)	Classroom Management	Domain Mean	85	3.75	0.06	3.67	3.67	3.67	3.75	3.81	3.83	3.92

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.2. Components of classroom management (component score)

Based on observers' mean classroom video ratings

	Domain	Component	Frequency (component score)				Percentage (component score)			
			below 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	below 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
B-M-V (Chile)	Classroom Management	Routines	0	0	30	68	0.0	0.0	30.6	69.4
Colombia	Classroom Management	Routines	0	0	4	79	0.0	0.0	4.8	95.2
England (UK)	Classroom Management	Routines	0	0	6	79	0.0	0.0	7.1	92.9
Germany*	Classroom Management	Routines	0	0	6	44	0.0	0.0	12.0	88.0
K-S-T (Japan)	Classroom Management	Routines	0	0	0	89	0.0	0.0	0.0	100.0
Madrid (Spain)	Classroom Management	Routines	0	0	5	80	0.0	0.0	5.9	94.1
Mexico	Classroom Management	Routines	0	1	36	66	0.0	1.0	35.0	64.1
Shanghai (China)	Classroom Management	Routines	0	0	0	85	0.0	0.0	0.0	100.0
B-M-V (Chile)	Classroom Management	Monitoring	0	8	80	10	0.0	8.2	81.6	10.2
Colombia	Classroom Management	Monitoring	0	3	48	32	0.0	3.6	57.8	38.6
England (UK)	Classroom Management	Monitoring	0	0	20	65	0.0	0.0	23.5	76.5
Germany*	Classroom Management	Monitoring	0	0	22	28	0.0	0.0	44.0	56.0
K-S-T (Japan)	Classroom Management	Monitoring	0	0	30	59	0.0	0.0	33.7	66.3

	Domain	Component	Frequency (component score)				Percentage (component score)			
			below 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	below 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
Madrid (Spain)	Classroom Management	Monitoring	0	3	42	40	0.0	3.5	49.4	47.1
Mexico	Classroom Management	Monitoring	0	2	66	35	0.0	1.9	64.1	34.0
Shanghai (China)	Classroom Management	Monitoring	0	0	71	14	0.0	0.0	83.5	16.5
B-M-V (Chile)	Classroom Management	Disruptions	0	0	4	94	0.0	0.0	4.1	95.9
Colombia	Classroom Management	Disruptions	0	0	0	83	0.0	0.0	0.0	100.0
England (UK)	Classroom Management	Disruptions	0	0	6	79	0.0	0.0	7.1	92.9
Germany*	Classroom Management	Disruptions	0	0	2	48	0.0	0.0	4.0	96.0
K-S-T (Japan)	Classroom Management	Disruptions	0	0	0	89	0.0	0.0	0.0	100.0
Madrid (Spain)	Classroom Management	Disruptions	0	0	1	84	0.0	0.0	1.2	98.8
Mexico	Classroom Management	Disruptions	0	0	2	101	0.0	0.0	1.9	98.1
Shanghai (China)	Classroom Management	Disruptions	0	0	0	85	0.0	0.0	0.0	100.0
B-M-V (Chile)	Classroom Management	Domain Mean	0	0	44	54	0.0	0.0	44.9	55.1
Colombia	Classroom Management	Domain Mean	0	0	6	77	0.0	0.0	7.2	92.8
England (UK)	Classroom Management	Domain Mean	0	0	9	76	0.0	0.0	10.6	89.4
Germany*	Classroom Management	Domain Mean	0	0	9	41	0.0	0.0	18.0	82.0
K-S-T (Japan)	Classroom Management	Domain Mean	0	0	2	87	0.0	0.0	2.2	97.8
Madrid (Spain)	Classroom Management	Domain Mean	0	0	8	77	0.0	0.0	9.4	90.6
Mexico	Classroom Management	Domain Mean	0	0	33	70	0.0	0.0	32.0	68.0
Shanghai (China)	Classroom Management	Domain Mean	0	0	0	85	0.0	0.0	0.0	100.0

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.3. Classroom management densities of domain scores (and social-emotional support)

Based on observers' video ratings

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.03	0.02	0.00
1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.03	0.02	0.01
1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.03	0.02	0.01
1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.04	0.03	0.02
1.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.00	0.00	0.00	0.04	0.04	0.02
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.00	0.00	0.00	0.04	0.04	0.04
2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.05	0.00	0.00	0.00	0.04	0.05	0.05
2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.01	0.00	0.00	0.04	0.06	0.06
2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.09	0.01	0.00	0.00	0.03	0.06	0.07
2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.11	0.01	0.00	0.00	0.03	0.07	0.08
2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.14	0.01	0.00	0.00	0.03	0.09	0.10
2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.16	0.02	0.00	0.00	0.02	0.10	0.11

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.19	0.03	0.00	0.00	0.02	0.12	0.14
2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.21	0.03	0.00	0.00	0.02	0.15	0.17
2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.24	0.04	0.00	0.00	0.01	0.18	0.22
2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.27	0.05	0.00	0.00	0.01	0.21	0.29
2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.29	0.07	0.00	0.00	0.01	0.25	0.38
2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.32	0.08	0.01	0.00	0.01	0.28	0.47
2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.35	0.09	0.01	0.01	0.01	0.32	0.58
2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.38	0.11	0.01	0.01	0.01	0.36	0.69
2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.41	0.13	0.02	0.01	0.01	0.41	0.80
2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.44	0.14	0.02	0.02	0.01	0.45	0.90
2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.48	0.16	0.03	0.03	0.01	0.49	0.98
2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.52	0.18	0.04	0.03	0.01	0.53	1.05
2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.57	0.19	0.06	0.04	0.01	0.57	1.11
2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.61	0.21	0.08	0.05	0.02	0.62	1.17
2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.66	0.22	0.10	0.06	0.03	0.67	1.23
2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.62	0.71	0.23	0.12	0.07	0.04	0.72	1.30
2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.67	0.75	0.25	0.15	0.08	0.05	0.77	1.37
2.48	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72	0.80	0.26	0.18	0.10	0.06	0.82	1.46
2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.78	0.84	0.27	0.22	0.11	0.07	0.88	1.54
2.52	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.84	0.88	0.29	0.26	0.12	0.09	0.93	1.60
2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.91	0.92	0.30	0.31	0.14	0.11	0.97	1.66
2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.98	0.95	0.32	0.35	0.15	0.14	1.01	1.69
2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	1.05	0.98	0.34	0.40	0.16	0.16	1.04	1.71
2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.12	1.00	0.37	0.45	0.18	0.19	1.07	1.72
2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.19	1.03	0.40	0.50	0.20	0.23	1.09	1.72
2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.24	1.06	0.42	0.55	0.21	0.26	1.10	1.71
2.66	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.28	1.08	0.46	0.60	0.23	0.30	1.11	1.70
2.68	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.31	1.11	0.49	0.65	0.25	0.34	1.11	1.66
2.70	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.32	1.14	0.52	0.69	0.27	0.38	1.11	1.60
2.72	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.33	1.16	0.56	0.73	0.30	0.42	1.12	1.52

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.74	0.03	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.33	1.19	0.60	0.77	0.32	0.46	1.12	1.42
2.76	0.04	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.34	1.21	0.63	0.80	0.35	0.50	1.13	1.30
2.78	0.05	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.35	1.23	0.67	0.83	0.38	0.54	1.15	1.17
2.80	0.06	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.37	1.24	0.70	0.86	0.41	0.58	1.16	1.04
2.82	0.06	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.40	1.24	0.73	0.89	0.44	0.61	1.18	0.92
2.84	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.42	1.24	0.76	0.91	0.47	0.65	1.20	0.83
2.86	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.44	1.22	0.79	0.93	0.50	0.68	1.22	0.76
2.88	0.08	0.00	0.00	0.01	0.00	0.00	0.07	0.00	1.43	1.19	0.81	0.96	0.54	0.71	1.23	0.71
2.90	0.09	0.00	0.00	0.01	0.00	0.00	0.07	0.00	1.41	1.16	0.83	0.98	0.57	0.74	1.23	0.69
2.92	0.11	0.00	0.00	0.02	0.00	0.00	0.07	0.00	1.35	1.11	0.86	1.00	0.60	0.77	1.23	0.67
2.94	0.14	0.00	0.00	0.03	0.00	0.00	0.06	0.00	1.28	1.06	0.87	1.02	0.63	0.80	1.21	0.66
2.96	0.18	0.00	0.00	0.04	0.00	0.00	0.06	0.00	1.18	1.01	0.89	1.04	0.67	0.83	1.19	0.64
2.98	0.22	0.00	0.01	0.06	0.00	0.00	0.06	0.00	1.06	0.96	0.90	1.05	0.70	0.86	1.15	0.61
3.00	0.27	0.00	0.02	0.07	0.00	0.00	0.06	0.00	0.95	0.91	0.92	1.06	0.73	0.89	1.10	0.56
3.02	0.32	0.00	0.03	0.09	0.00	0.00	0.07	0.00	0.84	0.86	0.93	1.07	0.77	0.92	1.04	0.51
3.04	0.38	0.00	0.05	0.10	0.00	0.01	0.08	0.00	0.74	0.82	0.93	1.08	0.81	0.95	0.98	0.44
3.06	0.43	0.00	0.07	0.10	0.00	0.02	0.10	0.00	0.66	0.78	0.94	1.08	0.86	0.97	0.91	0.38
3.08	0.49	0.00	0.10	0.10	0.00	0.03	0.13	0.00	0.60	0.75	0.94	1.08	0.91	0.99	0.84	0.33
3.10	0.54	0.01	0.13	0.10	0.00	0.05	0.16	0.00	0.56	0.73	0.95	1.07	0.97	1.01	0.76	0.28
3.12	0.59	0.02	0.17	0.09	0.00	0.07	0.19	0.00	0.54	0.70	0.95	1.05	1.02	1.02	0.69	0.25
3.14	0.64	0.03	0.21	0.08	0.00	0.10	0.24	0.00	0.53	0.68	0.95	1.03	1.08	1.02	0.62	0.22
3.16	0.68	0.05	0.25	0.08	0.00	0.12	0.29	0.00	0.52	0.66	0.96	1.01	1.13	1.02	0.55	0.19
3.18	0.72	0.08	0.29	0.10	0.00	0.15	0.35	0.00	0.51	0.64	0.96	0.99	1.17	1.01	0.49	0.17
3.20	0.75	0.12	0.31	0.12	0.00	0.17	0.41	0.00	0.49	0.61	0.97	0.96	1.21	1.00	0.43	0.15
3.22	0.78	0.15	0.32	0.17	0.00	0.19	0.48	0.00	0.47	0.58	0.98	0.93	1.23	0.99	0.38	0.12
3.24	0.80	0.19	0.31	0.24	0.00	0.21	0.56	0.00	0.44	0.55	0.98	0.91	1.25	0.99	0.33	0.10
3.26	0.82	0.22	0.29	0.33	0.00	0.22	0.63	0.00	0.41	0.52	0.99	0.88	1.27	0.98	0.30	0.07
3.28	0.83	0.26	0.26	0.43	0.00	0.22	0.70	0.00	0.37	0.49	1.00	0.85	1.27	0.98	0.27	0.05
3.30	0.86	0.30	0.23	0.54	0.00	0.21	0.78	0.00	0.33	0.45	1.01	0.83	1.28	0.98	0.25	0.03
3.32	0.89	0.33	0.22	0.63	0.00	0.21	0.84	0.00	0.30	0.41	1.01	0.81	1.29	0.98	0.23	0.02

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.34	0.94	0.36	0.21	0.71	0.00	0.22	0.91	0.00	0.28	0.37	1.01	0.79	1.30	0.99	0.22	0.01
3.36	1.01	0.37	0.22	0.75	0.01	0.24	0.96	0.00	0.25	0.33	1.00	0.77	1.31	1.00	0.22	0.01
3.38	1.10	0.37	0.24	0.77	0.03	0.28	1.02	0.00	0.24	0.30	0.99	0.76	1.32	1.02	0.21	0.00
3.40	1.21	0.38	0.27	0.78	0.08	0.33	1.07	0.00	0.23	0.26	0.97	0.75	1.34	1.03	0.21	0.00
3.42	1.32	0.41	0.31	0.77	0.14	0.40	1.11	0.00	0.23	0.23	0.95	0.74	1.35	1.04	0.20	0.00
3.44	1.45	0.48	0.36	0.77	0.21	0.48	1.14	0.00	0.23	0.20	0.92	0.73	1.35	1.04	0.20	0.00
3.46	1.57	0.62	0.41	0.79	0.25	0.56	1.18	0.00	0.23	0.18	0.88	0.73	1.34	1.04	0.19	0.00
3.48	1.68	0.81	0.48	0.82	0.27	0.66	1.20	0.00	0.22	0.15	0.84	0.72	1.32	1.04	0.19	0.00
3.50	1.77	1.04	0.56	0.88	0.28	0.79	1.24	0.00	0.21	0.13	0.80	0.71	1.28	1.03	0.18	0.00
3.52	1.84	1.26	0.65	0.95	0.30	0.95	1.27	0.00	0.19	0.11	0.75	0.70	1.23	1.01	0.17	0.00
3.54	1.88	1.46	0.75	1.03	0.35	1.13	1.32	0.00	0.16	0.10	0.70	0.69	1.17	0.98	0.16	0.00
3.56	1.88	1.62	0.84	1.12	0.42	1.33	1.38	0.00	0.14	0.08	0.66	0.67	1.09	0.95	0.16	0.00
3.58	1.85	1.73	0.92	1.22	0.51	1.52	1.46	0.01	0.11	0.07	0.61	0.65	1.00	0.91	0.15	0.00
3.60	1.79	1.82	1.00	1.32	0.64	1.68	1.54	0.08	0.08	0.06	0.56	0.62	0.90	0.86	0.13	0.00
3.62	1.71	1.88	1.07	1.44	0.79	1.80	1.63	0.57	0.06	0.04	0.52	0.59	0.80	0.80	0.12	0.00
3.64	1.61	1.94	1.17	1.56	0.93	1.90	1.72	2.14	0.04	0.04	0.47	0.55	0.71	0.75	0.11	0.00
3.66	1.51	1.98	1.29	1.70	1.04	1.99	1.80	4.25	0.03	0.03	0.43	0.51	0.61	0.68	0.10	0.00
3.68	1.42	2.02	1.45	1.84	1.20	2.08	1.85	5.06	0.02	0.02	0.40	0.46	0.53	0.62	0.09	0.00
3.70	1.33	2.06	1.65	1.99	1.45	2.17	1.88	4.61	0.01	0.02	0.36	0.42	0.45	0.56	0.08	0.00
3.72	1.25	2.12	1.88	2.12	1.76	2.24	1.87	4.82	0.01	0.01	0.33	0.37	0.38	0.50	0.06	0.00
3.74	1.17	2.20	2.13	2.24	2.07	2.28	1.83	5.94	0.00	0.01	0.30	0.33	0.32	0.44	0.05	0.00
3.76	1.09	2.30	2.36	2.32	2.40	2.28	1.76	5.63	0.00	0.01	0.27	0.28	0.26	0.39	0.04	0.00
3.78	1.00	2.40	2.55	2.36	2.80	2.23	1.67	3.97	0.00	0.00	0.25	0.24	0.22	0.34	0.03	0.00
3.80	0.90	2.47	2.67	2.33	3.21	2.13	1.54	3.28	0.00	0.00	0.22	0.20	0.18	0.29	0.03	0.00
3.82	0.79	2.47	2.71	2.24	3.51	2.01	1.40	3.36	0.00	0.00	0.20	0.17	0.15	0.26	0.02	0.00
3.84	0.67	2.38	2.68	2.09	3.64	1.89	1.26	2.79	0.00	0.00	0.17	0.14	0.12	0.22	0.01	0.00
3.86	0.56	2.18	2.58	1.90	3.61	1.77	1.10	1.61	0.00	0.00	0.15	0.11	0.09	0.19	0.01	0.00
3.88	0.45	1.89	2.41	1.67	3.51	1.66	0.95	0.72	0.00	0.00	0.13	0.09	0.07	0.17	0.01	0.00
3.90	0.35	1.55	2.21	1.43	3.35	1.55	0.80	0.45	0.00	0.00	0.11	0.07	0.05	0.15	0.00	0.00
3.92	0.27	1.19	1.96	1.19	3.10	1.45	0.66	0.41	0.00	0.00	0.09	0.05	0.04	0.13	0.00	0.00

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.94	0.20	0.86	1.69	0.96	2.69	1.32	0.54	0.25	0.00	0.00	0.08	0.04	0.03	0.11	0.00	0.00
3.96	0.14	0.60	1.41	0.75	2.14	1.17	0.42	0.08	0.00	0.00	0.06	0.03	0.02	0.10	0.00	0.00
3.98	0.10	0.40	1.13	0.56	1.51	1.00	0.32	0.01	0.00	0.00	0.05	0.02	0.01	0.08	0.00	0.00
4.00	0.07	0.26	0.86	0.41	0.94	0.81	0.24	0.00	0.00	0.00	0.04	0.02	0.01	0.07	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.4. Classroom management densities of domain scores (and instruction)

Based on observers' video ratings

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1.10	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
1.12	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00
1.14	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.00
1.16	0.00	0.04	0.00	0.00	0.00	0.01	0.02	0.00
1.18	0.00	0.07	0.00	0.00	0.00	0.01	0.03	0.00
1.20	0.00	0.10	0.00	0.00	0.00	0.02	0.04	0.00
1.22	0.00	0.14	0.00	0.00	0.00	0.03	0.05	0.00
1.24	0.00	0.20	0.00	0.00	0.00	0.04	0.06	0.00
1.26	0.00	0.27	0.00	0.00	0.00	0.06	0.08	0.00
1.28	0.00	0.34	0.00	0.00	0.00	0.08	0.09	0.00
1.30	0.00	0.42	0.00	0.00	0.00	0.10	0.11	0.00
1.32	0.00	0.51	0.00	0.00	0.00	0.13	0.12	0.00
1.34	0.00	0.60	0.00	0.00	0.00	0.15	0.14	0.00
1.36	0.01	0.69	0.00	0.00	0.00	0.18	0.16	0.00
1.38	0.01	0.77	0.00	0.00	0.00	0.21	0.18	0.00
1.40	0.03	0.85	0.00	0.00	0.00	0.24	0.21	0.00
1.42	0.06	0.92	0.00	0.00	0.00	0.26	0.23	0.00
1.44	0.12	0.98	0.00	0.00	0.00	0.28	0.26	0.00
1.46	0.20	1.04	0.00	0.00	0.00	0.28	0.30	0.00
1.48	0.31	1.08	0.00	0.00	0.00	0.28	0.35	0.00
1.50	0.43	1.12	0.01	0.00	0.01	0.28	0.42	0.00
1.52	0.58	1.16	0.01	0.00	0.01	0.27	0.49	0.00
1.54	0.72	1.19	0.01	0.01	0.02	0.27	0.58	0.01
1.56	0.86	1.22	0.02	0.01	0.02	0.28	0.69	0.01
1.58	0.96	1.26	0.03	0.03	0.04	0.30	0.79	0.02
1.60	1.03	1.29	0.04	0.04	0.05	0.34	0.89	0.03
1.62	1.07	1.32	0.06	0.06	0.07	0.40	0.99	0.04
1.64	1.10	1.35	0.08	0.09	0.09	0.47	1.06	0.05
1.66	1.17	1.37	0.10	0.13	0.12	0.56	1.13	0.07
1.68	1.28	1.38	0.13	0.17	0.15	0.66	1.17	0.08
1.70	1.46	1.39	0.16	0.21	0.19	0.77	1.20	0.09
1.72	1.69	1.39	0.21	0.25	0.24	0.87	1.22	0.10
1.74	1.96	1.38	0.27	0.29	0.30	0.98	1.23	0.11
1.76	2.23	1.37	0.34	0.33	0.36	1.08	1.24	0.15
1.78	2.47	1.35	0.42	0.35	0.43	1.17	1.25	0.21
1.80	2.63	1.32	0.50	0.38	0.51	1.25	1.26	0.29
1.82	2.69	1.28	0.59	0.40	0.60	1.33	1.28	0.40
1.84	2.62	1.25	0.67	0.42	0.69	1.39	1.30	0.52
1.86	2.45	1.21	0.74	0.46	0.78	1.45	1.32	0.65
1.88	2.20	1.18	0.80	0.52	0.87	1.50	1.35	0.78
1.90	1.93	1.15	0.84	0.59	0.95	1.55	1.37	0.91
1.92	1.66	1.14	0.88	0.69	1.02	1.59	1.40	1.04

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.94	1.44	1.14	0.91	0.81	1.07	1.64	1.42	1.17
1.96	1.27	1.15	0.94	0.95	1.11	1.68	1.43	1.32
1.98	1.15	1.15	0.97	1.10	1.14	1.71	1.45	1.48
2.00	1.05	1.14	1.02	1.25	1.15	1.74	1.45	1.66
2.02	0.97	1.11	1.07	1.40	1.16	1.75	1.43	1.83
2.04	0.88	1.06	1.12	1.53	1.16	1.74	1.40	1.98
2.06	0.79	0.99	1.17	1.64	1.16	1.71	1.35	2.11
2.08	0.70	0.89	1.23	1.74	1.17	1.66	1.29	2.18
2.10	0.63	0.79	1.27	1.81	1.17	1.59	1.21	2.20
2.12	0.58	0.68	1.31	1.87	1.17	1.50	1.12	2.17
2.14	0.54	0.58	1.34	1.91	1.18	1.41	1.02	2.10
2.16	0.50	0.48	1.38	1.93	1.19	1.30	0.91	2.01
2.18	0.47	0.39	1.41	1.93	1.20	1.19	0.81	1.91
2.20	0.44	0.31	1.45	1.91	1.22	1.08	0.72	1.84
2.22	0.43	0.25	1.49	1.87	1.24	0.97	0.63	1.78
2.24	0.42	0.20	1.54	1.81	1.26	0.85	0.56	1.74
2.26	0.41	0.16	1.58	1.73	1.27	0.74	0.49	1.69
2.28	0.39	0.12	1.61	1.64	1.29	0.63	0.44	1.63
2.30	0.34	0.09	1.62	1.53	1.30	0.54	0.39	1.53
2.32	0.27	0.07	1.62	1.42	1.30	0.46	0.35	1.41
2.34	0.19	0.05	1.59	1.30	1.29	0.40	0.32	1.27
2.36	0.12	0.03	1.55	1.18	1.27	0.35	0.30	1.13
2.38	0.07	0.02	1.48	1.05	1.24	0.32	0.28	1.00
2.40	0.04	0.01	1.40	0.93	1.19	0.29	0.27	0.89
2.42	0.02	0.01	1.31	0.82	1.14	0.27	0.27	0.79
2.44	0.01	0.00	1.21	0.72	1.08	0.25	0.26	0.70
2.46	0.00	0.00	1.10	0.64	1.01	0.23	0.26	0.61
2.48	0.00	0.00	0.99	0.58	0.95	0.21	0.26	0.52
2.50	0.00	0.00	0.88	0.54	0.88	0.18	0.26	0.41
2.52	0.00	0.00	0.78	0.52	0.82	0.15	0.25	0.31
2.54	0.00	0.00	0.67	0.51	0.76	0.11	0.24	0.22
2.56	0.00	0.00	0.57	0.50	0.70	0.09	0.22	0.14
2.58	0.00	0.00	0.47	0.49	0.64	0.06	0.19	0.09
2.60	0.00	0.00	0.38	0.47	0.59	0.04	0.16	0.05
2.62	0.00	0.00	0.30	0.45	0.54	0.03	0.14	0.03
2.64	0.00	0.00	0.24	0.42	0.49	0.02	0.11	0.01
2.66	0.00	0.00	0.19	0.37	0.44	0.01	0.08	0.01
2.68	0.00	0.00	0.15	0.33	0.40	0.01	0.06	0.01
2.70	0.00	0.00	0.12	0.27	0.36	0.00	0.04	0.02
2.72	0.00	0.00	0.10	0.22	0.32	0.00	0.03	0.02
2.74	0.00	0.00	0.08	0.17	0.28	0.00	0.02	0.04
2.76	0.00	0.00	0.07	0.13	0.25	0.00	0.01	0.05
2.78	0.00	0.00	0.07	0.09	0.22	0.00	0.01	0.06
2.80	0.00	0.00	0.06	0.06	0.20	0.00	0.00	0.07
2.82	0.00	0.00	0.05	0.04	0.17	0.00	0.00	0.07
2.84	0.00	0.00	0.04	0.02	0.15	0.00	0.00	0.07
2.86	0.00	0.00	0.03	0.01	0.13	0.00	0.00	0.06
2.88	0.00	0.00	0.02	0.01	0.12	0.00	0.00	0.05
2.90	0.00	0.00	0.02	0.00	0.10	0.00	0.00	0.03
2.92	0.00	0.00	0.01	0.00	0.09	0.00	0.00	0.02
2.94	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.01

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.96	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.01
2.98	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.00
3.00	0.00	0.00	0.02	0.00	0.06	0.00	0.00	0.00
3.02	0.00	0.00	0.02	0.00	0.05	0.00	0.00	0.00
3.04	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.00
3.06	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00
3.08	0.00	0.00	0.06	0.00	0.05	0.00	0.00	0.00
3.10	0.00	0.00	0.08	0.00	0.05	0.00	0.00	0.00
3.12	0.00	0.00	0.09	0.00	0.05	0.00	0.00	0.00
3.14	0.00	0.00	0.10	0.00	0.04	0.00	0.00	0.00
3.16	0.00	0.00	0.11	0.00	0.04	0.00	0.00	0.00
3.18	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.00
3.20	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.00
3.22	0.00	0.00	0.09	0.00	0.02	0.00	0.00	0.00
3.24	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.00
3.26	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.00
3.28	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00
3.30	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00
3.32	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
3.34	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
3.36	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.38	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.5. Lesson length by country

Calculated from the lengths of videos rated

	Number of lessons	Mean length	Standard deviation	Minimum length	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum length
B-M-V (Chile)	196	1:02:14	0:16:36	0:22:39	0:34:27	0:43:28	1:07:40	1:16:24	1:19:47	1:24:16
Colombia	166	1:03:02	0:19:19	0:24:25	0:41:36	0:46:32	0:57:21	1:20:39	1:31:39	1:58:45
England (UK)	167	0:54:08	0:08:50	0:23:46	0:45:30	0:48:53	0:53:59	0:57:03	1:02:59	1:39:53
Germany*	100	1:04:53	0:19:36	0:40:57	0:43:18	0:45:18	1:00:26	1:26:47	1:28:20	1:30:11
K-S-T (Japan)	177	0:49:51	0:02:35	0:38:37	0:45:23	0:48:15	0:50:34	0:51:37	0:52:13	0:54:28
Madrid (Spain)	169	0:47:02	0:06:06	0:32:31	0:40:10	0:42:32	0:46:28	0:51:25	0:54:14	1:16:29
Mexico	206	0:55:11	0:16:25	0:23:24	0:39:36	0:42:47	0:51:38	1:05:16	1:19:00	2:03:50
Shanghai (China)	170	0:42:03	0:03:11	0:34:23	0:39:24	0:40:13	0:41:40	0:43:54	0:44:54	1:08:11
Global Average	1 351	0:54:23	0:15:02	0:22:39	0:40:22	0:42:36	0:50:38	1:05:44	1:17:29	2:03:50

Notes: Time shown in hours:minutes:seconds.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.6. Time on task in classrooms: Percentage of first, middle and last lesson segments that devoted more than 30 seconds to non-mathematics tasks

Based on observers' mean segment video ratings

	Domain	Indicator	First segment	Middle segments	Last segment
B-M-V (Chile)	Classroom Management	Time on Task	26.0	4.1	18.8
Colombia	Classroom Management	Time on Task	30.7	4.2	13.5
England (UK)	Classroom Management	Time on Task	11.4	2.4	14.0
Germany*	Classroom Management	Time on Task	22.0	0.0	3.6
K-S-T (Japan)	Classroom Management	Time on Task	36.7	1.1	5.6
Madrid (Spain)	Classroom Management	Time on Task	8.9	3.0	5.4
Mexico	Classroom Management	Time on Task	33.5	8.7	21.9
Shanghai (China)	Classroom Management	Time on Task	14.1	0.0	1.2

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.7. Indicators of classroom management, percent present

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Classroom Management	WholeGroup	Percent Present	1-4	98	92.78	11.65	49.65	75.00	86.48	97.50	100.00	100.00	100.00
Colombia	Classroom Management	WholeGroup	Percent Present	1-4	83	94.25	10.19	60.71	79.52	91.31	100.00	100.00	100.00	100.00
England (UK)	Classroom Management	WholeGroup	Percent Present	1-4	85	94.62	8.26	60.71	85.29	89.05	100.00	100.00	100.00	100.00
Germany*	Classroom Management	WholeGroup	Percent Present	1-4	50	88.45	10.13	62.50	73.17	79.83	91.67	97.55	100.00	100.00
K-S-T (Japan)	Classroom Management	WholeGroup	Percent Present	1-4	89	95.56	6.87	62.50	88.93	91.67	100.00	100.00	100.00	100.00
Madrid (Spain)	Classroom Management	WholeGroup	Percent Present	1-4	85	96.63	8.15	60.00	89.29	95.83	100.00	100.00	100.00	100.00
Mexico	Classroom Management	WholeGroup	Percent Present	1-4	103	91.23	13.59	31.06	69.08	82.08	100.00	100.00	100.00	100.00
Shanghai (China)	Classroom Management	WholeGroup	Percent Present	1-4	85	99.61	2.31	80.00	100.00	100.00	100.00	100.00	100.00	100.00
B-M-V (Chile)	Classroom Management	SmallGroup	Percent Present	1-4	98	4.81	14.18	0.00	0.00	0.00	0.00	0.00	21.75	72.22
Colombia	Classroom Management	SmallGroup	Percent Present	1-4	83	10.34	18.60	0.00	0.00	0.00	0.00	24.18	45.56	71.18
England (UK)	Classroom Management	SmallGroup	Percent Present	1-4	85	2.16	5.58	0.00	0.00	0.00	0.00	3.21	8.33	32.14
Germany*	Classroom Management	SmallGroup	Percent Present	1-4	50	13.67	17.11	0.00	0.00	0.00	5.43	32.73	40.73	58.33
K-S-T (Japan)	Classroom Management	SmallGroup	Percent Present	1-4	89	20.30	19.91	0.00	0.00	0.00	16.67	41.67	46.67	79.17
Madrid (Spain)	Classroom Management	SmallGroup	Percent Present	1-4	85	19.20	25.91	0.00	0.00	0.00	0.00	45.17	53.83	100.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Mexico	Classroom Management	SmallGroup	Percent Present	1-4	103	21.91	27.85	0.00	0.00	0.00	6.25	44.44	71.55	100.00
Shanghai (China)	Classroom Management	SmallGroup	Percent Present	1-4	85	4.26	9.93	0.00	0.00	0.00	0.00	5.00	15.00	50.00
B-M-V (Chile)	Classroom Management	Pairs	Percent Present	1-4	98	4.05	11.14	0.00	0.00	0.00	0.00	0.00	14.22	57.50
Colombia	Classroom Management	Pairs	Percent Present	1-4	83	5.97	14.18	0.00	0.00	0.00	0.00	6.29	21.53	70.24
England (UK)	Classroom Management	Pairs	Percent Present	1-4	85	11.46	14.02	0.00	0.00	0.00	6.25	21.43	33.42	57.14
Germany*	Classroom Management	Pairs	Percent Present	1-4	50	16.17	16.03	0.00	0.00	0.00	12.50	27.48	40.98	54.55
K-S-T (Japan)	Classroom Management	Pairs	Percent Present	1-4	89	13.54	14.46	0.00	0.00	2.50	8.33	20.83	38.33	62.50
Madrid (Spain)	Classroom Management	Pairs	Percent Present	1-4	85	6.45	13.31	0.00	0.00	0.00	0.00	10.00	21.43	53.57
Mexico	Classroom Management	Pairs	Percent Present	1-4	103	9.30	16.64	0.00	0.00	0.00	0.00	20.83	33.33	83.64
Shanghai (China)	Classroom Management	Pairs	Percent Present	1-4	85	2.49	5.87	0.00	0.00	0.00	0.00	5.00	9.33	40.00
B-M-V (Chile)	Classroom Management	Individual	Percent Present	1-4	98	47.62	23.66	0.00	14.67	25.67	49.31	69.78	78.28	93.75
Colombia	Classroom Management	Individual	Percent Present	1-4	83	22.01	21.75	0.00	0.00	0.00	16.67	35.43	50.44	88.69
England (UK)	Classroom Management	Individual	Percent Present	1-4	85	84.23	12.70	50.00	66.67	74.88	85.71	95.83	100.00	100.00
Germany*	Classroom Management	Individual	Percent Present	1-4	50	35.57	21.04	0.00	3.75	20.36	35.00	50.00	60.82	88.64
K-S-T (Japan)	Classroom Management	Individual	Percent Present	1-4	89	76.68	17.13	16.67	58.10	63.57	81.67	91.67	97.14	100.00
Madrid (Spain)	Classroom Management	Individual	Percent Present	1-4	85	31.41	21.25	0.00	4.17	15.24	25.83	47.45	63.00	100.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Mexico	Classroom Management	Individual	Percent Present	1-4	103	37.92	27.06	0.00	3.57	9.09	36.90	64.71	76.81	95.83
Shanghai (China)	Classroom Management	Individual	Percent Present	1-4	85	68.41	17.53	14.17	50.00	55.00	70.00	85.00	90.00	100.00

Notes: 1. The activity structure indicators were rated by observers on a 1 to 4 scale with a 1 indicating the activity structure was not used in the segment and a 4 indicating it was used for the entire segment. For this aggregation method, the percentage of lesson segments each observer assigned any rating greater than 1 (no use of the activity structure) was found and then averaged over observers and lessons to obtain the percentage of lesson segments for a classroom in which each structure was used.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.8. Indicators of classroom management, basic average (percentiles)

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Classroom Management	TimeOnTask	Basic Average	1-4	98	3.79	0.15	3.18	3.61	3.68	3.80	3.93	3.97	4.00
Colombia	Classroom Management	TimeOnTask	Basic Average	1-4	83	3.78	0.19	2.97	3.55	3.66	3.82	3.96	4.00	4.00
England (UK)	Classroom Management	TimeOnTask	Basic Average	1-4	85	3.86	0.12	3.43	3.69	3.77	3.89	3.96	4.00	4.00
Germany*	Classroom Management	TimeOnTask	Basic Average	1-4	50	3.89	0.10	3.58	3.79	3.85	3.89	3.96	4.00	4.00
K-S-T (Japan)	Classroom Management	TimeOnTask	Basic Average	1-4	89	3.84	0.12	3.50	3.66	3.75	3.88	3.92	4.00	4.00
Madrid (Spain)	Classroom Management	TimeOnTask	Basic Average	1-4	85	3.89	0.13	3.25	3.72	3.80	3.92	4.00	4.00	4.00
Mexico	Classroom Management	TimeOnTask	Basic Average	1-4	103	3.71	0.21	2.82	3.45	3.53	3.75	3.89	3.95	4.00
Shanghai (China)	Classroom Management	TimeOnTask	Basic Average	1-4	85	3.94	0.07	3.75	3.85	3.87	3.95	4.00	4.00	4.00

Notes: 1. This indicator was aggregated to the classroom by averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 3.A.9. Indicators of classroom management, basic average (indicator score)

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)				Percentage (indicator score)			
				below 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 3.5 and 4.0	below 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 3.5 and 4.0
B-M-V (Chile)	Classroom Management	TimeOnTask	Basic Average	0	0	3	95	0.0	0.0	3.1	96.9
Colombia	Classroom Management	TimeOnTask	Basic Average	0	0	6	77	0.0	0.0	7.2	92.8
England (UK)	Classroom Management	TimeOnTask	Basic Average	0	0	1	84	0.0	0.0	1.2	98.8
Germany*	Classroom Management	TimeOnTask	Basic Average	0	0	0	50	0.0	0.0	0.0	100.0
K-S-T (Japan)	Classroom Management	TimeOnTask	Basic Average	0	0	0	89	0.0	0.0	0.0	100.0
Madrid (Spain)	Classroom Management	TimeOnTask	Basic Average	0	0	2	83	0.0	0.0	2.4	97.6
Mexico	Classroom Management	TimeOnTask	Basic Average	0	0	15	88	0.0	0.0	14.6	85.4
Shanghai (China)	Classroom Management	TimeOnTask	Basic Average	0	0	0	85	0.0	0.0	0.0	100.0

Notes: 1. This indicator was aggregated to the classroom by averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Notes

[1] The meaning of scale points for disruptions, routines and monitoring are explained in each section. The overall mean classroom management score is an arithmetic mean of the components and therefore, are not anchored by scale point descriptors.

[2] Germany* refers to a convenience sample of volunteer schools.

[3] To compare what was observed with what students and teachers reported, the “Index of Disruptions” was created which included the three statements on the frequency of disruptions (recoded so that high scores indicate rare disruptions) plus two statements on how teachers managed disruptions: “Our teacher (I) reacted to disruptions in such a way that the students stopped disturbing lessons” and “Our teacher (I) managed to stop disruptions quickly”.

4 Social-emotional support

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Teaching practices that provide social-emotional support create classroom environments in which students can learn and develop. This chapter describes the quality of social-emotional support practices observed in lessons as well as teachers' and students' perceptions of that support.

Social-emotional support has an impact on student cognitive and non-cognitive outcomes (Pianta, Hamre and Allen, 2012[1]; Wang and Degol, 2016[2]). For example, classrooms that are socially and emotionally supportive have been associated with higher scores on standardised tests (Allen et al., 2013[3]), higher student grade point averages (Wang and Holcombe, 2010[4]) and higher motivation to achieve (Patrick, Ryan and Kaplan, 2007[5]).[1]

This chapter reports on findings from observations of lessons on the quality of social-emotional support practices, and how teachers and students perceive this support.

Key findings

- The overall levels of social-emotional support observed are moderate across participating countries/economies. Classrooms are respectful, and moderately warm and encouraging.
- Most classrooms are respectful learning communities, with few negative interactions such as threats or degrading comments.
- Nine out of ten classrooms are neither very cold and distant nor very warm and encouraging environments. Only a few classrooms show high levels of encouragement and shared warmth.
- There are differences in how teachers encourage students to persist through their learning struggles. Most teachers in Germany*[2] (92%), Mexico (84%), and Biobío, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]") (76%) provide some support to students to help them better understand their errors, while the majority of teachers in other participating countries/economies tend to ignore students' errors or treat them superficially.
- Most students report experiencing social-emotional support through a positive relationship with their teacher and during the learning process. Eight out of ten students agree that they get along with their teacher, feel treated fairly by them and report that the teacher helped them with their learning.
- Teachers tend to perceive the social-emotional environment more positively than students. Nearly all teachers believe that they provide students with support for learning and have a good relationship with them. At the classroom level, the views of teachers and students are aligned to some extent.

Classrooms were moderately supportive social-emotional environments

Observing social-emotional practices in an objective and comparable way is challenging. Classrooms function like small communities, with teachers supporting students and students supporting other students, as well as teachers (Mikami et al., 2011[6]). Behaviours showing warmth and positive effects in one classroom community may or may not have the same meaning in another. This is even more true at an international level because the meaning of 'social-emotional' can be culture-specific.[3] For example, in one culture, it could be respectful for a student to look a teacher in the eye when being spoken to, while in another, directly gazing into a teacher's eyes when being reprimanded could be considered disrespectful.

The Study breaks new ground by observing social-emotional support in international classrooms in a standardised way. To overcome the measurement challenge, observers looked for specific evidence of behaviours related to respect, encouragement and warmth, and support for struggling students in the participating countries/economies. For example, smiling and laughter are interpreted as evidence of shared warmth; using appropriate names and traditional markers of manners (please, thank you) is counted as evidence of respect.

Taking into consideration these behaviours, the overall quality of social-emotional support practices in the classroom is moderate: Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]") (3.26), Madrid (Spain) (3.24), England (UK) (3.14), Germany* (3.13), Mexico (2.81), Colombia (2.80), B-M-V (Chile) (2.80) and Shanghai (China) (2.62). Annex 4.A, Tables 4.A.1 and 4.A.2 show descriptive statistics for each country/economy.

There are important differences in the levels of social-emotional support within each country/economy (Figure 4.1). For example, in Madrid (Spain) the quality of social-emotional practices ranges from 2 to 3.61. Ranges of a similar size were observed in every country/economy and suggest that in each country/economy, there were both classrooms with strong social-emotional practices in place, as well as classrooms with space for improving such practices.

It is worthwhile to note that no classrooms had very low scores on the overall quality of social-emotional support. Virtually no classroom had a score below 2 on a four-point scale. This indicates that there were very few or no students exposed to social-emotionally unsupportive environments across all participating countries/economies.

Classroom interactions were highly respectful

Building a safe environment in which students are treated, and treat one another, with respect and dignity is important to learning (Beghetto and Baxter, 2012[7]; Jansen, 2008[8]; Kapur, 2014[9]; Steuer, Rosentritt-Brunn and Dresel, 2013[10]). In the classroom, for example, students need to feel comfortable enough to be able to make mistakes and learn from those mistakes in front of their peers and teachers.

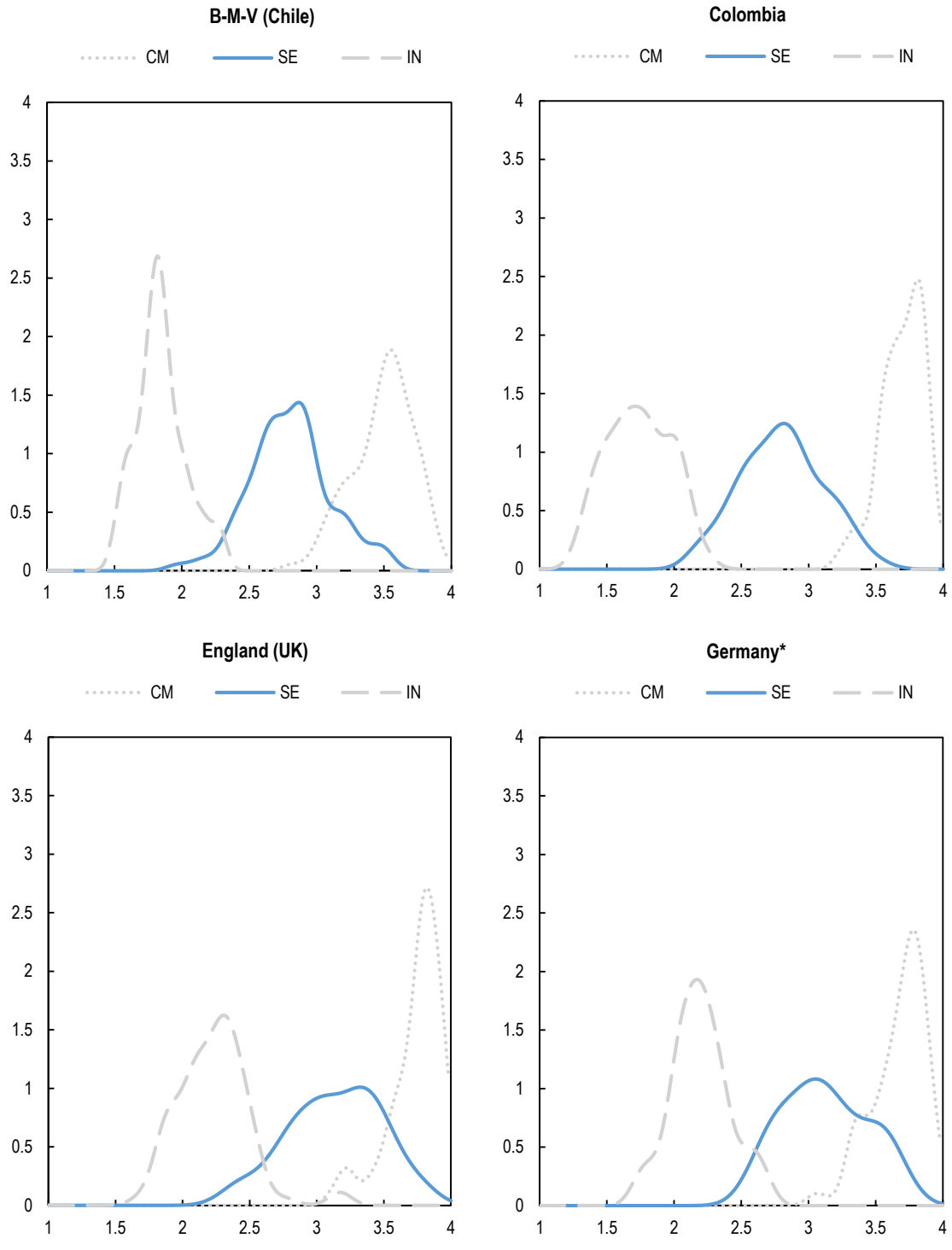
Observers holistically rated the level of respect in the lesson on a four-point scale through an evaluation of respectful and disrespectful behaviours. Respectful behaviours included instances in which teachers and students used respectful language, listened to one another, used appropriate names (e.g. Mr. or Mrs., Professor), used a respectful tone of voice and used traditional markers of manners (please, thank you, etc.). Examples of disrespectful behaviours include threats, mean or degrading comments and physical aggression (e.g. pushing someone or slamming a textbook against a desk). When respectful practices are low (score 1), the teacher and students rarely demonstrate respect for one another and there are negative interactions between them. When respectful practices are of high quality (score 4), the teachers and students consistently show the recognised respectful behaviours for one another and there are no negative interactions.

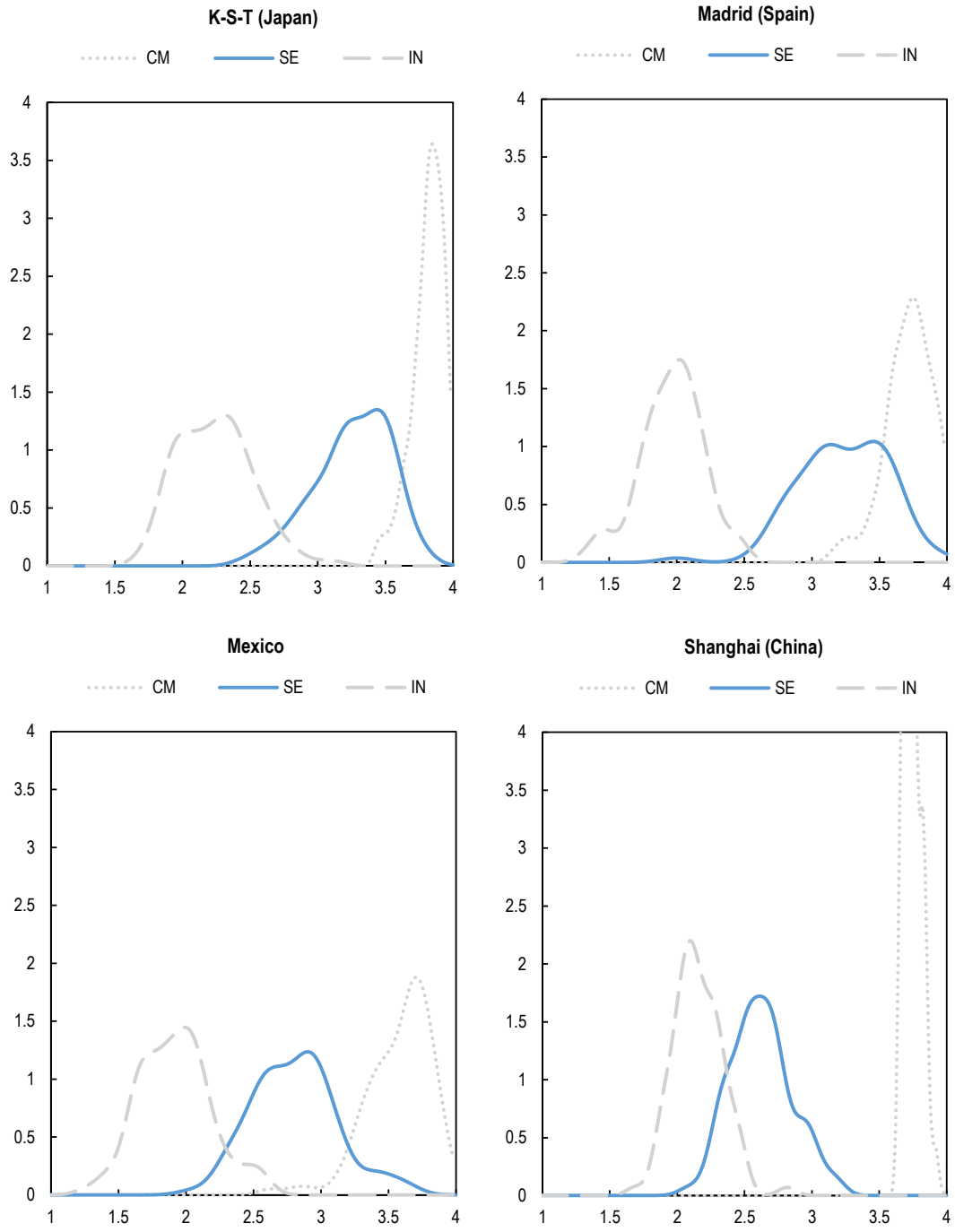
Classroom interactions were highly respectful. The observed level of respect in an average classroom in all countries/economies was above three on a four-point scale: Madrid (Spain) (3.75), K-S-T (Japan) (3.68), England (UK) (3.56), Colombia (3.44), Germany* (3.42), Mexico (3.30), B-M-V (Chile) (3.34) and Shanghai (China) (3.12).

There were virtually no classrooms in which teachers and students consistently demonstrated disrespect for one another and interacted in a negative way. The lowest classroom score ranges started from 2.03 in B-M-V (Chile) and 2.63 in Shanghai (China). Moreover, nine out of ten classrooms across participating countries/economies had a score between 3 and 4, indicating that the vast majority of students and teachers treated each other very respectfully (Figure 4.2).

Figure 4.1. Observed quality of social-emotional support

Distribution of classrooms by the mean classroom domain score



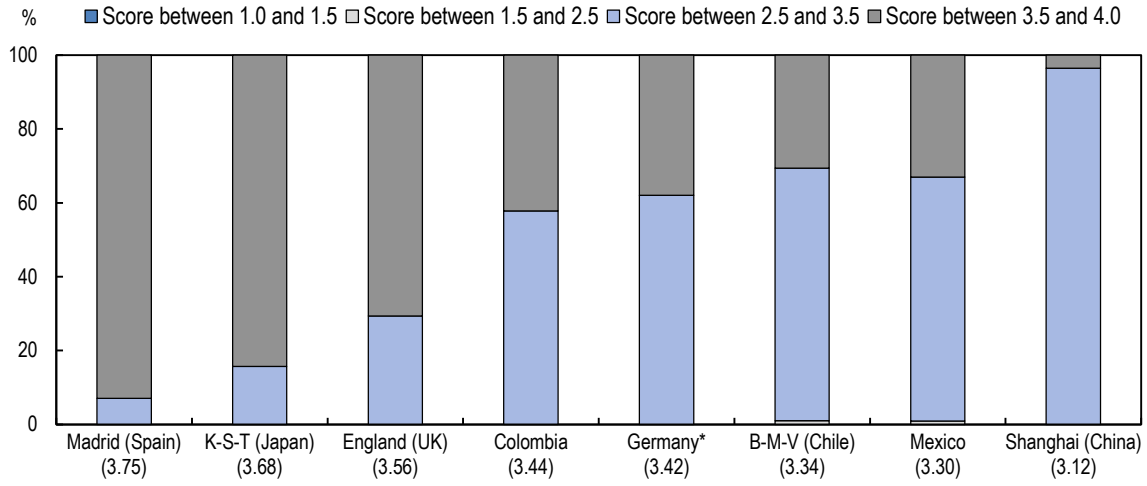


Notes: The social-emotional support (SE) domain score (blue solid line) for classrooms is the mean over two components: respect and encouragement and warmth. CM and IN refer to the domain score for classroom management and instruction, respectively.
The density curves for instruction (grey dashed line) and classroom management (grey dotted line) are included for reference.
This figure is a smoothed histogram of classroom scores using an interval size of 0.02 score points. The y-axis is density. The more peaked the curve is, the more classrooms have mean scores concentrated around a few score points (i.e. the more densely populated is that range under the curve).
The density curves are meant to convey the general shape of the distributions.
The classroom management curve for Shanghai (China) is truncated at y=4.0; it peaks at a density of 5.94 for the classroom mean score of 3.74.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Figure 4.2. Observed level of respect in teacher and students interactions

Percentage of classrooms by mean respect score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw score is based on observers' video ratings that range between 1 and 4 with 1 indicating teacher and students rarely demonstrating respect and occasionally demonstrating disrespect and 4 indicating frequent and consistent demonstrations of respect with no disrespectful behaviours.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score for respect.
Source: OECD, Global Teaching InSights Database.

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Classrooms were neither warm nor cold environments

Authentic learning is uncertain and can be emotionally uncomfortable. As students confront learning challenges, they may wonder if they are "smart enough" or "have what it takes" to do challenging work. Environments that are encouraging and warm support both the teacher and students in building the motivation, confidence and interest needed to learn in an authentic way. A recent literature review found that classrooms and schools in which teachers and students demonstrate encouragement and warmth are places in which students have higher academic achievement and motivation for learning (Wang and Degol, 2016[2]).

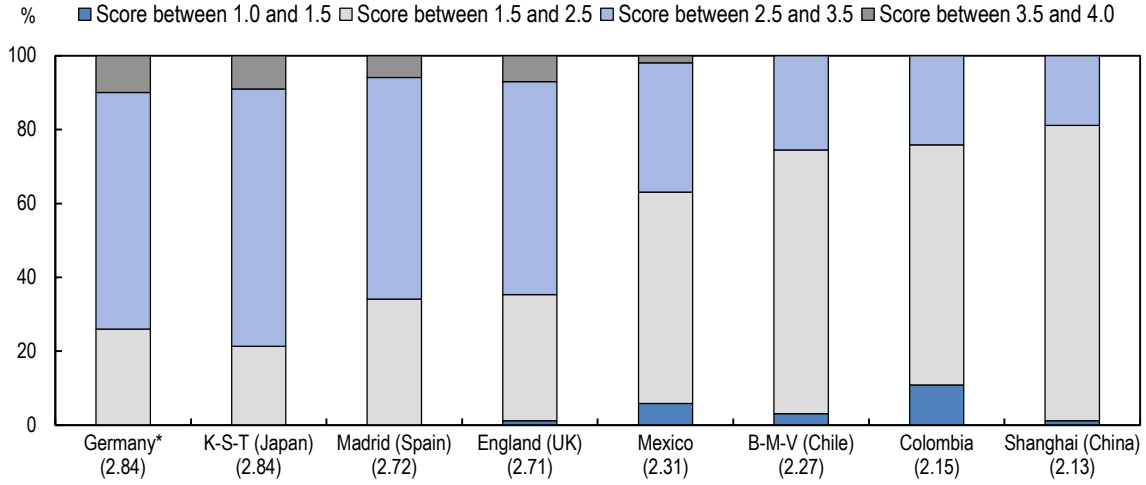
On a four-point scale, observers holistically rated the degree to which teachers and students provided encouragement (e.g. reassuring statements when errors are made, positive comments, compliments about students' mathematical work) and the degree to which there were moments of shared warmth (i.e. smiling, laughter, joking and playfulness). Lessons varied from having no encouraging behaviours and/or shared warmth (score 1) to having frequent encouraging and shared warmth behaviours (score 4).

Classrooms were neither very cold and distant nor very warm and encouraging environments. On average, encouragement and warmth practices were sometimes observed in K-S-T (Japan) (2.84), Germany* (2.84), Madrid (Spain) (2.72), England (UK) (2.71), and less frequently in Mexico (2.31), B-M-V (Chile) (2.27), Colombia (2.15) and Shanghai (China) (2.13). Roughly 90% of all classrooms in countries/economies had mean levels of encouragement and warmth that fell between 2 and 3 on the scale, meaning the behaviours that showed encouragement and shared warmth occurred "infrequently" or "sometimes" during the lessons.

There is little variation on the levels of encouragement and warmth across classrooms within countries and economies. Only one of every ten classrooms had an extreme classroom environment. An extreme environment is one that was rated in the lowest or highest category (Figure 4.3). A very encouraging and warm environment was observed in a few classrooms in Germany* (10%), K-S-T (Japan) (9%), England (UK) (7%) and Madrid (Spain) (6%). At the other end of the spectrum, Colombia (11%) and Mexico (6%) had a few classrooms where encouragement and warmth are not present at all.

Figure 4.3. Shared encouragement and warmth observed in the classroom

Percentage of classrooms by mean encouragement and warmth score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw score is based on observers' video ratings that range between 1 and 4 with 1 indicating no encouragement and no evidence of shared warmth and 4 indicating frequent encouragement and moments of shared warmth.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score for encouragement and warmth.
Source: OECD, Global Teaching InSights Database.

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Students received little support to persist through their learning struggles

It is common for students to make mistakes when learning– they carry out incorrect computations, they skip steps, or their answers are incorrect and they do not understand why. These errors and confusion can be vulnerable moments for students as they try to understand the mathematics, perhaps leading them to question their abilities and feel incompetent in the subject. But, at the same time this may provide opportunities to develop what is increasingly recognised as an important social-emotional skill – persistence (Barnes, 2019[11]).

In order for there to be an opportunity to show persistence, students needed to be aware they made a mistake or were struggling mathematically. Observers looked for instances of teachers pointing out errors (e.g. “You do not have number five correct.” or “That one is not quite right.”) or students realising themselves (e.g. “Oh, I see what I did wrong.” “We didn’t get number four right.” “I don’t understand.”). These opportunities to show persistence are present in virtually all classrooms observed across countries/economies (see Annex 4.A, Table 4.A.7). In England (UK), Germany*, K-S-T (Japan) and Madrid (Spain), student or teacher realisations of mistakes or learning struggles occurred in about half or more of the lessons observed.

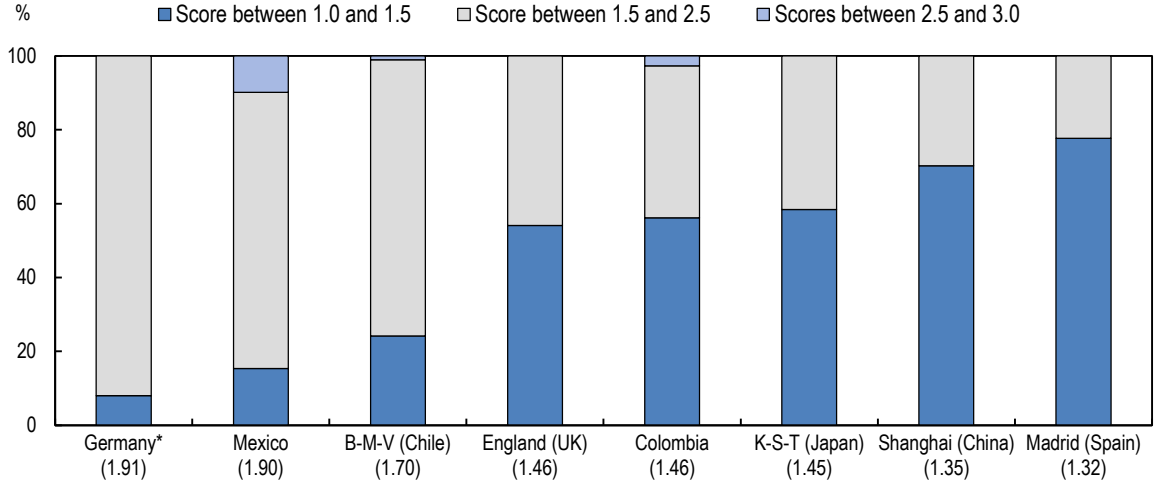
While it is unrealistic for teachers to spend considerable effort or time with every student error or misunderstanding, supporting students in their struggles provides opportunities to encourage the development of mathematical understanding and the social-emotional skill of persistence. There are different ways in which teachers can make use of opportunities for students to persist.

Observers rated on 1 to 4 scale. A rating of 1 indicated that there was no opportunity to show persistence. As there was no evidence that the students knew they had made an error or were struggling, those segments were disregarded and the scores were rescaled to range from 1 to 3. In Figure 4.4, a score 1 indicates that the teacher ignored or superficially addressed students' struggles, while a score 3 indicates the teacher supported students to address their struggle with depth.

Mistakes are rich learning opportunities – both for understanding mathematics more deeply and for developing persistence (Kapur and Bielaczyc, 2012[12]; Metcalfe, 2017[13]). There are however, many students in a classroom and therefore, teachers must decide how to handle any individual student's error and struggle given the group context. Further, teachers may allow students to struggle with their own errors or allow an error to be uncorrected for some time deliberately to support students' learning to think critically and independently. Teachers did not react to students' errors and struggles in the same ways within and across countries/economies. The vast majority of teachers in Germany* (92%), Mexico (85%) and B-M-V (Chile) (76%) moderately or strongly supported students to continue to show effort through their mathematical struggle (Figure 4.4). In contrast, the majority of teachers in Madrid (Spain) (78%), Shanghai (China) (70%), K-S-T (Japan) (58%), Colombia (56%) and England (UK) (54%) either ignored the mistakes or superficially encouraged students to continue to show effort through the challenge (scores between 1.0 and 1.5 in the figure).

Figure 4.4. Observed level of support to student persistence in classrooms

Percentage of classrooms by mean persistence score, after removing segments for which there was no opportunity to demonstrate persistence



Notes: The country/economy mean indicator persistence score is shown below the country/economy name, excluding any ratings that indicate there was no opportunity for persistence.
The original rating scale ranges from 1 to 4, but a rating of 1 indicates no opportunity to show persistence. Ratings of 1 were dropped from this analysis and the 2 to 4 ratings were rescaled to range from 1 to 3.
The raw score is based on observers' video ratings that range between 1 and 3 with 1 indicating that the teacher ignored or superficially addressed students' struggles to 3 indicating the teacher supported students addressing their struggle with depth.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score for persistence.
Source: OECD, Global Teaching InSights Database.

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Teachers and students were positive about the classroom environment

Students' and teachers' perceptions and feelings – both their individual experience and their shared collective experience as a class - matters. Social-emotional support is arguably the most personal aspect of teaching. Teachers need to understand the student's perspective and respond in a supportive way -- being aware of students' needs, acting responsibly, caring both for students' learning and personal growth. These interactions depend on teachers' own perceptions and feelings, and in turn shape their own experience in the classroom.

Students felt social-emotionally supported in class

Students and teachers were asked about their level of agreement with comparable statements related to the level of social-emotional support in the classroom. Across all participating countries/economies, most students felt social-emotionally supported both in terms of receiving support for learning and having a positive relationship with their teacher (Table 4.1).

Table 4.1. Student perceptions on social-emotional support

Percentage of students who agreed or strongly agreed with three statements on teacher support for learning and five statements on teacher-student relationship

	Teacher Support for Learning			Teacher-Student Relationship				
	Our mathematics teacher …			I got along well with my mathe-matics teacher.	My mathematics teacher …			
	...gave extra help when we needed it.	...continued teaching until we understood.	...helped us with our learning.		...was interested in my well-being	...really listened to what I had to say	...treated me fairly	...made me feel she/he really cared about me.
B-M-V (Chile)	87	87	92	91	83	85	87	78
Colombia	87	87	92	90	77	83	90	75
England (UK)	89	85	94	89	77	79	91	68
Germany*	77	64	66	81	69	78	85	59
K-S-T (Japan)	69	81	92	84	51	86	91	69
Madrid (Spain)	79	85	89	84	80	82	85	72
Mexico	88	89	92	90	82	86	91	79
Shanghai (China)	94	89	96	91	84	88	93	84

Notes: Response scale: Strongly disagree – Disagree – Agree – Strongly agree.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Most notably, eight out of ten students agreed that they got along with their teacher, felt treated fairly by them and reported that the teacher helped them with their learning in all countries/economies except for Germany* on the last statement. Most students also agreed that their teacher was interested about their well-being and cared about them.

Teachers believed that they provided great social-emotional support

Virtually every teacher believed that they provided students with support for learning and nurtured their relationship in all countries/economies except for K-S-T (Japan). For example, every single teacher reported treating students fairly and listening to what they had to say (see Annex 4.A, Table 4.A.10). The perceptions of the overwhelming majority of Japanese teachers were like those of their peers in other countries, although two out of ten considered that they could do more to improve the social-emotional environment in the classroom.

Teachers tended to have more positive views than students in terms of the social-emotional support they provided. These differences are in line with findings from other studies (OECD, 2016[14]). Students may want to receive more social-emotional support than teachers are aware of. The gap between teacher and student views may also reflect more critical attitudes among students or some bias due to positive self-reporting among teachers.

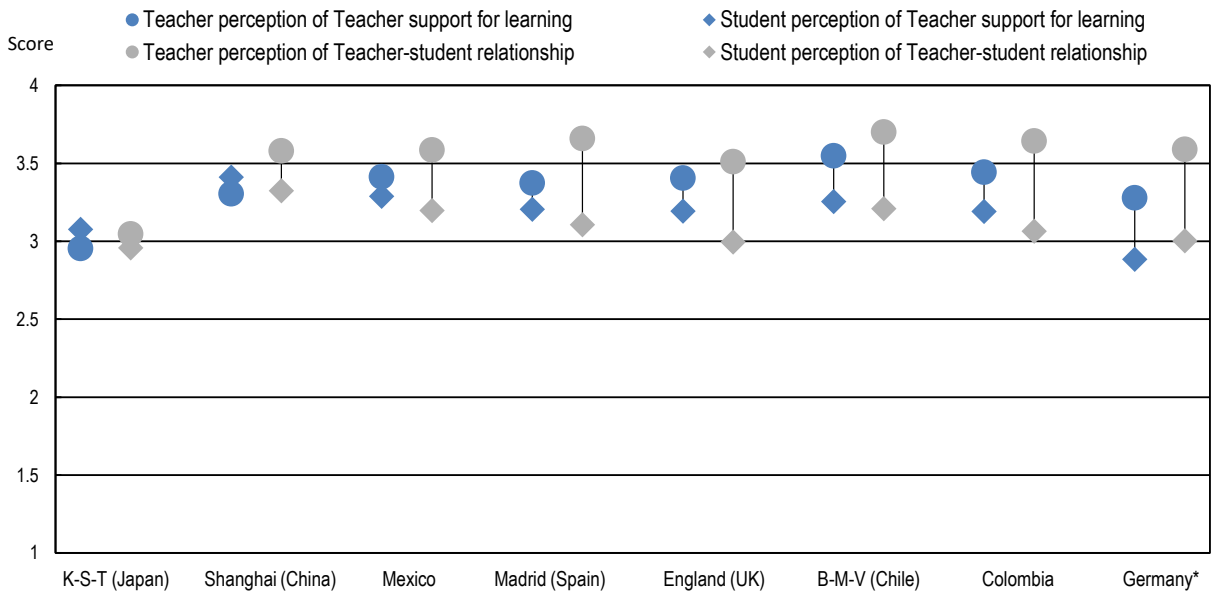
The smallest discrepancies between teacher and student views were regarding whether the teacher continued teaching until students understood the content. Teachers may be more cautious to claim that students understand the content taught than students themselves.

In contrast, student and teacher reports differed most strongly in social-emotional aspects related to their relationship such as “I showed interest in those students’ well-being” and “I made those students feel I really cared about them”. Teachers and students may experience emotional warmth differently, and they may hold different expectations of what a desirable and appropriate expression of caring looks like.

To further compare their responses, teachers’ and students’ views were aggregated in a respective index of teacher support for learning and teacher-student relationship (Figure 4.5). These are the result of averaging students’ and teachers’ four-point scale responses on the agreement with the abovementioned statements. The gap between teacher reports and student reports can be shown to be statistically significant for both indices in each country/economy – with the exception of Teacher Support for Learning in K-S-T (Japan) and Shanghai (China), where teacher perceptions and student perceptions were very close.

Figure 4.5. Teacher and student perceptions on support for learning and teacher-student relationship

Country/economy means of teachers' and students' indices of social-emotional support



Notes: Response scale: 1 Strongly disagree – 2 Disagree – 3 Agree – 4 Strongly agree.
*Germany refers to a convenience sample of volunteer schools.
Countries/economies are ordered from left to right with increasing magnitude of the difference between teacher judgements and student judgements.
Source: OECD, Global Teaching InSights Database.

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The views of the teacher and students of the same classroom were loosely aligned

Do students' views align to that of their teacher? At the classroom level, teachers' and students' indices of social-emotional support were significantly correlated in the majority of countries/economies. The teacher of students who reported better social-emotional support in their class also tended to report a better climate and vice versa. In the teacher support for learning index, correlations between teachers' perceptions and students' perceptions were significant in B-M-V (Chile) (0.22), Shanghai (China) (0.24), Mexico (0.26), K-S-T (Japan) (0.29) and Germany* (0.43), while in the teacher-student relationship index, correlations were significant in England (UK) (0.32), K-S-T (Japan) (0.35), Shanghai (China) (0.37), Mexico (0.42) and Germany* (0.56).

It is worth noting that teacher perceptions and student perceptions were quite well aligned when reporting on the quality of their relationship, but rather weakly when reporting on the quality of learning support.

What looks like a warm classroom environment might not feel so

Teachers' and students' subjective perception of the classroom environment might be different from that based on evidence from an independent observer. For example, observers noted that classrooms in Germany* and K-S-T (Japan) have similarly high levels of encouragement and warmth, while seven out of ten German students and only half of their Japanese peers considered that the teacher cared about their well-being. Thus, students and observers had similar views on German classrooms but they disagreed on

Japanese ones. Combining different sources of evidence can provide a richer, more complete, and also more diverse understanding of teaching and learning. However, these differences need to be interpreted with great caution as, for example, Japanese students might respond differently than German ones due to cultural factors.

Interpreting social-emotional qualities of classroom interaction requires a good deal of sensitivity for different perspectives on what seems to be the same reality. Yet, manoeuvring the social-emotional dynamics is a major task teachers are facing on a daily basis. Against this background, the fact that teachers – with the exception of the Japanese - reported overly positively with regard to the support they provided or the relationship they had established with their students, raises questions.

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Annex 4.A. Chapter tables

Annex Table 4.A.1. Components of social-emotional support (percentiles)

Based on observers' mean classroom video ratings

	Domain	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Social-Emotional Support	Respect	98	3.34	0.29	2.03	3.05	3.17	3.38	3.58	3.68	3.88
Colombia	Social-Emotional Support	Respect	83	3.44	0.25	2.50	3.17	3.25	3.45	3.63	3.71	3.92
England (UK)	Social-Emotional Support	Respect	85	3.56	0.39	2.50	2.93	3.25	3.67	3.90	4.00	4.00
Germany*	Social-Emotional Support	Respect	50	3.42	0.28	2.65	3.14	3.18	3.41	3.67	3.81	4.00
K-S-T (Japan)	Social-Emotional Support	Respect	89	3.68	0.24	2.50	3.42	3.50	3.75	3.87	4.00	4.00
Madrid (Spain)	Social-Emotional Support	Respect	85	3.75	0.26	2.50	3.50	3.57	3.83	4.00	4.00	4.00
Mexico	Social-Emotional Support	Respect	103	3.30	0.29	2.48	2.95	3.02	3.31	3.56	3.67	3.83
Shanghai (China)	Social-Emotional Support	Respect	85	3.12	0.17	2.63	3.00	3.00	3.08	3.25	3.33	3.50
B-M-V (Chile)	Social-Emotional Support	Encouragement	98	2.27	0.48	1.25	1.56	1.86	2.25	2.64	3.00	3.42
Colombia	Social-Emotional Support	Encouragement	83	2.15	0.53	1.08	1.47	1.70	2.19	2.55	2.83	3.31
England (UK)	Social-Emotional Support	Encouragement	85	2.71	0.50	1.42	2.08	2.20	2.75	3.08	3.32	3.75
Germany*	Social-Emotional Support	Encouragement	50	2.84	0.51	1.68	2.20	2.33	2.83	3.28	3.46	3.88
K-S-T (Japan)	Social-Emotional Support	Encouragement	89	2.84	0.49	1.50	2.17	2.42	2.92	3.28	3.42	3.83
Madrid (Spain)	Social-Emotional Support	Encouragement	85	2.72	0.55	1.50	2.00	2.17	2.71	3.25	3.40	4.00
Mexico	Social-Emotional Support	Encouragement	103	2.31	0.53	1.08	1.67	1.93	2.29	2.73	3.05	3.68
Shanghai (China)	Social-Emotional Support	Encouragement	85	2.13	0.35	1.38	1.67	1.83	2.08	2.42	2.61	2.92
B-M-V (Chile)	Social-Emotional Support	Domain mean	98	2.80	0.30	1.97	2.45	2.58	2.81	3.00	3.20	3.52
Colombia	Social-Emotional Support	Domain mean	83	2.80	0.31	2.16	2.40	2.54	2.79	3.08	3.24	3.53
England (UK)	Social-Emotional Support	Domain mean	85	3.14	0.35	2.31	2.69	2.84	3.14	3.46	3.58	3.83
Germany*	Social-Emotional Support	Domain mean	50	3.13	0.32	2.57	2.75	2.83	3.10	3.48	3.57	3.75
K-S-T (Japan)	Social-Emotional Support	Domain mean	89	3.26	0.28	2.46	2.88	3.00	3.25	3.50	3.57	3.79
Madrid (Spain)	Social-Emotional Support	Domain mean	85	3.24	0.33	2.00	2.82	2.97	3.25	3.54	3.61	3.96

	Domain	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Mexico	Social-Emotional Support	Domain mean	103	2.81	0.31	2.04	2.42	2.55	2.79	3.02	3.16	3.67
Shanghai (China)	Social-Emotional Support	Domain mean	85	2.62	0.23	2.08	2.33	2.42	2.63	2.79	2.95	3.19

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.2. Components of social-emotional support (component score)

Based on observers' mean classroom video ratings

	Domain	Component	Frequency (component score)				Percentage (component score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
B-M-V (Chile)	Social-Emotional Support	Respect	0	1	67	30	0.0	1.0	68.4	30.6
Colombia	Social-Emotional Support	Respect	0	0	48	35	0.0	0.0	57.8	42.2
England (UK)	Social-Emotional Support	Respect	0	0	25	60	0.0	0.0	29.4	70.6
Germany*	Social-Emotional Support	Respect	0	0	31	19	0.0	0.0	62.0	38.0
K-S-T (Japan)	Social-Emotional Support	Respect	0	0	14	75	0.0	0.0	15.7	84.3
Madrid (Spain)	Social-Emotional Support	Respect	0	0	6	79	0.0	0.0	7.1	92.9
Mexico	Social-Emotional Support	Respect	0	1	68	34	0.0	1.0	66.0	33.0
Shanghai (China)	Social-Emotional Support	Respect	0	0	82	3	0.0	0.0	96.5	3.5
B-M-V (Chile)	Social-Emotional Support	Encouragement	3	70	25	0	3.1	71.4	25.5	0.0
Colombia	Social-Emotional Support	Encouragement	9	54	20	0	10.8	65.1	24.1	0.0
England (UK)	Social-Emotional Support	Encouragement	1	29	49	6	1.2	34.1	57.6	7.1
Germany*	Social-Emotional Support	Encouragement	0	13	32	5	0.0	26.0	64.0	10.0
K-S-T (Japan)	Social-Emotional Support	Encouragement	0	19	62	8	0.0	21.3	69.7	9.0
Madrid (Spain)	Social-Emotional Support	Encouragement	0	29	51	5	0.0	34.1	60.0	5.9
Mexico	Social-Emotional Support	Encouragement	6	59	36	2	5.8	57.3	35.0	1.9
Shanghai (China)	Social-Emotional Support	Encouragement	1	68	16	0	1.2	80.0	18.8	0.0
B-M-V (Chile)	Social-Emotional Support	Domain mean	0	13	83	2	0.0	13.3	84.7	2.0
Colombia	Social-Emotional Support	Domain mean	0	13	69	1	0.0	15.7	83.1	1.2
England (UK)	Social-Emotional Support	Domain mean	0	5	69	11	0.0	5.9	81.2	12.9
Germany*	Social-Emotional Support	Domain mean	0	0	40	10	0.0	0.0	80.0	20.0
K-S-T (Japan)	Social-Emotional Support	Domain mean	0	1	65	23	0.0	1.1	73.0	25.8
Madrid (Spain)	Social-Emotional Support	Domain mean	0	1	61	23	0.0	1.2	71.8	27.1
Mexico	Social-Emotional Support	Domain mean	0	15	85	3	0.0	14.6	82.5	2.9
Shanghai (China)	Social-Emotional Support	Domain mean	0	22	63	0	0.0	25.9	74.1	0.0

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.3. Social-emotional support densities of domain scores (and classroom management)

Based on observers' video ratings

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.03	0.02	0.00
1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.03	0.02	0.01
1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.03	0.02	0.01
1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.04	0.03	0.02
1.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.00	0.00	0.00	0.04	0.04	0.02
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.00	0.00	0.00	0.04	0.04	0.04
2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.05	0.00	0.00	0.00	0.04	0.05	0.05
2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.01	0.00	0.00	0.04	0.06	0.06
2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.09	0.01	0.00	0.00	0.03	0.06	0.07
2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.11	0.01	0.00	0.00	0.03	0.07	0.08
2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.14	0.01	0.00	0.00	0.03	0.09	0.10
2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.16	0.02	0.00	0.00	0.02	0.10	0.11

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.19	0.03	0.00	0.00	0.02	0.12	0.14
2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.21	0.03	0.00	0.00	0.02	0.15	0.17
2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.24	0.04	0.00	0.00	0.01	0.18	0.22
2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.27	0.05	0.00	0.00	0.01	0.21	0.29
2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.29	0.07	0.00	0.00	0.01	0.25	0.38
2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.32	0.08	0.01	0.00	0.01	0.28	0.47
2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.35	0.09	0.01	0.01	0.01	0.32	0.58
2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.38	0.11	0.01	0.01	0.01	0.36	0.69
2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.41	0.13	0.02	0.01	0.01	0.41	0.80
2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.44	0.14	0.02	0.02	0.01	0.45	0.90
2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.48	0.16	0.03	0.03	0.01	0.49	0.98
2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.52	0.18	0.04	0.03	0.01	0.53	1.05
2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.57	0.19	0.06	0.04	0.01	0.57	1.11
2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.61	0.21	0.08	0.05	0.02	0.62	1.17
2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.66	0.22	0.10	0.06	0.03	0.67	1.23
2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.62	0.71	0.23	0.12	0.07	0.04	0.72	1.30
2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.67	0.75	0.25	0.15	0.08	0.05	0.77	1.37
2.48	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72	0.80	0.26	0.18	0.10	0.06	0.82	1.46
2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.78	0.84	0.27	0.22	0.11	0.07	0.88	1.54
2.52	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.84	0.88	0.29	0.26	0.12	0.09	0.93	1.60
2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.91	0.92	0.30	0.31	0.14	0.11	0.97	1.66
2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.98	0.95	0.32	0.35	0.15	0.14	1.01	1.69
2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	1.05	0.98	0.34	0.40	0.16	0.16	1.04	1.71
2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.12	1.00	0.37	0.45	0.18	0.19	1.07	1.72
2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.19	1.03	0.40	0.50	0.20	0.23	1.09	1.72
2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.24	1.06	0.42	0.55	0.21	0.26	1.10	1.71
2.66	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.28	1.08	0.46	0.60	0.23	0.30	1.11	1.70
2.68	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.31	1.11	0.49	0.65	0.25	0.34	1.11	1.66
2.70	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.32	1.14	0.52	0.69	0.27	0.38	1.11	1.60
2.72	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.33	1.16	0.56	0.73	0.30	0.42	1.12	1.52

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.74	0.03	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.33	1.19	0.60	0.77	0.32	0.46	1.12	1.42
2.76	0.04	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.34	1.21	0.63	0.80	0.35	0.50	1.13	1.30
2.78	0.05	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.35	1.23	0.67	0.83	0.38	0.54	1.15	1.17
2.80	0.06	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.37	1.24	0.70	0.86	0.41	0.58	1.16	1.04
2.82	0.06	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.40	1.24	0.73	0.89	0.44	0.61	1.18	0.92
2.84	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.42	1.24	0.76	0.91	0.47	0.65	1.20	0.83
2.86	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.44	1.22	0.79	0.93	0.50	0.68	1.22	0.76
2.88	0.08	0.00	0.00	0.01	0.00	0.00	0.07	0.00	1.43	1.19	0.81	0.96	0.54	0.71	1.23	0.71
2.90	0.09	0.00	0.00	0.01	0.00	0.00	0.07	0.00	1.41	1.16	0.83	0.98	0.57	0.74	1.23	0.69
2.92	0.11	0.00	0.00	0.02	0.00	0.00	0.07	0.00	1.35	1.11	0.86	1.00	0.60	0.77	1.23	0.67
2.94	0.14	0.00	0.00	0.03	0.00	0.00	0.06	0.00	1.28	1.06	0.87	1.02	0.63	0.80	1.21	0.66
2.96	0.18	0.00	0.00	0.04	0.00	0.00	0.06	0.00	1.18	1.01	0.89	1.04	0.67	0.83	1.19	0.64
2.98	0.22	0.00	0.01	0.06	0.00	0.00	0.06	0.00	1.06	0.96	0.90	1.05	0.70	0.86	1.15	0.61
3.00	0.27	0.00	0.02	0.07	0.00	0.00	0.06	0.00	0.95	0.91	0.92	1.06	0.73	0.89	1.10	0.56
3.02	0.32	0.00	0.03	0.09	0.00	0.00	0.07	0.00	0.84	0.86	0.93	1.07	0.77	0.92	1.04	0.51
3.04	0.38	0.00	0.05	0.10	0.00	0.01	0.08	0.00	0.74	0.82	0.93	1.08	0.81	0.95	0.98	0.44
3.06	0.43	0.00	0.07	0.10	0.00	0.02	0.10	0.00	0.66	0.78	0.94	1.08	0.86	0.97	0.91	0.38
3.08	0.49	0.00	0.10	0.10	0.00	0.03	0.13	0.00	0.60	0.75	0.94	1.08	0.91	0.99	0.84	0.33
3.10	0.54	0.01	0.13	0.10	0.00	0.05	0.16	0.00	0.56	0.73	0.95	1.07	0.97	1.01	0.76	0.28
3.12	0.59	0.02	0.17	0.09	0.00	0.07	0.19	0.00	0.54	0.70	0.95	1.05	1.02	1.02	0.69	0.25
3.14	0.64	0.03	0.21	0.08	0.00	0.10	0.24	0.00	0.53	0.68	0.95	1.03	1.08	1.02	0.62	0.22
3.16	0.68	0.05	0.25	0.08	0.00	0.12	0.29	0.00	0.52	0.66	0.96	1.01	1.13	1.02	0.55	0.19
3.18	0.72	0.08	0.29	0.10	0.00	0.15	0.35	0.00	0.51	0.64	0.96	0.99	1.17	1.01	0.49	0.17
3.20	0.75	0.12	0.31	0.12	0.00	0.17	0.41	0.00	0.49	0.61	0.97	0.96	1.21	1.00	0.43	0.15
3.22	0.78	0.15	0.32	0.17	0.00	0.19	0.48	0.00	0.47	0.58	0.98	0.93	1.23	0.99	0.38	0.12
3.24	0.80	0.19	0.31	0.24	0.00	0.21	0.56	0.00	0.44	0.55	0.98	0.91	1.25	0.99	0.33	0.10
3.26	0.82	0.22	0.29	0.33	0.00	0.22	0.63	0.00	0.41	0.52	0.99	0.88	1.27	0.98	0.30	0.07
3.28	0.83	0.26	0.26	0.43	0.00	0.22	0.70	0.00	0.37	0.49	1.00	0.85	1.27	0.98	0.27	0.05
3.30	0.86	0.30	0.23	0.54	0.00	0.21	0.78	0.00	0.33	0.45	1.01	0.83	1.28	0.98	0.25	0.03
3.32	0.89	0.33	0.22	0.63	0.00	0.21	0.84	0.00	0.30	0.41	1.01	0.81	1.29	0.98	0.23	0.02

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.34	0.94	0.36	0.21	0.71	0.00	0.22	0.91	0.00	0.28	0.37	1.01	0.79	1.30	0.99	0.22	0.01
3.36	1.01	0.37	0.22	0.75	0.01	0.24	0.96	0.00	0.25	0.33	1.00	0.77	1.31	1.00	0.22	0.01
3.38	1.10	0.37	0.24	0.77	0.03	0.28	1.02	0.00	0.24	0.30	0.99	0.76	1.32	1.02	0.21	0.00
3.40	1.21	0.38	0.27	0.78	0.08	0.33	1.07	0.00	0.23	0.26	0.97	0.75	1.34	1.03	0.21	0.00
3.42	1.32	0.41	0.31	0.77	0.14	0.40	1.11	0.00	0.23	0.23	0.95	0.74	1.35	1.04	0.20	0.00
3.44	1.45	0.48	0.36	0.77	0.21	0.48	1.14	0.00	0.23	0.20	0.92	0.73	1.35	1.04	0.20	0.00
3.46	1.57	0.62	0.41	0.79	0.25	0.56	1.18	0.00	0.23	0.18	0.88	0.73	1.34	1.04	0.19	0.00
3.48	1.68	0.81	0.48	0.82	0.27	0.66	1.20	0.00	0.22	0.15	0.84	0.72	1.32	1.04	0.19	0.00
3.50	1.77	1.04	0.56	0.88	0.28	0.79	1.24	0.00	0.21	0.13	0.80	0.71	1.28	1.03	0.18	0.00
3.52	1.84	1.26	0.65	0.95	0.30	0.95	1.27	0.00	0.19	0.11	0.75	0.70	1.23	1.01	0.17	0.00
3.54	1.88	1.46	0.75	1.03	0.35	1.13	1.32	0.00	0.16	0.10	0.70	0.69	1.17	0.98	0.16	0.00
3.56	1.88	1.62	0.84	1.12	0.42	1.33	1.38	0.00	0.14	0.08	0.66	0.67	1.09	0.95	0.16	0.00
3.58	1.85	1.73	0.92	1.22	0.51	1.52	1.46	0.01	0.11	0.07	0.61	0.65	1.00	0.91	0.15	0.00
3.60	1.79	1.82	1.00	1.32	0.64	1.68	1.54	0.08	0.08	0.06	0.56	0.62	0.90	0.86	0.13	0.00
3.62	1.71	1.88	1.07	1.44	0.79	1.80	1.63	0.57	0.06	0.04	0.52	0.59	0.80	0.80	0.12	0.00
3.64	1.61	1.94	1.17	1.56	0.93	1.90	1.72	2.14	0.04	0.04	0.47	0.55	0.71	0.75	0.11	0.00
3.66	1.51	1.98	1.29	1.70	1.04	1.99	1.80	4.25	0.03	0.03	0.43	0.51	0.61	0.68	0.10	0.00
3.68	1.42	2.02	1.45	1.84	1.20	2.08	1.85	5.06	0.02	0.02	0.40	0.46	0.53	0.62	0.09	0.00
3.70	1.33	2.06	1.65	1.99	1.45	2.17	1.88	4.61	0.01	0.02	0.36	0.42	0.45	0.56	0.08	0.00
3.72	1.25	2.12	1.88	2.12	1.76	2.24	1.87	4.82	0.01	0.01	0.33	0.37	0.38	0.50	0.06	0.00
3.74	1.17	2.20	2.13	2.24	2.07	2.28	1.83	5.94	0.00	0.01	0.30	0.33	0.32	0.44	0.05	0.00
3.76	1.09	2.30	2.36	2.32	2.40	2.28	1.76	5.63	0.00	0.01	0.27	0.28	0.26	0.39	0.04	0.00
3.78	1.00	2.40	2.55	2.36	2.80	2.23	1.67	3.97	0.00	0.00	0.25	0.24	0.22	0.34	0.03	0.00
3.80	0.90	2.47	2.67	2.33	3.21	2.13	1.54	3.28	0.00	0.00	0.22	0.20	0.18	0.29	0.03	0.00
3.82	0.79	2.47	2.71	2.24	3.51	2.01	1.40	3.36	0.00	0.00	0.20	0.17	0.15	0.26	0.02	0.00
3.84	0.67	2.38	2.68	2.09	3.64	1.89	1.26	2.79	0.00	0.00	0.17	0.14	0.12	0.22	0.01	0.00
3.86	0.56	2.18	2.58	1.90	3.61	1.77	1.10	1.61	0.00	0.00	0.15	0.11	0.09	0.19	0.01	0.00
3.88	0.45	1.89	2.41	1.67	3.51	1.66	0.95	0.72	0.00	0.00	0.13	0.09	0.07	0.17	0.01	0.00
3.90	0.35	1.55	2.21	1.43	3.35	1.55	0.80	0.45	0.00	0.00	0.11	0.07	0.05	0.15	0.00	0.00
3.92	0.27	1.19	1.96	1.19	3.10	1.45	0.66	0.41	0.00	0.00	0.09	0.05	0.04	0.13	0.00	0.00

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.94	0.20	0.86	1.69	0.96	2.69	1.32	0.54	0.25	0.00	0.00	0.08	0.04	0.03	0.11	0.00	0.00
3.96	0.14	0.60	1.41	0.75	2.14	1.17	0.42	0.08	0.00	0.00	0.06	0.03	0.02	0.10	0.00	0.00
3.98	0.10	0.40	1.13	0.56	1.51	1.00	0.32	0.01	0.00	0.00	0.05	0.02	0.01	0.08	0.00	0.00
4.00	0.07	0.26	0.86	0.41	0.94	0.81	0.24	0.00	0.00	0.00	0.04	0.02	0.01	0.07	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.4. Social-emotional support densities of domain scores (and instruction)

Based on observers' video ratings

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1.10	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
1.12	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00
1.14	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.00
1.16	0.00	0.04	0.00	0.00	0.00	0.01	0.02	0.00
1.18	0.00	0.07	0.00	0.00	0.00	0.01	0.03	0.00
1.20	0.00	0.10	0.00	0.00	0.00	0.02	0.04	0.00
1.22	0.00	0.14	0.00	0.00	0.00	0.03	0.05	0.00
1.24	0.00	0.20	0.00	0.00	0.00	0.04	0.06	0.00
1.26	0.00	0.27	0.00	0.00	0.00	0.06	0.08	0.00
1.28	0.00	0.34	0.00	0.00	0.00	0.08	0.09	0.00
1.30	0.00	0.42	0.00	0.00	0.00	0.10	0.11	0.00
1.32	0.00	0.51	0.00	0.00	0.00	0.13	0.12	0.00
1.34	0.00	0.60	0.00	0.00	0.00	0.15	0.14	0.00
1.36	0.01	0.69	0.00	0.00	0.00	0.18	0.16	0.00
1.38	0.01	0.77	0.00	0.00	0.00	0.21	0.18	0.00
1.40	0.03	0.85	0.00	0.00	0.00	0.24	0.21	0.00
1.42	0.06	0.92	0.00	0.00	0.00	0.26	0.23	0.00
1.44	0.12	0.98	0.00	0.00	0.00	0.28	0.26	0.00
1.46	0.20	1.04	0.00	0.00	0.00	0.28	0.30	0.00
1.48	0.31	1.08	0.00	0.00	0.00	0.28	0.35	0.00
1.50	0.43	1.12	0.01	0.00	0.01	0.28	0.42	0.00
1.52	0.58	1.16	0.01	0.00	0.01	0.27	0.49	0.00
1.54	0.72	1.19	0.01	0.01	0.02	0.27	0.58	0.01
1.56	0.86	1.22	0.02	0.01	0.02	0.28	0.69	0.01
1.58	0.96	1.26	0.03	0.03	0.04	0.30	0.79	0.02
1.60	1.03	1.29	0.04	0.04	0.05	0.34	0.89	0.03
1.62	1.07	1.32	0.06	0.06	0.07	0.40	0.99	0.04
1.64	1.10	1.35	0.08	0.09	0.09	0.47	1.06	0.05
1.66	1.17	1.37	0.10	0.13	0.12	0.56	1.13	0.07
1.68	1.28	1.38	0.13	0.17	0.15	0.66	1.17	0.08
1.70	1.46	1.39	0.16	0.21	0.19	0.77	1.20	0.09
1.72	1.69	1.39	0.21	0.25	0.24	0.87	1.22	0.10
1.74	1.96	1.38	0.27	0.29	0.30	0.98	1.23	0.11
1.76	2.23	1.37	0.34	0.33	0.36	1.08	1.24	0.15
1.78	2.47	1.35	0.42	0.35	0.43	1.17	1.25	0.21
1.80	2.63	1.32	0.50	0.38	0.51	1.25	1.26	0.29
1.82	2.69	1.28	0.59	0.40	0.60	1.33	1.28	0.40
1.84	2.62	1.25	0.67	0.42	0.69	1.39	1.30	0.52
1.86	2.45	1.21	0.74	0.46	0.78	1.45	1.32	0.65
1.88	2.20	1.18	0.80	0.52	0.87	1.50	1.35	0.78
1.90	1.93	1.15	0.84	0.59	0.95	1.55	1.37	0.91
1.92	1.66	1.14	0.88	0.69	1.02	1.59	1.40	1.04

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.94	1.44	1.14	0.91	0.81	1.07	1.64	1.42	1.17
1.96	1.27	1.15	0.94	0.95	1.11	1.68	1.43	1.32
1.98	1.15	1.15	0.97	1.10	1.14	1.71	1.45	1.48
2.00	1.05	1.14	1.02	1.25	1.15	1.74	1.45	1.66
2.02	0.97	1.11	1.07	1.40	1.16	1.75	1.43	1.83
2.04	0.88	1.06	1.12	1.53	1.16	1.74	1.40	1.98
2.06	0.79	0.99	1.17	1.64	1.16	1.71	1.35	2.11
2.08	0.70	0.89	1.23	1.74	1.17	1.66	1.29	2.18
2.10	0.63	0.79	1.27	1.81	1.17	1.59	1.21	2.20
2.12	0.58	0.68	1.31	1.87	1.17	1.50	1.12	2.17
2.14	0.54	0.58	1.34	1.91	1.18	1.41	1.02	2.10
2.16	0.50	0.48	1.38	1.93	1.19	1.30	0.91	2.01
2.18	0.47	0.39	1.41	1.93	1.20	1.19	0.81	1.91
2.20	0.44	0.31	1.45	1.91	1.22	1.08	0.72	1.84
2.22	0.43	0.25	1.49	1.87	1.24	0.97	0.63	1.78
2.24	0.42	0.20	1.54	1.81	1.26	0.85	0.56	1.74
2.26	0.41	0.16	1.58	1.73	1.27	0.74	0.49	1.69
2.28	0.39	0.12	1.61	1.64	1.29	0.63	0.44	1.63
2.30	0.34	0.09	1.62	1.53	1.30	0.54	0.39	1.53
2.32	0.27	0.07	1.62	1.42	1.30	0.46	0.35	1.41
2.34	0.19	0.05	1.59	1.30	1.29	0.40	0.32	1.27
2.36	0.12	0.03	1.55	1.18	1.27	0.35	0.30	1.13
2.38	0.07	0.02	1.48	1.05	1.24	0.32	0.28	1.00
2.40	0.04	0.01	1.40	0.93	1.19	0.29	0.27	0.89
2.42	0.02	0.01	1.31	0.82	1.14	0.27	0.27	0.79
2.44	0.01	0.00	1.21	0.72	1.08	0.25	0.26	0.70
2.46	0.00	0.00	1.10	0.64	1.01	0.23	0.26	0.61
2.48	0.00	0.00	0.99	0.58	0.95	0.21	0.26	0.52
2.50	0.00	0.00	0.88	0.54	0.88	0.18	0.26	0.41
2.52	0.00	0.00	0.78	0.52	0.82	0.15	0.25	0.31
2.54	0.00	0.00	0.67	0.51	0.76	0.11	0.24	0.22
2.56	0.00	0.00	0.57	0.50	0.70	0.09	0.22	0.14
2.58	0.00	0.00	0.47	0.49	0.64	0.06	0.19	0.09
2.60	0.00	0.00	0.38	0.47	0.59	0.04	0.16	0.05
2.62	0.00	0.00	0.30	0.45	0.54	0.03	0.14	0.03
2.64	0.00	0.00	0.24	0.42	0.49	0.02	0.11	0.01
2.66	0.00	0.00	0.19	0.37	0.44	0.01	0.08	0.01
2.68	0.00	0.00	0.15	0.33	0.40	0.01	0.06	0.01
2.70	0.00	0.00	0.12	0.27	0.36	0.00	0.04	0.02
2.72	0.00	0.00	0.10	0.22	0.32	0.00	0.03	0.02
2.74	0.00	0.00	0.08	0.17	0.28	0.00	0.02	0.04
2.76	0.00	0.00	0.07	0.13	0.25	0.00	0.01	0.05
2.78	0.00	0.00	0.07	0.09	0.22	0.00	0.01	0.06
2.80	0.00	0.00	0.06	0.06	0.20	0.00	0.00	0.07
2.82	0.00	0.00	0.05	0.04	0.17	0.00	0.00	0.07
2.84	0.00	0.00	0.04	0.02	0.15	0.00	0.00	0.07
2.86	0.00	0.00	0.03	0.01	0.13	0.00	0.00	0.06
2.88	0.00	0.00	0.02	0.01	0.12	0.00	0.00	0.05
2.90	0.00	0.00	0.02	0.00	0.10	0.00	0.00	0.03
2.92	0.00	0.00	0.01	0.00	0.09	0.00	0.00	0.02

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.94	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.01
2.96	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.01
2.98	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.00
3.00	0.00	0.00	0.02	0.00	0.06	0.00	0.00	0.00
3.02	0.00	0.00	0.02	0.00	0.05	0.00	0.00	0.00
3.04	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.00
3.06	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00
3.08	0.00	0.00	0.06	0.00	0.05	0.00	0.00	0.00
3.10	0.00	0.00	0.08	0.00	0.05	0.00	0.00	0.00
3.12	0.00	0.00	0.09	0.00	0.05	0.00	0.00	0.00
3.14	0.00	0.00	0.10	0.00	0.04	0.00	0.00	0.00
3.16	0.00	0.00	0.11	0.00	0.04	0.00	0.00	0.00
3.18	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.00
3.20	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.00
3.22	0.00	0.00	0.09	0.00	0.02	0.00	0.00	0.00
3.24	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.00
3.26	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.00
3.28	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00
3.30	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00
3.32	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
3.34	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
3.36	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.38	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.5. Indicators of social-emotional support, basic average excluding ratings of 1 (percentiles)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale[2]	Number of classrooms[3]	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	95	1.70	0.37	1.00	1.18	1.43	1.71	2.00	2.16	3.00
Colombia	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	73	1.46	0.43	1.00	1.00	1.00	1.40	1.78	2.04	3.00
England (UK)	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	85	1.46	0.20	1.08	1.19	1.31	1.45	1.63	1.71	1.94
Germany*	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	50	1.91	0.28	1.25	1.50	1.61	1.93	2.17	2.26	2.40
K-S-T (Japan)	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	89	1.45	0.27	1.00	1.12	1.24	1.46	1.63	1.80	2.25
Madrid (Spain)	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	85	1.32	0.23	0.96	1.03	1.12	1.29	1.50	1.63	2.14
Mexico	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	91	1.90	0.45	1.00	1.33	1.54	1.93	2.25	2.44	3.00
Shanghai (China)	Social-Emotional Support	Persistence	Basic Average without 1s	1-4	84	1.35	0.27	1.00	1.00	1.08	1.29	1.59	1.75	2.00

Notes: 1. This indicator was aggregated to the classroom by averaging any rating greater than 1 over observers, segments and lessons.
2. The original rating scale ranges from 1 to 4, but a rating of 1 indicates no opportunity to show persistence. Ratings of 1 were dropped from this analysis and the 2 to 4 ratings were rescaled to range from 1 to 3.
3. The number of classrooms may be less than the number of classrooms in the Study for a country/economy because classrooms with all ratings of 1 were excluded from this aggregation method.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.6. Indicators of social-emotional support, basic average excluding ratings of 1 (indicator score)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Social-Emotional Support	Persistence	Basic Average without 1s	23	71	1	24.2	74.7	1.1
Colombia	Social-Emotional Support	Persistence	Basic Average without 1s	41	30	2	56.2	41.1	2.7
England (UK)	Social-Emotional Support	Persistence	Basic Average without 1s	46	39	0	54.1	45.9	0.0
Germany*	Social-Emotional Support	Persistence	Basic Average without 1s	4	46	0	8.0	92.0	0.0
K-S-T (Japan)	Social-Emotional Support	Persistence	Basic Average without 1s	52	37	0	58.4	41.6	0.0
Madrid (Spain)	Social-Emotional Support	Persistence	Basic Average without 1s	66	19	0	77.6	22.4	0.0
Mexico	Social-Emotional Support	Persistence	Basic Average without 1s	14	68	9	15.4	74.7	9.9
Shanghai (China)	Social-Emotional Support	Persistence	Basic Average without 1s	59	25	0	70.2	29.8	0.0

Notes: 1. This indicator was aggregated to the classroom by averaging any rating greater than 1 over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.7. Indicators of social-emotional support, percent present

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Social-Emotional Support	Persistence	Percent Present	1-4	98	29.95	15.67	0.00	11.72	17.83	27.64	41.83	50.00	75.00
Colombia	Social-Emotional Support	Persistence	Percent Present	1-4	83	20.82	16.00	0.00	0.00	6.86	17.86	34.08	39.83	68.18
England (UK)	Social-Emotional Support	Persistence	Percent Present	1-4	85	62.59	15.02	25.00	42.43	50.00	62.50	75.14	79.58	95.83
Germany*	Social-Emotional Support	Persistence	Percent Present	1-4	50	47.24	16.10	8.33	24.82	33.57	46.97	59.27	66.73	87.50
K-S-T (Japan)	Social-Emotional Support	Persistence	Percent Present	1-4	89	50.51	19.28	8.33	24.64	33.33	50.00	66.67	77.17	92.86
Madrid (Spain)	Social-Emotional Support	Persistence	Percent Present	1-4	85	58.23	25.33	4.17	24.50	39.50	60.00	81.33	91.33	100.00
Mexico	Social-Emotional Support	Persistence	Percent Present	1-4	103	21.91	17.26	0.00	0.00	5.00	19.64	35.00	44.79	66.67
Shanghai (China)	Social-Emotional Support	Persistence	Percent Present	1-4	85	30.87	15.74	0.00	10.00	15.00	30.00	45.00	50.00	70.00

Notes: 1. The persistence indicator was rated by observers on a 1 to 4 scale. For this aggregation method, the percentage of lesson segments each observer assigned any rating greater than 1 was found and then averaged over observers and lessons to obtain the percentage of lesson segments for a classroom in which students showed persistence through mathematical errors.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.8. Indicators of social-emotional support, basic average (percentiles)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Social-Emotional Support	PublicSharing	Basic Average	1-3	98	1.79	0.24	1.20	1.47	1.57	1.79	1.99	2.06	2.41
Colombia	Social-Emotional Support	PublicSharing	Basic Average	1-3	83	1.77	0.24	1.11	1.50	1.58	1.79	1.95	2.02	2.29
England (UK)	Social-Emotional Support	PublicSharing	Basic Average	1-3	85	1.92	0.30	1.21	1.51	1.67	1.90	2.17	2.29	2.75
Germany*	Social-Emotional Support	PublicSharing	Basic Average	1-3	50	2.02	0.25	1.43	1.67	1.83	2.04	2.21	2.30	2.55
K-S-T (Japan)	Social-Emotional Support	PublicSharing	Basic Average	1-3	89	1.98	0.29	1.17	1.60	1.75	2.00	2.24	2.29	2.79
Madrid (Spain)	Social-Emotional Support	PublicSharing	Basic Average	1-3	85	1.80	0.29	1.00	1.46	1.54	1.83	2.08	2.17	2.29
Mexico	Social-Emotional Support	PublicSharing	Basic Average	1-3	103	2.03	0.33	1.07	1.56	1.79	2.06	2.26	2.40	2.72
Shanghai (China)	Social-Emotional Support	PublicSharing	Basic Average	1-3	85	2.53	0.28	1.68	2.17	2.33	2.58	2.75	2.85	3.00

Notes: 1. This indicator was aggregated to the classroom by averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.9. Indicators of social-emotional support, basic average (indicator score)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				below 1.5	between 1.5 and 2.5	between 2.5 and 3.0	below 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Social-Emotional Support	PublicSharing	Basic Average	11	87	0	11.2	88.8	0.0
Colombia	Social-Emotional Support	PublicSharing	Basic Average	8	75	0	9.6	90.4	0.0
England (UK)	Social-Emotional Support	PublicSharing	Basic Average	7	74	4	8.2	87.1	4.7
Germany*	Social-Emotional Support	PublicSharing	Basic Average	2	46	2	4.0	92.0	4.0
K-S-T (Japan)	Social-Emotional Support	PublicSharing	Basic Average	5	81	3	5.6	91.0	3.4
Madrid (Spain)	Social-Emotional Support	PublicSharing	Basic Average	12	73	0	14.1	85.9	0.0
Mexico	Social-Emotional Support	PublicSharing	Basic Average	8	88	7	7.8	85.4	6.8
Shanghai (China)	Social-Emotional Support	PublicSharing	Basic Average	0	32	53	0.0	37.6	62.4

Notes: 1. This indicator was aggregated to the classroom by averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 4.A.10. Teacher perceptions on social-emotional support

Percentage of teachers who agreed or strongly agreed with three statements on teacher support for learning and five statements on teacher-student-relationship

	Teacher Support for Learning			Teacher-Student Relationship				
	I gave extra help when these students needed it.	I continued teaching until these students understood.	I helped these students with their learning.	I got along well with these students.	I showed interest in these students' well-being.	I really listened to what these students had to say.	I treated these students fairly.	I made students feel I really cared about them.
B-M-V (Chile)	99	97	100	100	99	100	100	100
Colombia	99	95	100	100	100	100	100	100
England (UK)	100	88	100	98	100	98	99	99
Germany*	100	88	96	96	92	100	100	94
K-S-T (Japan)	78	79	100	91	73	99	99	70
Madrid (Spain)	95	91	100	100	100	100	100	100
Mexico	99	93	100	100	100	99	100	98
Shanghai (China)	100	89	100	100	100	100	99	99

Notes: Response scale: Strongly disagree – Disagree – Agree – Strongly agree.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934186790

Notes

[1] There has been recent increased attention to the development of students' social-emotional skills. While these are critical skills, students' social-emotional skills were not rated by observers. Instead, the teaching practices that support a wide range of academic as well as social-emotional outcomes (e.g. efficacy, interest) are discussed in this chapter.

[2] Germany* refers to a convenience sample of volunteer schools.

[3] All of the practices measured are, to varying degrees, culture-specific. By measuring practices in standardised ways that are anchored to specific behaviours, the scholarly and policy communities are more able to discuss the meaning of those practices and determine country-specific implications of the levels measured in the Study.

5 Instruction

Courtney A. Bell, Jonathan Schweig, Katherine E. Castellano, Eckhard Klieme and Brian M. Stecher

Teaching practices that instruct students about mathematics are central to students learning mathematics and learning how to learn academic subject matter more broadly. This chapter describes the quality of instruction observed in lessons and teaching materials, and reports on teachers' and students' perspectives on the quality of instructional practices.

Instruction is critical to students' academic learning and the development of positive dispositions toward mathematics and themselves. Instruction is made up of the practices teachers use to help their students learn the curriculum, building from students' current understandings of mathematics to the instructional goals in the quadratic equations unit.[1] Using instructional practices to help students learn is at the heart of the teaching job.

Instruction is a rich domain of teaching. In this study it was broken into sub-domain practices related to subject matter (e.g. clarity of learning goals, types of mathematical representations, connections and patterns), the depth of students' cognitive engagement (e.g. level of cognitive demand, understanding of rationales, opportunities to practice, metacognition), teachers' assessments of and responses to students' understandings (e.g. eliciting of student thinking, providing feedback to students on their thinking and aligning instruction to that thinking), and students' participation in the classroom's discourse (e.g. who speaks, the nature of questions, the type of explanations).

This chapter reports findings on the quality of instruction from four perspectives: observations of lessons, analyses of lesson materials (including lesson plans, visual aids, handouts and student assignments), teacher questionnaires and student questionnaires.

Key findings

- The overall observed quality of instruction was low, with a mean score below 2.25 on a four-point scale in each country/economy. However, quality varied within countries/economies. The quality of the classroom discourse practices and teachers' assessments of and responses to students' thinking was higher than the quality of subject matter and students' cognitive engagement.
- Students learnt quadratic equations primarily through equations, and sometimes through graphs or drawings, but rarely made connections among the different representations or aspects of the mathematics. Similarly, they had limited opportunities to connect their learning to real world contexts or to explore patterns or generalisations in the mathematics.
- Students had frequent opportunities to develop mathematical fluency through repetitive practice. They were sometimes or frequently asked to take on cognitively demanding tasks in 53% of classrooms in Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), and a minority of classrooms in Germany*[2] (12%), Mexico (9%) and England (UK) (8%). Similarly, they seldom used multiple approaches to solve problems, articulated the rationale for mathematical procedures and processes, or engaged in other highly promoted practices for cognitive engagement such as idea-based discussions, metacognition and self-assessment. Teachers mostly used technology for communication purposes rather than for conceptual understanding of mathematics and students made little use of it.
- Teachers regularly assessed and responded to students' thinking. Teachers elicited a moderate amount of student thinking concerning, on average, answers to problems, procedures and the steps necessary for solving a problem. Teachers sometimes used students' thinking to align instruction. Few teachers provided feedback that was complete and focused on why students' thinking was correct or incorrect in Germany* (18%), Madrid (Spain) (16%), England (UK) (8%), K-S-T (Japan) (8%), Mexico (7%) and Shanghai (China) (5%).

- The detail and depth of classroom discourse varied. Students were regularly asked questions to recall information and state answers, or summarise and apply rules and procedures. They sometimes participated in the classroom discourse by contributing detailed thinking in most classrooms. Similarly, when explanations were given by teachers or students, the explanations were generally brief and/or superficial; lengthier, deeper explanations were observed in some classrooms in Shanghai (China) (56%), K-S-T (Japan) (55%), England (UK) (24%), Madrid (Spain) (19%), Germany* (18%), Biobío, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]") (13%), Colombia (8%) and Mexico (7%).
- When surveyed after the unit, most students (between 63% and 91%) agreed that they had been cognitively engaged by mathematical tasks until they understood them. Fewer students reported having developed their own ideas and just half of them reported being required to engage in discussions with their peers. Teachers tended to be more positive than students about the level of classroom discourse.

The overall quality of instruction was the lowest of the three domains

To measure the overall quality of instruction, observers holistically rated the quality of 2-3 teaching practices for each of the four sub-domains of instruction on a four-point scale. Those practices included:

- Subject matter: explicit connections and explicit patterns and generalisations.
- Assessment of and response to students: eliciting student thinking, teacher feedback and aligning instruction to present student thinking.
- Cognitive engagement of students: engagement in cognitively demanding subject matter, multiple approaches to/perspectives on reasoning, understanding of subject matter procedures and processes.
- Discourse: nature of discourse, questioning and explanations.

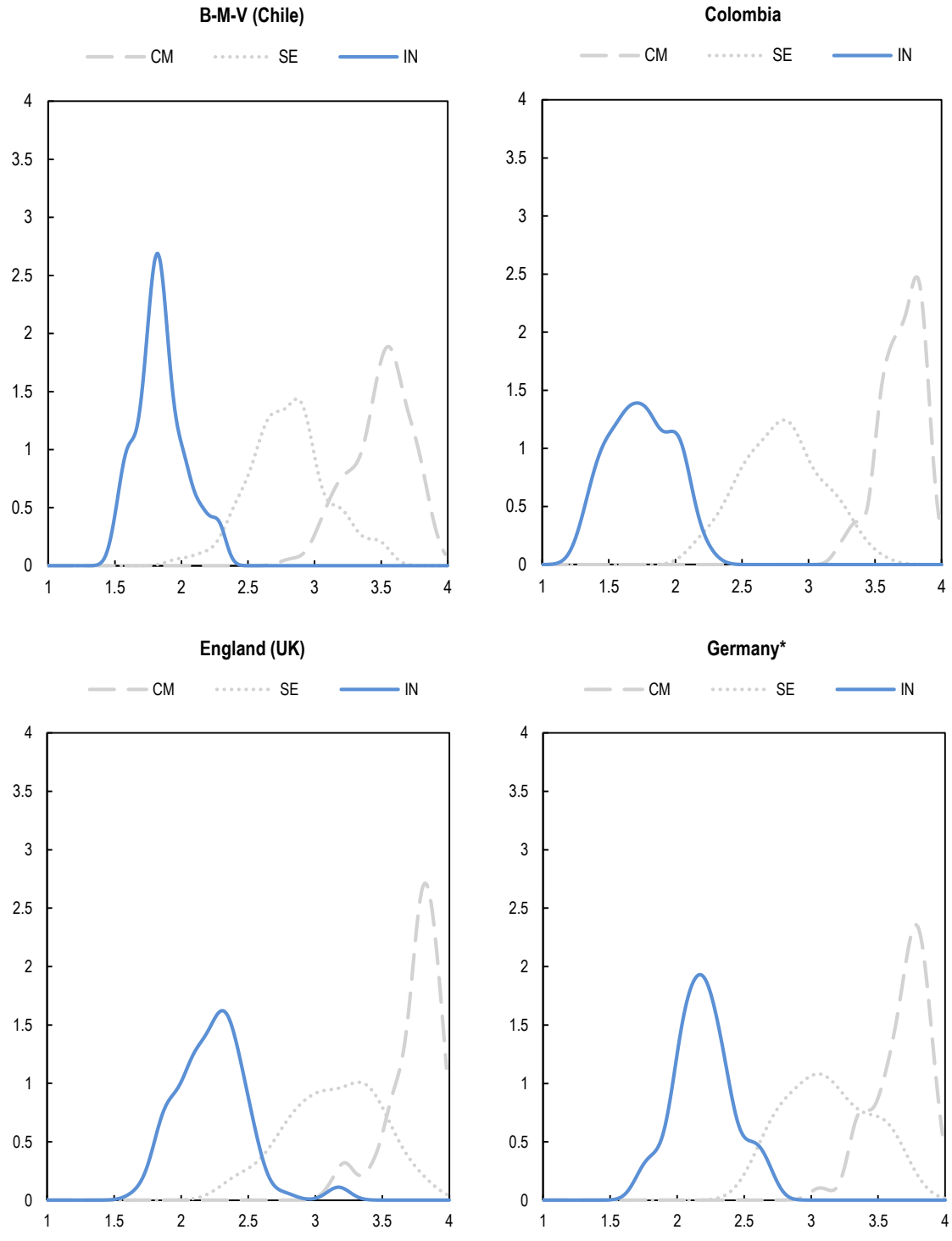
Ratings were aggregated into an overall instructional sub-domain score on the 1-4 scale (see Annex 5.A, Tables 5.A.1 and 5.A.2 for details about each sub-domain's aggregated scores).

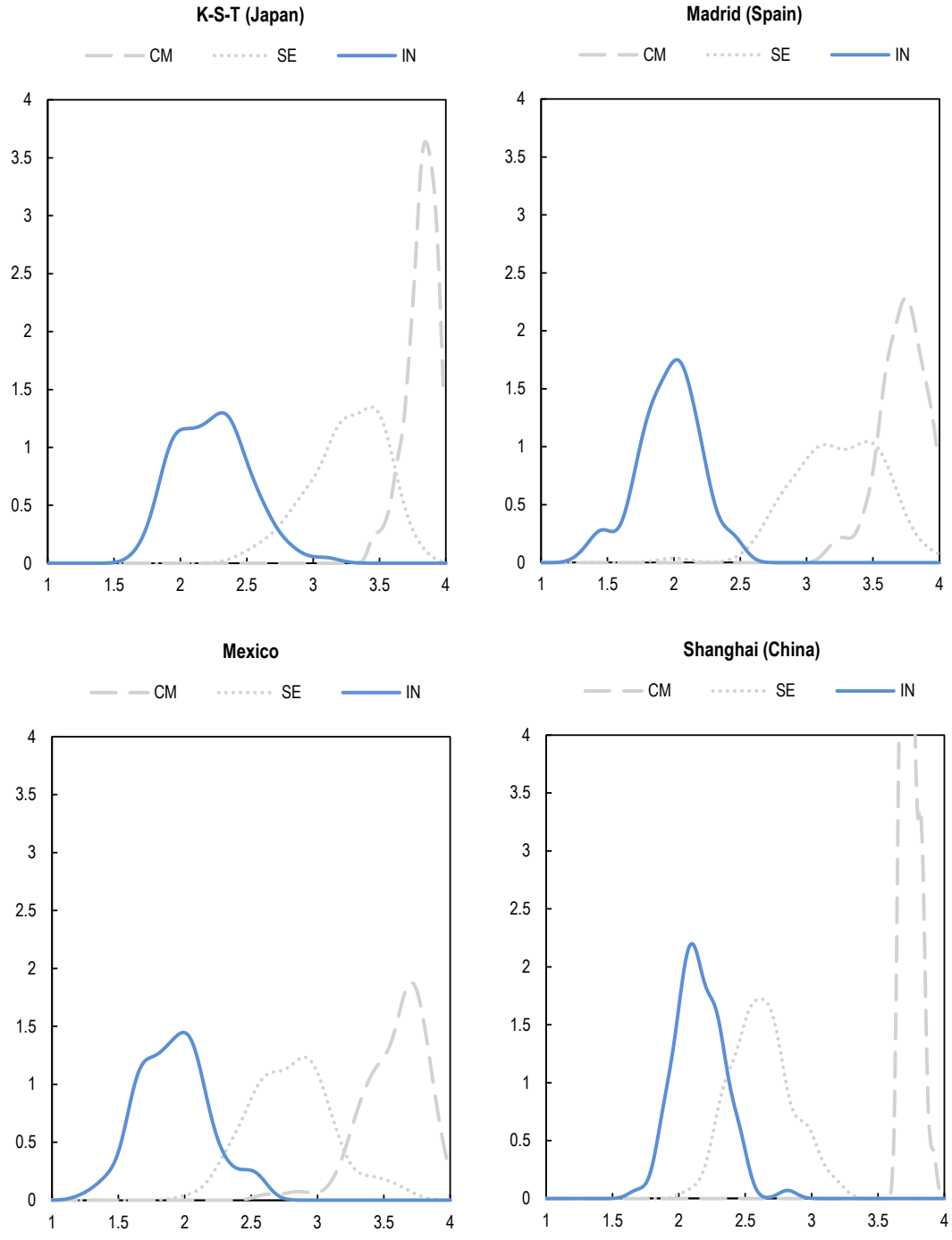
With a range of mean scores from 1.74 to 2.24 on a four-point scale, the overall quality of instruction observed was lower than that of classroom management (range of 3.49 to 3.81) and social-emotional support (range of 2.62 to 3.26) in all countries/economies (Figure 5.1). Instruction mean domain scores suggest there is room for improvement in some classrooms in every country/economy (K-S-T [Japan] [2.24], England [UK] [2.23], Germany* [2.20], Shanghai [China] [2.15], Madrid [Spain] [1.96], Mexico [1.92], B-M-V [Chile] [1.85] and Colombia [1.74]) (see Annex 5.A, Tables 5.A.1 and 5.A.2).

In B-M-V (Chile), England (UK), Germany*, Madrid (Spain) and Shanghai (China) the overall quality of instruction was roughly similar across classrooms as many classroom means were concentrated within a score range (Figure 5.1). In contrast, Colombia, K-S-T (Japan) and Mexico have flatter distributions, suggesting that there are larger differences across classrooms in the quality of instruction within these countries/economies.

Figure 5.1. Observed quality of instruction in classrooms

Distribution of classrooms, by the mean instruction domain score





Notes: The classroom instruction (IN) domain score (blue solid line) is the mean over four sub-domains of instruction: discourse, quality of subject matter, cognitive engagement and assessment of student understanding.
SE and CM refer to the domain score for social-emotional support and classroom management, respectively.
The density curves for classroom management (grey dashed line) and social-emotional support (grey dotted line) are included for reference.
This figure is a smoothed histogram of classroom scores using an interval size of 0.02 score points. The y-axis is density. The more peaked the curve is, the more classrooms have mean scores concentrated around a few score points (i.e. the more densely populated is that range under the curve).
The density curves are meant to convey the general shape of the distributions.
The classroom management curve for Shanghai (China) is truncated at y=4.0; it peaks at a density of 5.94 for the classroom mean score of 3.74.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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A closer look at the practices that compose the overall instructional domain provides a richer and more complex picture. See Chapter 2 for the specific practices and aggregation strategy used for the instruction domain and sub-domains. Classrooms' mean instructional sub-domain scores are plotted in Figure 5.2 in a density curve, ranging from the lowest score of 1 to the highest score of 4. The lowest rated practices were quality of subject matter (ranging from 1.36 to 1.97) and cognitive engagement (ranging from 1.48 to 2.07) in every country/economy. The mean classroom scores for discourse (ranging from 1.85 to 2.54) and assessment of and response to students' thinking (ranging from 2.11 to 2.70) were around the middle of the four-point scale but still well below those for classroom management and below the social-emotional support scores.[3]

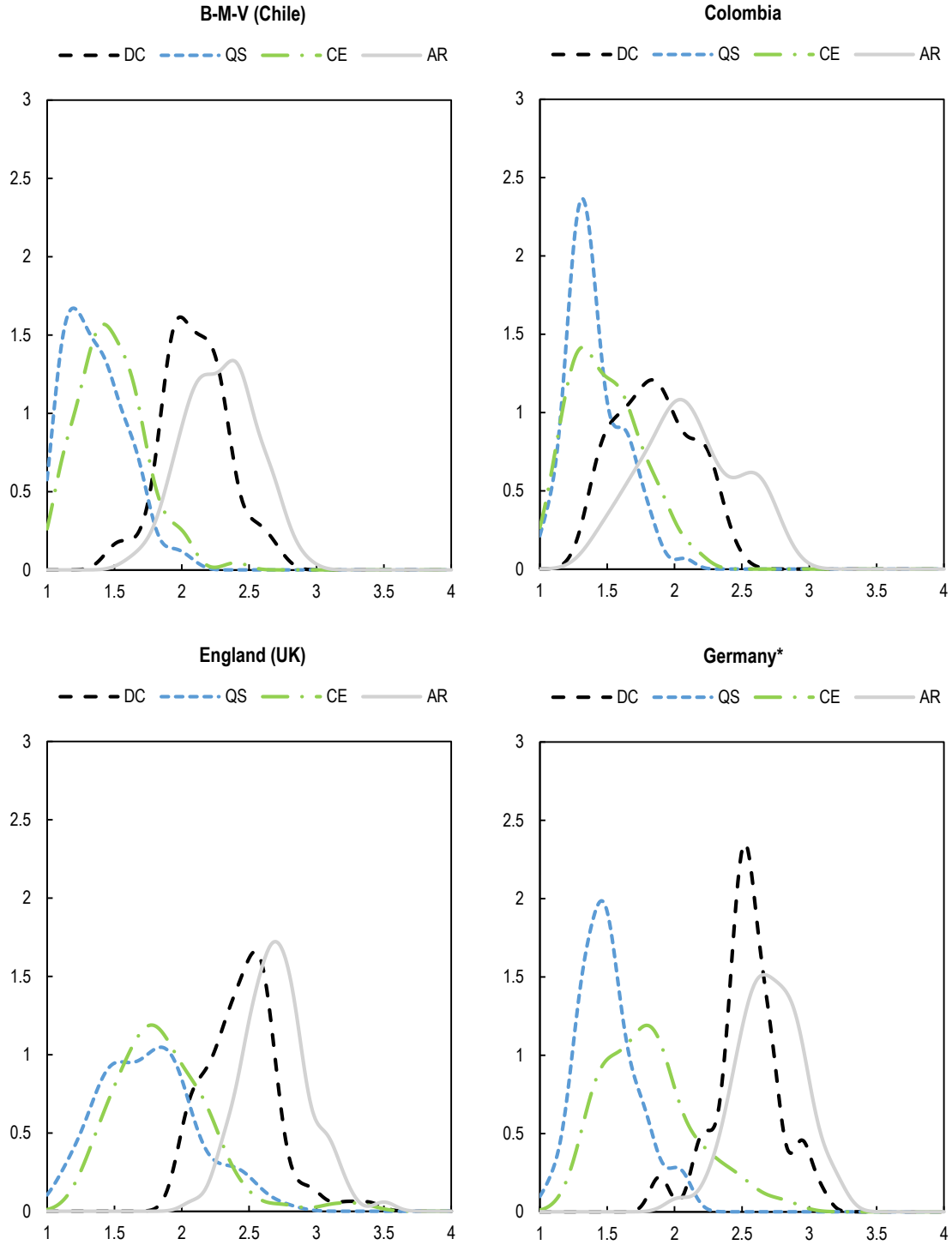
The differences of the sub-domain scores within countries highlight important insights. Figure 5.2 shows that some classrooms' mean scores were above the midpoint of the four-point scale. This occurred most frequently in either the discourse and/or the assessment practices. This means that observers in every country saw some classrooms with moderate or strong practices for at least one sub-domain.

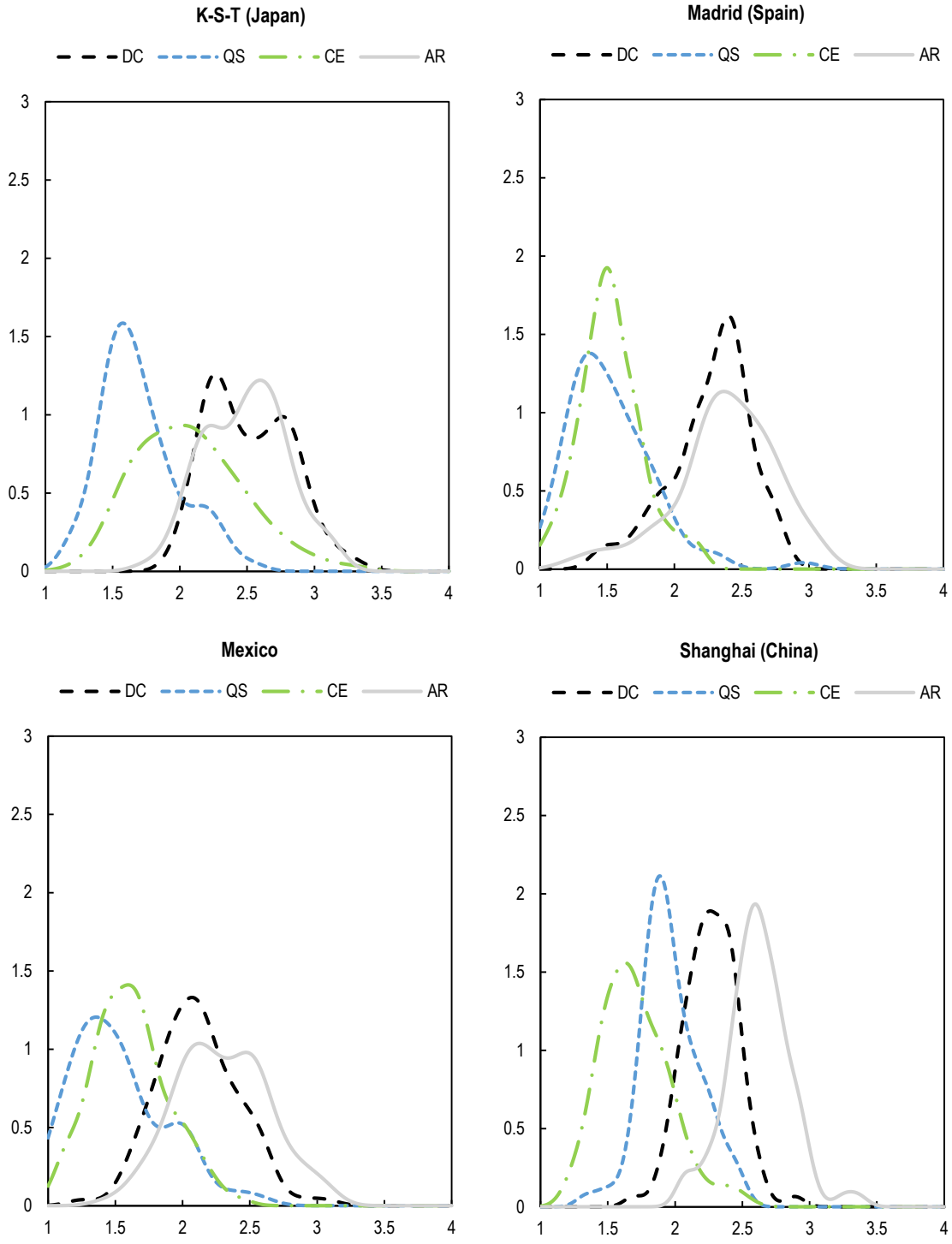
It is worthwhile to highlight that the quality of practices observed in Shanghai (China) classrooms was quite similar. Classrooms were concentrated around the mean score for each sub-domain in Figure 5.2. This suggests that teachers and students engaged in similar practices at a similar level of quality no matter the classroom in which they participated.

This is not the case in other countries/economies as revealed by the variety of shapes of density curves in Figure 5.2. In England (UK), many classrooms were quite similar to one another on assessment and discourse, but differed considerably on cognitive engagement and quality of subject matter. In Colombia and Germany*, classrooms were similar to one another on quality of subject matter and discourse respectively, but differed on the other two sub-domains. The lack of clear patterns suggests significant differences within countries.

Figure 5.2. Observed quality of discourse (DC), quality of subject matter (QS), cognitive engagement (CE), and assessment of and responses to student understanding (AR) in the classroom

Distribution of classrooms, by the mean instruction sub-domain scores





Notes: Each sub-domain of instruction is the mean over two or three component scores. The more peaked the curve is, the more classrooms have mean scores concentrated around a few score points (i.e. the more densely populated is that range under the curve).
This figure includes smoothed histograms of classroom scores using an interval size of 0.02 score points. The y-axis is density.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ordered alphabetically.
Source: OECD, Global Teaching InSights Database.

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Raising the quality of the mathematics

The foundation of learning quadratic equations is the quality of the mathematics itself. It is possible to teach most mathematic topics as a series of disconnected facts, theorems, procedures and processes. When this occurs, students may simply memorise how to do problems or memorise which procedures and processes are and are not allowed. But in this portrayal of mathematics, few students will have the opportunity to see the patterns and connections within and across topics in mathematics. Thus, a foundational aspect of high-quality instruction is providing students with access to high quality mathematics that has explicit learning goals and systematic opportunities to learn how to solve mathematical problems and how to think mathematically.

High-quality subject matter is not solely the province of teachers and students. Each country/economy's curriculum plays an important role in the nature and quality of quadratic equations taught and learnt (see Chapter 6 for more details). Depending on the country/economy's policies, teachers may have some freedom to modify and/or enrich the curriculum provided to them.

The quality of subject matter sub-domain is made up of two components – explicit connections and explicit patterns and generalisations. Observers also rated the explicitness of learning goals, the degree to which students made real-world connections to quadratic equations and the use of different types of representations (e.g. pictures, graphs, etc.). As Figure 5.2 shows, observers found that in general the quality of subject matter was the lowest or second lowest scoring sub-domain, with mean classroom scores lower than 2 on the four-point scale for all countries/economies (Shanghai [China] [1.97], England [UK] [1.76], K-S-T [Japan], [1.70], Madrid [Spain] [1.53], Mexico [1.53], Germany* [1.51], Colombia [1.41] and B-M-V [Chile] [1.36]). This section provides additional detail regarding the specific teaching practices measured in the quality of subject matter sub-domain.

Learning activities were clearer and more explicit than learning goals

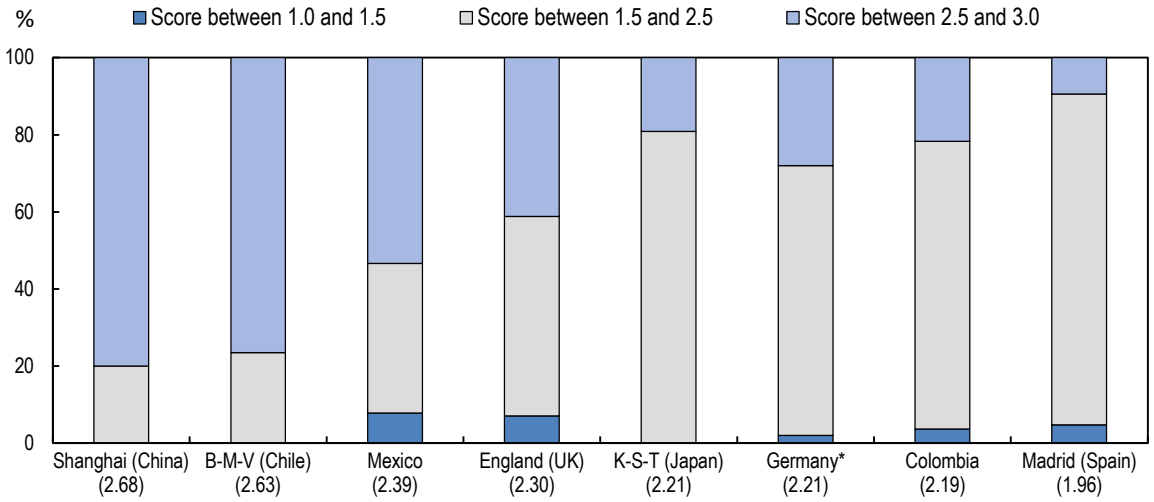
It is helpful for students to know what they are expected to learn. Teachers can make explicit the activity or lesson's learning goals. If a teacher states "Today you will learn to solve quadratic equations using factorisation", the teacher is describing a specific learning goal for the lesson. If a teacher says, "Today we will work together in pairs on the homework from yesterday" or "Today we will continue our study of quadratic equations", she is specifying an activity, but not a specific mathematics learning goal. A learning activity and a learning goal are not the same thing. Activities are used to help students achieve goals.

Observers documented whether there was no explicit learning goal or activity stated (score 1), an explicit statement of a topic or activity (score 2) or an explicit statement of a learning goal (score 3). This was noted every 8 minutes of the lesson. Once a learning activity or goal was made explicit – whenever this occurred in the lesson –the observer reassigned the same rating as the previous segment unless there was a new explicitly stated activity or goal. Classroom averages were calculated as described in Chapter 2.

All teachers in B-M-V (Chile), K-S-T (Japan) and Shanghai (China), and over 90% of teachers in the other countries/economies stated an explicit learning activity or goal, scores 2 and 3 (Figure 5.3). There was wide variation across countries in the degree to which an explicit learning goal – not just an activity – was stated. In B-M-V (Chile) and Shanghai (China), more than three-quarters of teachers identified a clear learning goal, while in Colombia, K-S-T (Japan) and Madrid (Spain), less than one-quarter did (see Annex 5.A, Tables 5.A.5 and 5.A.6 for additional details).

Figure 5.3. Explicitness of learning goals and activities

Percentage of classrooms observed by mean explicit learning goal score



Notes: The country/economy mean indicator score is shown below the country/economy name.
The raw score is based on observers' video ratings that ranged between 1 and 3 with 1 indicating no explicit statement of learning goals or activities and 3 indicating explicit statement of learning goals.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score of explicit learning goals and activities.
Source: OECD, Global Teaching InSights Database.

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Teachers can also make learning goals explicit in teaching materials (including lesson plans, visual aids, handouts and student assignments). These were assigned a score of 3 if they provided evidence of explicit learning goals, a score of 2 if they only provided evidence of topics to be covered or activities to be undertaken, and a score of 1 if neither of these goal statements were present. Classroom averages were calculated as described in Chapter 2. Additionally, classroom maximum scores were calculated as the highest score achieved for each teacher on any given lesson.

In Shanghai (China), teachers had specified the learning goals for nearly all of the materials collected (see Annex 5.B, Teaching Materials [TM] Table 5.B.1). In other countries/economies, most teaching materials only indicated topics to be covered or activities to be undertaken, with mean scores ranging from 1.7 in Madrid (Spain) to 2.4 in Mexico. Teachers did not consistently specify learning goals in materials across lessons. The majority of teachers in B-M-V (Chile), Colombia, England (UK), Mexico and Shanghai (China) made learning goals explicit in at least one of the four lessons for which teaching materials were collected. The majority of teachers in K-S-T (Japan) made learning goals explicit in at least one of the two lessons for which teaching materials were collected (see Annex 5.B, TM Table 5.B.2).

Equations were used far more than graphs or drawings

Within the limitations of the curricula, teachers made choices about what mathematical representations would be taught and how they would be taught.[4] Of course, equations can be expected to be the most prominent type of representation used in teaching the focal topic of quadratic equations. However, other types of representations can be used either sequentially or at the same time, to enhance students' learning opportunities (see Chapter 6).

For example, when helping students understand the meaning of $2x^2 = 0$, the teacher might ask students to graph $y = 2x^2$. This means that the graph and the equation would have been used at the same time. In order to determine what representations were available to students, observers identified the representations that occurred in each eight-minute segment of the lesson. The number of segments that had a certain representation – e.g. a graph, table, etc. – was then counted. That number of segments was then divided by the total number of segments in the lesson. This resulted in a percentage of lesson segments in which that type of representation was used. These percentages were averaged over observers and lessons to obtain a percentage of segments for which a representation was used on average across observers and lessons for a classroom.

Equations were present in over 88% of lesson segments of the average classroom in all participating countries/economies (see Annex 5.A, Table 5.A.7).

Equations were used with graphs in a smaller proportion of lesson segments in Germany* (34%), Colombia (28%), England (UK) (22%), B-M-V (Chile) (15%) and Mexico (11%). Graphs were almost never used during quadratic equations lessons in K-S-T (Japan) (1%) and Shanghai (China) (0%).

Drawings, representations that provide information required to solve the problem, were used in a considerable proportion of lesson segments in K-S-T (Japan) (38%) and Mexico (24%), but more rarely used in other countries/economies (ranging from 5 to 14% of lesson segments).

Other types of representations such as objects (physical objects such as a replica Eiffel Tower or a sheet of paper or dice) and tables (an arrangement of numbers, signs, or words that exhibit a set of facts or relations in a definite, compact and comprehensive form) were rarely used in any participating countries/economies.

Connections between aspects of the mathematics were more frequently made in teaching materials than during lessons

When students are able to make clear, explicit and specific connections between different aspects of the mathematics, they can develop deeper understanding (Stigler and Hiebert, 1999[1]). This does not mean simply learning different types of representations (e.g. equations, graphs, drawings) but rather, it means learning how to connect representations and understand how they are related. Other kinds of connections are also important, such as connections between types of equations and ways of solving those equations. An example is students' making a connection between the nature of a, b and c in the quadratic equation $ax^2 + bx + c = 0$ and the solution method that is most efficient (e.g. factoring, completing the square). Observers noted connections between two representations or any other two aspects of the mathematics, such as a connection between a mathematical rule and an equation or between two procedures.

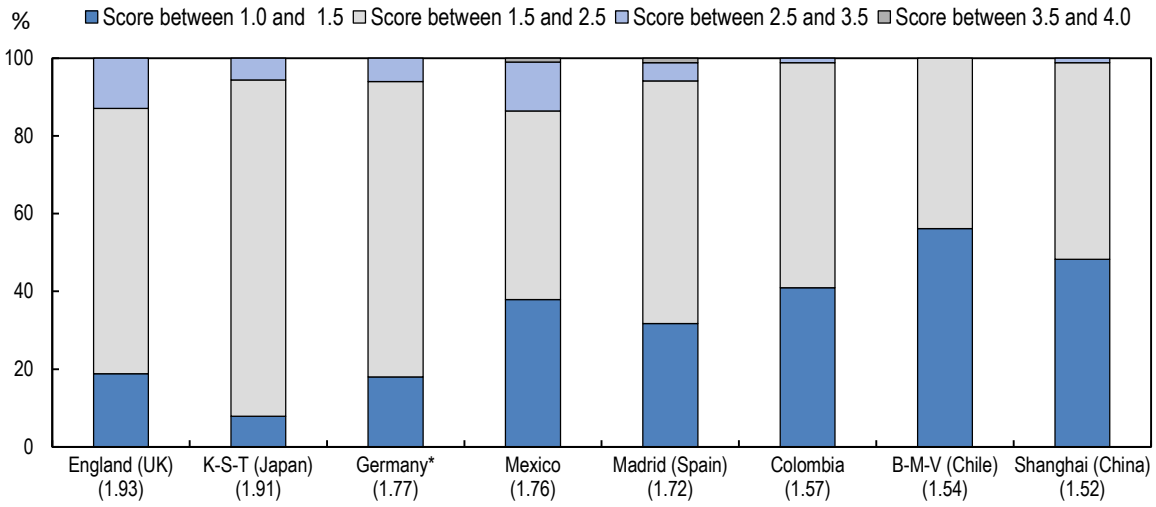
Observers rated the holistic quality of connections – their explicitness, the number present and the nature of the connections on a 1 to 4 scale, aggregated as described in Chapter 2. A rating of 1 indicated that the observers saw no connections and a rating of 4 represented frequent conceptually complex connections.

Connections were not common, and often implicit and/or vague when present (Figure 5.4). The average country/economy's classroom scored between 1.5 and 2 (England [UK] [1.93], K-S-T [Japan] [1.91], Germany* [1.77], Mexico [1.76], Madrid [Spain] [1.72], Colombia [1.57], B-M-V [Chile] [1.54] and Shanghai [China] [1.52]. Scores in this range mean that on average, lessons had zero or one and/or vague connection. This is noteworthy, given the fact multiple representations were frequently present and there are many potential connections between aspects of the mathematics.

Only teachers and students of a few classrooms in Mexico (14%), England (UK) (13%), Madrid (Spain) (6%) and K-S-T (Japan) (6%) were observed making at least two instructional connections between ideas, procedures, perspectives, representations or equations.

Figure 5.4. Connections between different aspects of the mathematics

Percentage of classrooms by mean explicit connections score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw component score is based on observers' video ratings that range between 1 and 4 with 1 indicating no explicit connections and 4 indicating 2 or more explicit connections.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom score of the quality of explicit connections.
Source: OECD, Global Teaching InSights Database.

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Teaching materials can provide opportunities to make connections between the different representations (including textual, symbolic, visual and physical representations) of the same mathematical idea. The scoring of teaching materials was based on whether students were responsible for making these connections (score 3), the teacher or teaching materials made the connections explicit (e.g. an activity provides both an equation and a graph of the same quadratic function) (score 2), or each mathematical idea is represented in a single manner (e.g. a table, graph, diagram or equation) or multiple representations are present but they never connected (score 1). Classroom averages were calculated as described in Chapter 2. Classroom maximum scores were calculated as the highest score achieved for each teacher on any given lesson.

Teachers tended to use materials that make explicit connections among multiple representations as indicated by mean scores around 2 in Germany* (2.40), K-S-T (Japan) (2.28), Mexico (2.28), England (UK) (2.14), B-M-V (Chile) (1.86), Colombia (1.81) and Madrid (Spain) (1.65) (see Annex 5.B, TM Table 5.B.3). In Shanghai (China) (1.29), students did not typically have opportunities to explore connections among representations; most teaching materials had mathematical ideas represented in a single manner or multiple representations were unconnected.

There was variation in the extent to which teaching materials asked students to make connections between different representations within country/economies and across lessons. The majority of teachers in in B-M-V (Chile), Colombia, England (UK), Germany*, K-S-T (Japan), Madrid (Spain) and Mexico used materials with evidence that students were provided opportunities to make connections by themselves in at least one lesson (see Annex 5.B, TM Table 5.B.4).

Connections between mathematical representations might be easier to foster in the context of certain subtopics. For example, in Germany*, though opportunities to make connections are rare, these

opportunities show strong positive associations with the exploration of graphs and functions (r = 0.68). When mathematical connections were made in Shanghai (China), these were often related to the use of real-word situations to translate verbal, textual, or figural information (other than graphs of functions) into equations or appropriate mathematical expressions (r = 0.88).

Connections to real-world contexts were made at least once in teaching materials and rarely in lessons

Opportunities for students to connect classroom mathematics to real-world contexts are important, as they can enhance conceptual understanding (Blum, 2002[2]; De Lange, 1996[3]; Gravemeijer et al., 2000[4]; Perry and Dockett, 2015[5]; Boaler, 2000[6]).The ability to apply mathematics to problems arising in everyday life and the workplace is considered fundamental to mathematical literacy and proficiency (CCSSI, 2010[7]; National Council Of Teachers Of Mathematics, 2000[8]; OECD, 2019[9]). All mathematics topics have some potential connections to students' lives but the ease with which these may be made will vary by the age of the students and the specifics topic at hand. Quadratic equations, for example, can be used to maximise profit, to find the area of a room or a field, to model the motion of a ball or another projectile, or to find the stopping distance of a car traveling at a given velocity.

There are many real-world connections to quadratic functions, but fewer to quadratic equations. Even though some country/economies taught equations and functions in an integrated way, students across countries had few or no opportunities to work with real-world connections in the lessons observed (see *Global Teaching InSights Technical Report*).

Teaching materials showed differences across participating countries/economies in fostering connections to real-world contexts outside of mathematics such as classic "word problems", real data analysis (e.g. finding the maximum height achieved by a projectile), "hands-on" representations using props or physical materials (e.g. using circles of varying diameter to measure pasta) and modelling real phenomena (e.g. modelling the elevation angle of the sun over the course of a day). The highest rating (3) occurred if students are responsible for making the connection and the lowest (1) if there was no evidence of real-world connections. Classroom averages were calculated as described in Chapter 2.

The teaching materials tended to show that either the real-world connections were made explicit to the students, or that the real-world context of a task might not have been necessary to carry out the activity on average in Mexico (1.92), K-S-T (Japan) (1.91), Germany* (1.73) and B-M-V (Chile) (1.51) (see Annex 5.B, TM Table 5.B.22). In contrast, teaching materials contained on average no connections among mathematics and real-world contexts, including students' life experience, in England (UK) (1.31), Shanghai (China) (1.36), Colombia (1.45) and Madrid (Spain) (1.45). In spite of this, the majority of teachers in all country/economies used materials that had some connections among mathematics and real-world contexts in at least one lesson (see Annex 5.B, TM Table 5.B.23).

There was variation in the extent to which teaching materials had evidence of students playing a role in making real-world connections (see Annex 5.B, TM Table 5.B.23). Students in the majority of classrooms in Germany*, K-S-T (Japan), Madrid (Spain) and Mexico were asked to figure out how to connect or apply mathematics to a real-world context, develop a mathematical model that is appropriate to a situation or explain mathematical relationships using contextual information in at least one lesson.

Few opportunities existed to notice patterns or make generalisations in classroom interactions or teaching materials

One way for students to develop strong understandings of mathematics is for them to look for and notice patterns in or to make generalisations across aspects of the mathematics. A teacher might have the class work on six problems, share their solution strategies (e.g. completing the square, using the quadratic

formula, or factorising) and then ask them to try and notice when and why factoring works on some problems but not on others.

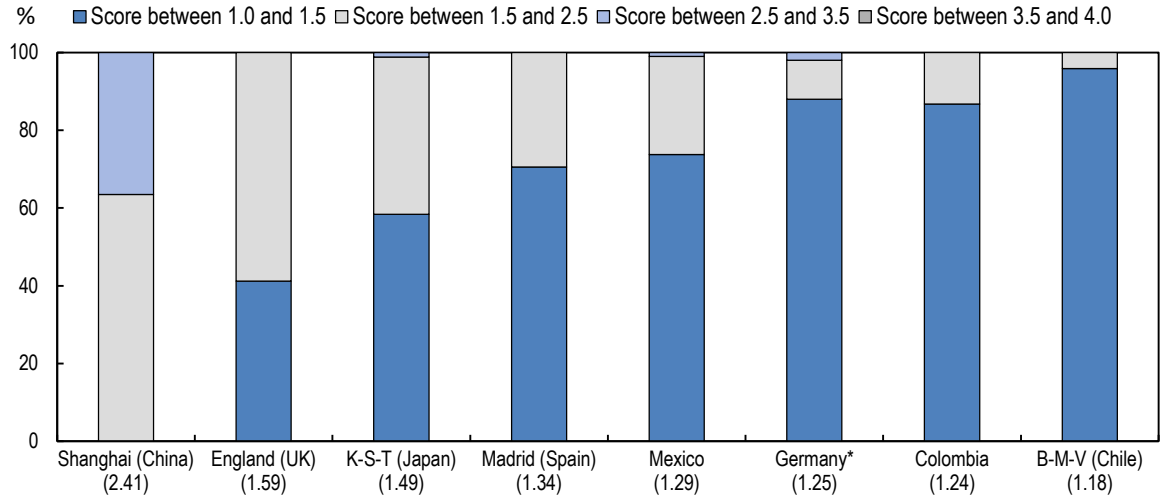
Observers holistically rated the quality of patterns and generalisations on a four-point scale (see Chapter 2 for aggregation method), noting who was noticing the pattern or generalisation (i.e. the teacher or the students) and whether the pattern concerned surface or deeper features of the mathematics. A 1 indicates students were not asked to look for patterns or make generalisations and a 4 indicates that either the students or teachers looked for mathematical patterns about deeper features of the mathematics or made explicit generalisations about deeper mathematics. The example of noticing why factoring works on some problems and not others would be considered a deeper feature of the mathematics.

Neither the teacher nor students engaged considerably in looking for patterns and making generalisations in the mathematical work on average in England (UK) (1.59), K-S-T (Japan) (1.49), Madrid (Spain) (1.34), Mexico (1.29), Germany* (1.25), Colombia (1.24) and B-M-V (Chile) (1.18). In contrast, their peers in Shanghai (China) (2.41) did look for patterns on surface aspects of mathematics and developed generalisations focused on nomenclature or algorithmic processes (Figure 5.5).

It is worthwhile to note that the type of patterns or generalisations that can support the development of strong understandings of mathematics were not observed in any classroom. They would enable students to notice patterns in the deeper features of the mathematics and to develop generalisations focused on foundational concepts, ideas, and/or definitions in a clear and explicit way. The contrary was actually observed in most classrooms in B-M-V (Chile) (96%), Germany* (88%), Colombia (87%), Madrid (Spain) (74%) and Mexico (71%) where almost no patterns or generalisations were engaged by students at all (score below 1.5). Fewer classrooms in K-S-T (Japan) (58%) and England (UK) (41%), and no Shanghai (China) (0%) classrooms fell in this lowest category.

Figure 5.5. Patterns and generalisations

Percentage of classrooms that had a mean patterns and generalisations score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw component score is based on observers' video ratings that range between 1 and 4 with 1 not requiring students to look for patterns or make generalisations and 4 requiring students or teachers to look for deeper mathematical patterns or make explicit generalisations about deeper mathematics.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom scores of the quality of patterns and generalisations.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934186885

Teaching materials can also provide students with opportunities to notice explicit patterns and make generalisations. Evidence that students were asked to use patterns or repeated reasoning to understand quantitative relationships, make conjectures, make predictions, or derive general methods or rules, was rated more highly (score 3) than evidence that patterns and generalisations were already presented to students in the teaching materials (score 2). No attention to patterns and generalisations was rated 1. Classroom averages were calculated as described in Chapter 2 and classroom maximum scores were calculated as the highest score achieved for each teacher on any submitted lesson.

There were generally few opportunities to notice patterns and make generalisations in teaching materials. The majority of teachers in B-M-V (Chile), Colombia and Madrid (Spain) had no such opportunities in any lessons (see Annex 5.B, TM Table 5.B.14). In K-S-T (Japan), the majority of teachers typically used materials where patterns and generalisations were presented to students, and in Shanghai (China), nine out of ten teachers typically provided such opportunities (see Annex 5.B, TM Table 5.B.13). The majority of the teachers in England (UK), Germany* and Mexico used materials where patterns and generalisations were presented to students in at least one lesson (see Annex 5.B, TM Table 5.B.14), although such opportunities were not systematic as indicated by mean scores across lessons of 1.32, 1.44 and 1.33 respectively.

Engaging students in cognitively demanding work

Much has been written about the importance of engaging students cognitively. When students are cognitively engaged, they tend to be more interested (Fauth et al., 2014[10]) and their learning outcomes improve (Baumert et al., 2010[11]; Lipowsky et al., 2009[12]). While researchers agree that students must be cognitively engaged for them to develop strong understandings of mathematics, it is often challenging to discern from observations of students' behaviour whether or not students are cognitively engaged. By the time students reach secondary school, students have generally learnt how to behave so that our methods for discerning students' cognitive engagement must go beyond observing whether students are moving their pencils or listening attentively to whoever is speaking. Observers drew on two aspects of classroom interactions in order to judge students' cognitive engagement – the nature of the mathematics at hand and the actions students took with that mathematics.

As Figure 5.2 shows, the cognitive demand on students was low and generally as low as the sub-domain scores on the quality of subject matter. It is sensible that if subject matter provides few learning opportunities to develop understanding, the frequency and depth of students' cognitive engagement may also be low. Country/economy mean student cognitive engagement scores were as follows: K-S-T (Japan) (2.07), England (UK) (1.86), Germany* (1.81), Shanghai (China) (1.71), Mexico (1.61), Madrid (Spain) (1.53), Colombia (1.49) B-M-V (Chile) (1.48). This section provides additional detail regarding the specific teaching practices measured in the cognitive engagement sub-domain.

Students occasionally engaged in cognitively demanding mathematical work

One way to engage students cognitively is to ask them to carry out cognitively demanding work. Many common tasks in the teaching of quadratic equations can be taught in ways requiring little cognitive demand and would not be rated highly on this scale. For example, the task below would have been rated low because it does not require analysis, creation or evaluation.

Figure 5.6. Example of undemanding and demanding task from Study pilot materials

Solve. First, try to solve the equation by factorisation. If you cannot, do it using the quadratic formula. 54. $4y^2 - 12y = -1$ 57. $9y^2 = -30v - 23$	Knowing that x and y are real numbers and given the equation $(x^2+y^2)(x^2+y^2+1)=20$ Solve for the value of x^2+y^2

Source: OECD, Global Teaching InSights Database.

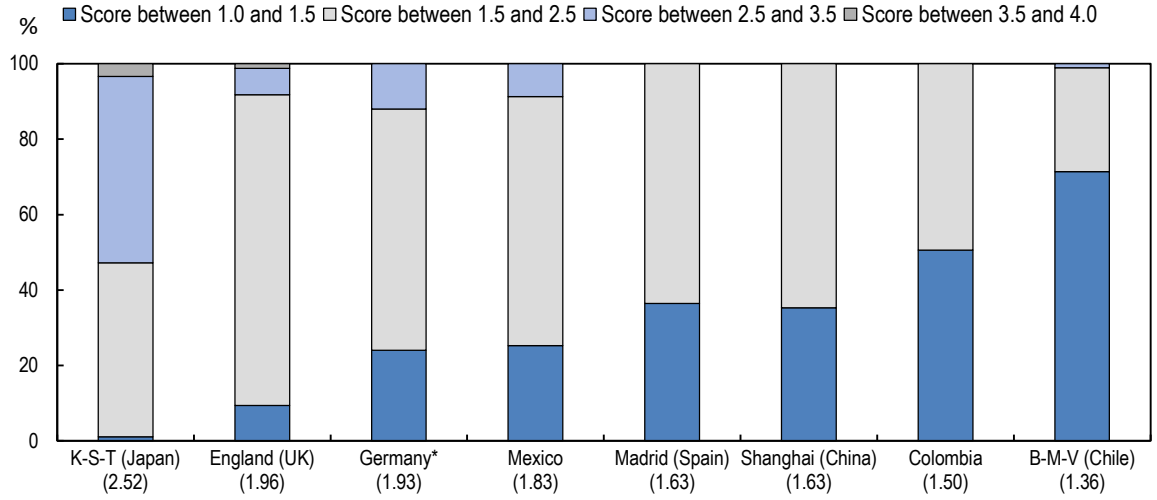
Observers rated the frequency of cognitively demanding work holistically on a four-point scale and aggregated as described in Chapter 2. Tasks that required thoughtful analysis, creation or evaluation were considered more cognitively demanding. If work with such tasks was frequent, observers assigned a rating of 4, if such work did not occur, observers assigned that segment of the lesson a rating of 1. Figure 5.7 shows the percentage of classrooms that had a mean cognitive engagement score in the specified score range.

Students were not given cognitively challenging work on a regular basis. The average level of cognitive demand observed was generally low, with a mean score ranging from 2.52 in K-S-T (Japan) to 1.36 in B-M-V (Chile) (see Annex 5.A, Tables 5.A.8 and 5.A.9). On average, students only engaged occasionally in analyses, creation or evaluation work that is cognitively rich and requires thoughtfulness (K-S-T [Japan] [2.52], England [UK] [1.96], Germany* [1.93], Mexico [1.83]) Madrid [Spain] [1.63], Shanghai [China] [1.63], Colombia [1.50] and B-M-V [Chile] [1.36]).

There was also variation within countries/economies. In K-S-T (Japan), students in 53% of classrooms sometimes or frequently were asked to do cognitively demanding tasks whilst 46% were only asked to do so occasionally (Figure 5.7). Students in a small number of classrooms in Germany* (12%), Mexico (9%) and England (UK) (8%) were also sometimes or frequently cognitively engaged.

Figure 5.7. Student engagement in cognitively demanding subject matter

Percentage of classrooms observed that had a mean cognitive engagement score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw component score is based on observers' video ratings that range between 1 and 4 with 1 indicating students generally not engaging in cognitively demanding subject matter and 4 indicating frequent engagement with cognitively demanding subject matter.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom scores for the quality of engagement in cognitively demanding subject matter.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934186904

Students in varying proportions of classrooms were never engaged in cognitively demanding tasks, B-M-V (Chile) (71%), Colombia (51%), Madrid (Spain) (37%), Mexico (25%), Germany* (24%) and England (UK) (9%). This low level of cognitive challenge raises the need to consider whether and how students can engage with the subject matter in more cognitively demanding ways, more frequently. The example of the Japanese classrooms regularly engaging students in cognitively demanding work suggests that it is possible to have consistently high levels of cognitive demand with the topic of quadratic equations.

Students sometimes made sense of the rationales for procedures and processes

Cognitive demand can be thought of as the cognitive requirements – its richness or difficulty – of a task. Cognitive engagement – how students and teachers interact cognitively with the task – is a different aspect of teaching and learning. Students may be asked to work on cognitively demanding tasks however, when the tasks are enacted, students' cognitive engagement may not match the level of demand in the task (Henningsen and Stein, 1997[13]). One way to improve cognitive engagement is to require students to engage in sense-making strategies when carrying out tasks of any level of cognitive demand. Sense-making strategies support students in understanding why procedures and processes are logical. On average, students did this type of sense-making more often than they engaged with cognitively demanding tasks.

Observers rated on a four point scale the degree to which students tried to understand the rationale for procedures and processes – one way to make sense of (or understand) mathematical procedures or processes – by stating the goals or properties of the procedure, stating why a procedure or solution is

correct or incorrect, or visually designating the steps or elements of a procedure. A score of 1 meant that students never engaged with the rationales for procedures and processes, while a score of 4 meant that they frequently did so. Chapter 2 details the aggregation method used to create classroom mean scores.

On average, students did not engage or occasionally tried to understand the rationale for procedures and processes as shown by mean scores around 2 in K-S-T (Japan) (2.22), England (UK) (2.18), Germany* (2.03), Shanghai (China) (1.95), B-M-V (Chile) (1.87), Mexico (1.81), Colombia (1.76) and Madrid (Spain) (1.69) (see Annex 5.A, Tables 5.A.8 and 5.A.9). This means that students may frequently follow procedures and processes without really understanding the underlying mathematics.

Students had many opportunities to practice

Understanding rationales for procedures and processes is not enough, students need to be able to apply them. When students go over and over the same computations and processes through repetitive practice, they develop fluency to perform them quickly and effectively.

Teachers can devote lesson time to provide students with opportunities to practice. This can be useful when teachers want to make sure that students practice certain procedures or computations, support those who might not be able to complete them on their own or want to build upon them to explain further their rationales. To estimate the time spent on practicing in a lesson, observers noted the amount of time spent practicing in each 8 minute segment of the lesson: ranging from more than half of the time observed (rating 3), only half of the time (rating 2) or no time at all was spent on practice (rating 1). The highest assigned rating across all lesson segments was then assigned as the lesson score. A rating of 3 can be interpreted as there was at least four to eight minutes per lesson spent practicing. It is worth noting that because the highest score for the lesson was taken, there could have been more practice time.

On average, students had at least four minutes of practice time per lesson in England (UK) (2.96), Shanghai (China) (2.69), B-M-V (Chile) (2.59), Germany* (2.45), Madrid (Spain) (2.41), Mexico (2.25), K-S-T (Japan) (2.05) and Colombia (1.96).

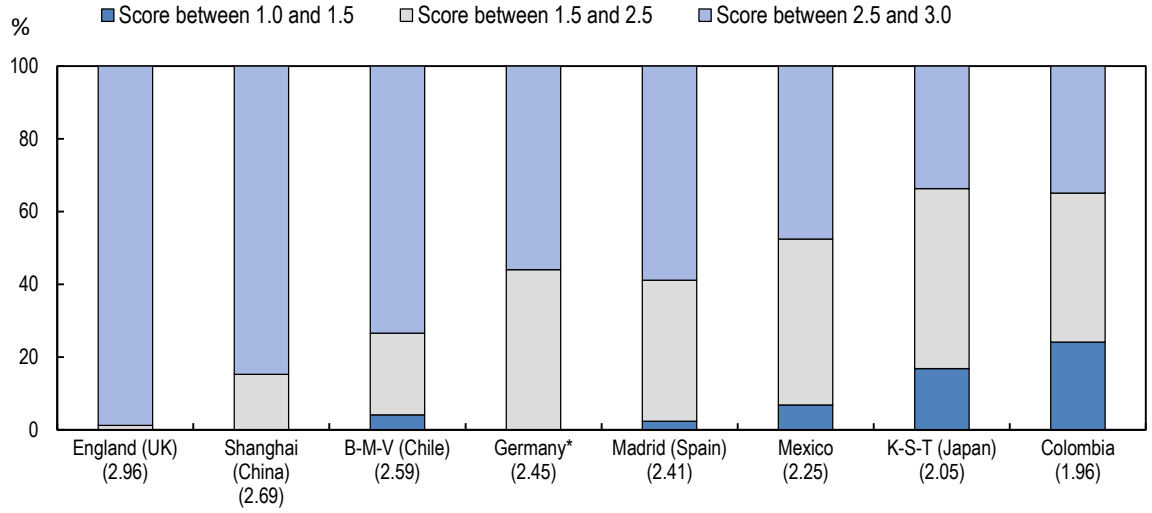
There are important differences, however, both between and within countries that are shown in Figure 5.8. In England (UK), virtually all classrooms had between four and eight minutes of practice time in every lesson. In contrast, students in some classrooms of five countries/economies spent less than four minutes practicing per lesson on average (Colombia [24%], K-S-T [Japan] [17%], Mexico [7%] and B-M-V [Chile] [4%]).

The teaching materials can also provide an indication of the number of opportunities students had to practice and develop fluency with specific skills or procedures (refer to Chapter 2 for details on the calculation of classroom averages). These materials include opportunities to practice outside the lesson through homework assignments. The number of opportunities to practice is divided into three levels: more than five opportunities (score 3), one to five (score 2), or no opportunities at all (score 1).

Teaching materials contain evidence of opportunities to practice in all eight countries/economies (see Annex 5.B, TM Table 5.B.17). The mean scores suggest that materials typically provide at least one opportunity to practice (e.g. all means are greater than or equal to two). In B-M-V (Chile), England (UK), Germany*, Madrid (Spain) and Shanghai (China), the majority of teachers typically provide more than five opportunities to practice.

Figure 5.8. Observed repetitive practice in the classroom

Percentage of classrooms that had a mean highest repetitive practice score



Notes: The country/economy mean indicator score is shown below the country/economy name.
The raw indicator score is based on observers' video ratings that range between 1 and 3 with 1 indicating no time spent practicing, a 2 indicating less than 4 minutes spent practicing and a 3 indicating 4-8 minutes practicing.
This indicator was aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom scores for repetitive practice.
Source: OECD, Global Teaching InSights Database.

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A single approach to solving problems or reasoning prevailed in both lessons and teaching materials

Another way to engage students cognitively is to ask them to use more than one approach to solving the same problem. Sometimes teachers do this sequentially – in one lesson they teach how to factorise a quadratic equation and in the next lesson they teach how to use the quadratic formula to solve the same problem. Other times teachers may ask students to use multiple approaches in the same lesson or to choose an efficient problem-solving approach from the approaches they have learnt.

Observers noted the nature and frequency of solving problems with multiple approaches holistically on a four-point scale (see Chapter 2 for the aggregation method). Score 1 indicates that students did not use multiple solution strategies, while score 4 means that at least one student used more than two procedures or reasoning approaches to solve the problem or type of problem in some depth.

Across countries/economies, students in the average classroom used multiple solution strategies rarely, if at all, with means at the bottom of the four-point scale, between 1.2 to 1.5 (see Annex 5.A, Tables 5.A.8 and 5.A.9). There was a brief use of a second solution strategy by at least one student in one in ten classrooms in England (UK), Germany*, K-S-T (Japan) and Shanghai (China).

Students can also be asked to use more than one method or approach to complete a single mathematical task or activity and to understand the relationships between different methods in the teaching materials. A score of 1 was assigned if students were not asked to use more than one method or approach, a score of 2 was assigned if students could use different methods and a score of 3 was assigned if students were

required to use more than one method or to compare and contrast different approaches. In addition to the classroom averages (described in Chapter 2), classroom maximum scores were calculated as the highest score achieved for each teacher on any given lesson.

When considering all teaching materials collected, students typically were not required to use more than one mathematical approach to complete a task or compare and contrast different approaches as shown by mean scores ranging 1 to 2 in all participating countries/economies (see Annex 5.B, TM Table 5.B.18). In at least one lesson, however, students in the majority of classrooms were able to use multiple approaches and the majority of those in Shanghai (China) were required to do so (see Annex 5.B, TM Table 5.B.19).

Little use of idea-based discussion, metacognition and self-assessment

The education research community has been looking into and advocating for specific teaching strategies that support cognitive engagement for a long time. But, do teachers use these strategies in the classroom? The Study measured the presence of three of these well-researched strategies in classrooms; namely idea-based discussion, metacognitive prompting and self-assessment. In short, there was little use of any of these three strategies in lessons.

Objective-focused discussions – the type of discussion strategy measured in the Study – centre on a learning objective and make extensive use of students' ideas publicly. Such discussions have been used to deepen students' understandings and improve cognitive engagement (Leinhardt and Steele, 2005[14]). There were very few or no classrooms where the teacher guided the discussion towards a learning goal and students did much of the talking based on their own ideas (see Annex 5.A, Tables 5.A.10 and 5.A.11).

Metacognition is often understood to refer to a broad category of thinking in which students think about their thinking. There are many teaching strategies that can engage students in this type of thought; asking students to find the step in which they made a mistake or selecting the most efficient solution strategy from among alternative strategies are just two of the many strategies observers noted.

The focus was on whether and how frequently students reflected on their own thinking. A teacher might ask "Can you look at question 7 and think about why you did what you did?", "Why did you think it was a good idea to use the complete the square approach?" or "Can you think about which approach would be easier – using the quadratic formula or factorising?" Teachers asking the question was not enough to earn a high score, students had to respond to the question. This is a narrowly defined version of metacognition.

While clearly an important type of metacognition for students to practice, this type of metacognition was observed in very few classrooms in the eight country/economy's classrooms (see Annex 5.A, Tables 5.A.12 and 5.A.13). The exception to this was that one in five teachers in K-S-T (Japan) asked their students to engage in metacognition briefly and/or superficially at least once in a lesson.

Self-assessment is another well-researched strategy that was largely unseen. In all country/economies, the typical teacher used materials that did not ask students to assess their own understanding of the content or to reflect on their own learning (see Annex 5.B, TM Table 5.B.20).

Yet, one in five teachers in K-S-T (Japan) and Shanghai (China) used teaching materials with self-assessment opportunities regularly. When such opportunities were recorded, they occurred in broad and general ways (e.g. "how confident are you about your understanding of this topic?") rather than in specific terms that were connected to the lesson content.

Technology used for communication purposes

Technology holds the promise of engaging students in higher order thinking and cognitively demanding tasks. Yet, more technology use does not necessarily translate into better teaching and learning.

Studies suggest it matters less whether students and teachers use technology and more what students and teachers do with the technology (Fishman and Dede, 2016[15]).

Students almost never used technology (i.e. non-graphing calculators, graphing calculators, tablets, cell phones and computers) in the average classroom of the Study. Students did not use technology during the lessons observed in four out of five classrooms in all countries/economies but Germany* (56%) (see Annex 5.A, Table 5.A.14). This includes software designed to carry out simulations, instructional games or interactive graphing tasks. Only a small proportion of classrooms in Germany* (20%), Colombia (10%), B-M-V (Chile) (8%), England (UK) (8%) and Madrid (Spain) (8%) ever used such software (see Annex 5.A, Tables 5.A.12 and 5.A.13). It may be the case that such software was unavailable in other classrooms.

Most teachers used technology, but frequently for communication purposes -- as a whiteboard or blackboard might be used. Only a small proportion of classrooms used technology not just for communication purposes, but also to help students develop conceptual understanding (England [UK] [21%], Mexico [19%], Colombia [14%], K-S-T [Japan] [12%], Madrid [Spain] [11%], Germany* [10%], Shanghai [China] [8%] and B M V [Chile] [5%]) (Table 5.1).

Table 5.1. Use of technology in the classroom

Percentage of classrooms that made use of technology for each purpose

	Number of classrooms	Number of Classrooms with Highest Rating for				Percentage of Classrooms with Highest Rating for			
		No Technology Used	Communication Only	Communication + Limited Conceptual Understanding	Communication + Conceptual Understanding	No Technology Used	Communication Only	Communication + Limited Conceptual Understanding	Communication + Conceptual Understanding
B-M-V (Chile)	98	42	43	8	5	42.9	43.9	8.2	5.1
Colombia	83	42	19	it	12	50.6	22.9	12.0	14.5
England (UK)	85	0	47	20	18	0.0	55.3	23.5	21.2
Germany*	50	12	24	9	5	24.0	48.0	18.0	10.0
K-S-T (Japan)	89	70	5	3	11	78.7	5.6	3.4	12.4
Madrid (Spain)	85	40	27	9	9	47.1	31.8	10.6	10.6
Mexico	103	60	15	8	20	58.3	14.6	7.8	19.4
Shanghai (China)	85	5	60	13	7	5.9	70.6	15.3	8.2

Notes: The table summarises classrooms' "best" use of technology by tabulating those classrooms whose highest rating over segments, lessons and observers was a 1 (no technology used), 2 (technology used for communication only), 3 (technology used for communication and limited conceptual understanding) or a 4 (technology used for communication and conceptual understanding).
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Similarly, there was very little evidence of the use of technology as a tool to develop understanding of mathematical concepts and relationships in the teaching materials (see Annex 5.B, TM Table 5.B.21). In B-M-V (Chile), Colombia, England (UK), K-S-T (Japan), Mexico and Shanghai (China), nine in ten teachers used materials that did not include technology or used technology only to make communication more efficient (e.g. students view projected slides). However, one in five teachers in Germany* and one in ten teachers in Madrid (Spain) make some use of technology in teaching materials as a tool to make computation or graphing more efficient (e.g. calculators), to reinforce teaching (e.g. internet instructional videos), for practice, assessment or feedback to the teacher (e.g. online practice problems, quizzes and/or reporting), or for checking correctness (e.g. students are told to use a calculator to confirm their solutions).

Assessing and responding to students' thinking

Many studies have shown the importance of determining what students know and are able to do and then connecting that to the learning goal (Black and Wiliam, 2009[16]; Rakoczy et al., 2019[17]). This is known as formative assessment. Teachers do this repeatedly minute-by-minute and day-by-day in order to provide instruction that is sensitive to the specific needs and ideas in the classroom.

The strategies teachers use to elicit student thinking, provide feedback and align instruction with that thinking vary, but the goal is the same – to provide appropriate instruction that guides students to new understandings. While one teacher may use the strategy of asking students to raise their hands with questions and another teacher might look over students' shoulders and review the students' work as it occurs, all teachers have strategies for learning what students are thinking and providing feedback on that thinking.

As Figure 5.2 shows, teachers engaged in assessing and responding to student thinking regularly. Mean scores fell in the middle of the four-point scoring scale in England (UK) (2.70), Germany* (2.70), Shanghai (China) (2.62), K-S-T (Japan) (2.49), Madrid (Spain) (2.38), Mexico (2.29), B-M-V (Chile) (2.29) and Colombia (2.11) (see Annex 5.A, Tables 5.A.1 and 5.A.2). This section provides additional detail regarding the specific teaching practices measured in the assessment of and response to student thinking sub-domain.

Teachers elicited moderate levels of student thinking

In order to know what students are thinking, teachers must elicit that thinking in some way. For example, they might assign students a problem set to work on, ask questions of them or invite them to explain the procedure they used. It is difficult for teachers to know and address student understandings if students are not required to show their thinking – in writing or by speaking. Being unaware of student understandings may result in less tailored instruction than is needed for all students to learn.

The amount and type of student thinking elicited – e.g. answers, procedures, ideas – was rated holistically on a four-point scale (see Chapter 2 for aggregation method). A rating of 1 meant that there was no student thinking present. Teachers may have been at the front of the room going through a new problem type and only the teacher was talking and writing. Rating 4 meant that there were many student contributions regarding answers, procedures and steps to solve problems but also contributions that included students thinking about ideas and concepts.

In each country/economy, on average, teachers used questions, tasks and prompts to elicit a moderate amount of student thinking that concerned the answers, procedures and the steps necessary for solving a problem. The average classroom was rated in the middle of the scale on eliciting student thinking: Shanghai (China) (3.12), Germany* (2.90), England (UK) (2.83), K-S-T (Japan) (2.68), Madrid (Spain) (2.49), Mexico (2.45), B-M-V (Chile) (2.40) and Colombia (2.28) (see Annex 5.A, Tables 5.A.8 and 5.A.9). This means that on average, students provided contributions that ranged from perfunctory (rating 2) to more detailed (rating 3) regarding answers, procedures and steps to solve problems.

In virtually all classrooms in Shanghai (China) (100%), England (UK) (93%) and Germany* (90%), teachers frequently elicited moderate to large amounts of student thinking concerning answers, procedures, the steps necessary for solving a problem, ideas and/or concepts (i.e. teachers had average classroom scores between 2.5 and 4.0). Many of K-S-T (Japan)'s teachers (71%) also carried out this type of eliciting.

This amount and type of student thinking was elicited in half or fewer classrooms in Madrid (Spain) (52%), Mexico (46%), B-M-V (Chile) (43%) and Colombia (28%). This means that on average, the prompts, questions and tasks given in many classrooms provided little access to student thinking.

Teachers sometimes used students' thinking instructionally

Student thinking can be a powerful instructional resource. After eliciting students' thinking, teachers can choose to carry on with their lesson as planned or embark into unknown territory by using students' thinking instructionally. This can take different forms.

For example, teachers may choose to ignore student thinking momentarily, guided by the knowledge that students will eventually understand the lesson's objective with a bit more practice. If the teacher is trying to determine a pattern of thinking across students, she might ask multiple students to share their thinking before assessing what the class understands or does not understand and addressing those understandings through instruction.

When the teacher selects students to share their solution methods on the board, teachers may ignore a correct solution process in order to show where an incorrect process went amiss. Teachers' decisions about how to instructionally use students' thinking are often sensitive to the students' specific thinking and the relationship of that thinking to the learning goal.

When rating the "aligning instruction to present student thinking" component, observers considered four types of actions when determining the degree to which teachers used students' thinking instructionally:

- drawing attention to the students' contribution
- asking a question in response to a student's contribution
- requesting students provide the next step in the procedure or process
- acknowledging patterns in student contributions.

Observers also considered the degree to which teachers provided students with hints or cues. Cues and hints are comments or questions that are intended to move students' thinking forward and are said in response to written or spoken student thinking.

The degree to which teachers used student thinking to inform instruction was rated holistically by observers on a four-point scale and aggregated as described in Chapter 2. A rating of 1 indicated that teachers did not use students' contributions and did not provide cues or hints, and a rating of 4 indicates the teacher frequently used students' contributions and provided frequent cues and hints to support students' understandings.

On average, teachers across countries/economies sometimes used students' thinking and provided some cues or hints. In all country/economy means were clustered between 2.65 and 3.25 (see Annex 5.A, Tables 5.A.8 and 5.A.9) except for Colombia with a mean score of 2.38.

In all but one country/economy, more than two-thirds of teachers used student thinking – on average – sometimes or frequently to adapt instruction: Germany* (98%), England (UK) (98%), K-S-T (Japan) (90%), Shanghai (China) (84%), B-M-V (Chile) (73%), Mexico (73%), Madrid (Spain) (68%) and Colombia (41%). This suggests that at a general level teachers' words and actions aimed to connect to students' thinking.

Teachers provided limited feedback that was complete and focused on why

When teachers use student thinking instructionally, they may or may not provide explicit feedback about why that thinking is correct or incorrect. There is a large and persuasive body of research on the importance of such feedback to student learning (Black and Wiliam, 2009[16]). Therefore, it is important to understand the degree to which teachers address student thinking by providing feedback.

Feedback was defined as the back and forth exchanges between the teacher and students that focus on why the students' understandings are correct or incorrect, and the degree to which teacher and student exchanges address the mathematics in a complete manner. This definition implies that when a teacher

asks a student what the solution to $x^2 + 3x + 2 = 0$ is and a student responds that x can be either -1 or -2; and the teacher says "correct", this is not feedback about "why". Saying correct does not help students understand why that answer is correct. Such an exchange can of course, be valuable and is a back and forth exchange – simply not one that focuses on "why".

Observers assigned feedback ratings holistically on a four-point scale (see Chapter 2 for aggregation method). A rating of 1 indicated there was no feedback and/or teacher and student interactions addressed the mathematics in a limited manner. A rating of 4 was assigned when there was frequent feedback and teacher and student interactions addressed the mathematics in a complete manner

In all eight countries/economies, the typical classroom had a small number of feedback interactions focused on why. The mean score was around 2 in all participating countries/economies: Germany* (2.12), England (UK) (2.01), Shanghai (China) (1.94), Madrid (Spain) (1.97), Japan (1.83), Mexico (1.78), B-M-V (Chile) (1.73) and Colombia (1.67). The vast majority of teachers -- between 82% and 98% per country/economy – rarely provided feedback focused on why the mathematics was correct or incorrect; instead they had exchanges with students that were limited in the degree to which they addressed the mathematics at hand.

Only a few teachers sometimes provided feedback about why answers were correct or incorrect in Germany* (18%), Madrid (Spain) (16%), England (UK) (8%), K-S-T (Japan) (8%), Mexico (7%) and Shanghai (China) (5%) (see Annex 5.A, Tables 5.A.8 and 5.A.9).

Building a rich and deep classroom discourse

Classroom discourse regularly requires students to make their detailed thinking visible to themselves, other students or the teacher supports students' learning (Resnick, Asterhan and Clarke, 2018[18]). Discourse comes in both the written and spoken form and in all types of activity structures -- written work on the board for the whole class to see, spoken explanations in front of the whole class or in student pairs, or even written work on their own papers at their desks. The discourse required of students – its level of detail, its cognitive requirements and the degree to which it demands students to explain why the mathematics works the way it does – are critical features of high-quality instruction. Discourse patterns – who speaks and writes at what moment in the lesson – are related to the cultural norms of schools and classrooms. There were differences in these patterns by country/economy.

As Figure 5.2 showed, classroom discourse was somewhat superficial. Mean classroom discourse scores fell below or in the middle of the four-point scale: Germany* (2.54), K-S-T (Japan) (2.52), England (UK) (2.44), Madrid (Spain) (2.27), (Shanghai (China) (2.27), Mexico (2.11), B-M-V (Chile) (2.10) and Colombia (1.85). This section provides additional detail regarding the specific teaching practices measured in the discourse sub-domain.

Students sometimes shared their detailed thinking in lessons and teaching materials

The nature of the classroom discourse was rated holistically on a four-point scale (the aggregation method is detailed in Chapter 2). Observers rated the nature of classroom discourse, taking account of who was speaking or writing (teachers, students or both) and the level of detail in students' contributions. At the low end of the scale, a 1 indicates that the teacher did much of the talking and writing and students did not offer detailed contributions. At the high end, a 4 indicates that students participated in the discourse and that students frequently contributed detailed thinking.

Approximately half or more of the classrooms were characterised by students initiating discourse and sometimes making detailed contributions to the discourse of their lessons as shown by mean scores around the middle of the four-point scale in Germany* (2.82), England (UK) (2.54), Madrid (Spain) (2.53) and K-S-T (Japan) (2.46) (see Annex 5.A, Tables 5.A.8 and 5.A.9).

In contrast, only 3% to 22% of classrooms in B-M-V (Chile), Colombia, Mexico and Shanghai (China) required students to participate in these ways. In these countries, on average, classrooms rarely had students contribute their detailed thinking and the teacher initiated most of the classroom discourse. The mean scores in these countries/economies were closer to a 2 on the four-point scale in Mexico (2.15), Shanghai (China) (2.06), B-M-V (Chile) (2.02) and Colombia (1.72).

Another feature of classroom discourse relates to the kinds of questions that prompt students' responses. Students may be asked to participate in the classroom discourse in different ways, from recalling what has occurred to higher order tasks like analysing or synthesising. The types of questions to which students respond also shape the classroom discourse.

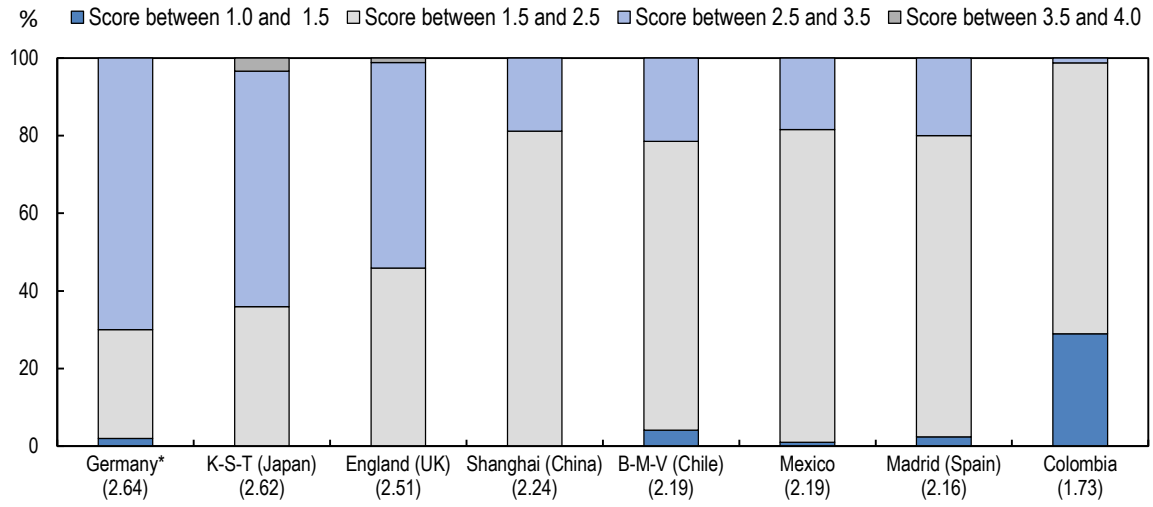
Questioning of students was rated by observers on a four-point scale; Figure 5.9 shows the distribution of scores over the four score ranges. Questions in rating 1 emphasise recalling and reporting answers while questions in rating 4 emphasise analysis, synthesis, justification and conjecture. Questions in the middle are mixtures of these emphases.

The mean classroom's questioning score was around the middle of the four-point scale in Germany* (2.64), K-S-T (Japan) (2.62), England (UK) (2.51), Shanghai (China) (2.24), B-M-V (Chile) (2.19), Mexico (2.19), Madrid (Spain) (2.16) and lower in Colombia (1.73). This implies that the average classroom in every country/economy had a mixture of questions that asked students to recall and report answers, and questions that asked students to summarise and apply rules and procedures, but few questions that emphasised analysis, synthesis and other more complex mathematical actions.

Figure 5.9 shows the extent of differences on the type of questions that students engaged within countries/economies. In Germany* (70%), K-S-T (Japan) (64%) and England (UK) (54%) the majority of classrooms tended to emphasise questions requiring summarisation and the application of rules and procedures or analysis type questions. In Colombia (99%), Mexico (82%), Shanghai (China) (81%), Madrid (Spain) (80%) and B-M-V (Chile) (79%), the majority of classrooms tended to emphasise questions that exclusively focused on recalling and reporting answers or generally focused on those types of questions with some summarisation and application of rules and procedures.

Figure 5.9. Quality of questions in which students engage

Percentage of classrooms that had a mean questioning score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw component score is based on observers' video ratings that range between 1 and 4 with 1 using superficial types of questions (e.g. recall, reporting) and 4 using deep types of questions (e.g. analysis, synthesis, justification and conjecture).
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom scores of the quality of questioning.
Source: OECD, Global Teaching InSights Database.

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Teaching materials can also provide students opportunities to explain or justify their thinking. Evidence that students were asked to communicate their mathematical thinking by explaining both how to perform procedures and why those procedures work was rated more highly (score 3) than evidence that students needed to offer either a how or a why explanation (score 2). Evidence that students were only asked to recall facts or definitions or to follow algorithms was assigned the lowest rating (score 1). Classroom averages were calculated as described in Chapter 2 and classroom maximum scores were calculated as the highest score achieved for each teacher on any given lesson.

In the majority of countries/economies, the typical teaching materials asked students to recall facts, recall definitions or follow algorithms (mean scores were close to 1) (see Annex 5.B, TM Table 5.B.15). Only in Shanghai (China), which had the highest mean score, the majority of teachers used materials that offered opportunities for students to explain both how to perform procedures and to justify why procedures work in at least one lesson. In England (UK), Germany*, K-S-T (Japan) and Mexico, there was evidence that the majority of teachers used teaching materials that asked students to explain their thinking (either how or why) in at least one lesson (see Annex 5.B, TM Table 5.B.16).

In contrast, the majority of teachers in B-M-V (Chile), Colombia and Madrid (Spain) did not use teaching materials that asked students to explain their thinking in any lessons. In only a few cases students were required to communicate explain how to perform procedures, describe how one thing is related to another or justify why procedures work (see Annex 5.B, TM Table 5.B.16).

Teaching materials may afford different opportunities for students to communicate their thinking. The nature of the tasks, the lesson goals, the specific subtopics covered and didactical approach (as described in Chapter 6) all play a role in whether such opportunities are present (Boaler and Staples, 2008[19]; Cohen and Lotan, 1994[20]; Horn, 2006[21]; Schoenfeld, Kilpatrick and Wood, 2008[22]).

Teaching materials that focus on solving equations often focus more on recall and memories (Henningsen and Stein, 1997[13]; Porter et al., 2011[23]; Rivera and Becker, 2009[24]).

While the actual content to be taught may more naturally afford opportunities for students to explain their thinking, there was evidence that teachers have ways to embed such opportunities into any content. Opportunities for student explanation were associated to a different variety of subtopics. For example, opportunities to explain occurred most frequently in the context of exploring real world applications in Colombia (r = 0.35) and K-S-T (Japan) (r = 0.25), completing the square in Shanghai (China) (r = 0.31) and exploring functions in Germany* (r = 0.52) (see Annex 5.B, TM Tables 5.B.5 to 5.B.12).

Classroom explanations were generally brief and/or superficial

Sometimes questions posed to students naturally require quite simple or straightforward responses. For example, in the middle of the quadratic equations unit when students are practicing the application of a single procedure, it may not be necessary to provide a detailed explanation about why the procedure works the way it does. But at other times in a lesson or unit, it may be critical for students to understand why a procedure works and perhaps how the procedure differs from the one they learnt the day before. Explanations – descriptions of why ideas or procedures are the way they are – are an important part of supporting the development of a robust understanding of quadratic equations.

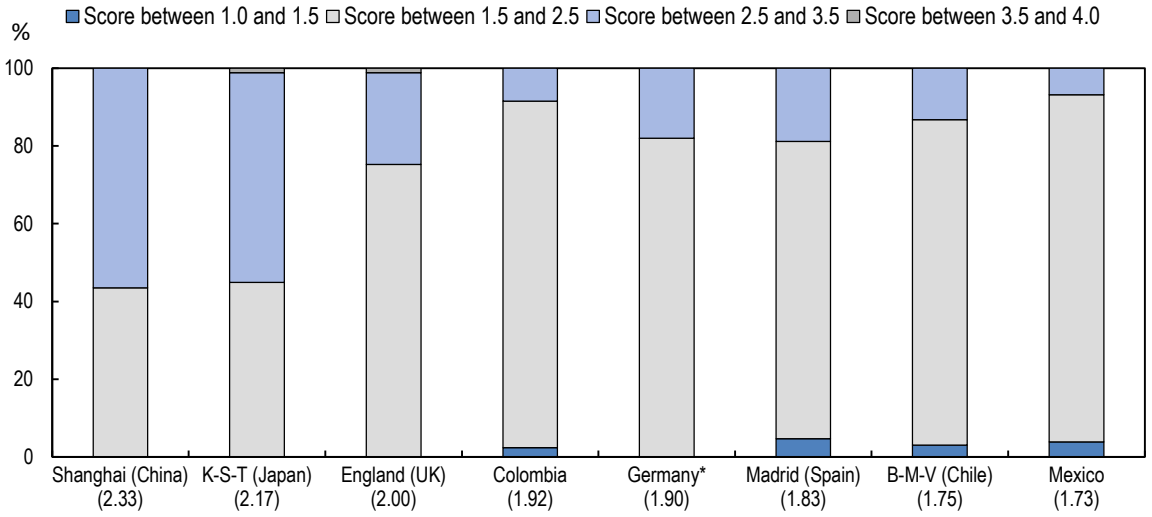
The explanations teachers or students offered were observed and rated on a four-point scale. The highest rating (rating 4) indicates that written or spoken explanations focused on deeper features of the mathematics and/or they were lengthier, more detailed explanations. The lowest rating (rating 1) indicates there were no explanations of why ideas or procedures are correct or incorrect or the explanations were brief or superficial.

The average classroom in each country had explanations present however, they were generally brief or superficial with mean scores between 2 and 2.5 in Shanghai (China) (2.49), K-S-T (Japan) (2.47), England (UK) (2.29), Germany* (2.15), Madrid (Spain) (2.12), Colombia (2.09), B-M-V (Chile) (2.08), Mexico (2.00).

Yet, over half of the classrooms focused on lengthier explanations and explanations of deeper mathematics in Shanghai (China) (56%) and K-S-T (Japan) (55%), with classroom mean scores above 2.5 (Figure 5.10). This was only the case in a markedly smaller proportion of classrooms in England (UK) (24%), Madrid (Spain) (19%), Germany* (18%), B-M-V (Chile) (13%), Colombia (8%) and Mexico (7%).

Figure 5.10. Observed quality of explanations in the classroom

Percentage of classrooms observed that had an explanations score



Notes: The country/economy mean component score is shown below the country/economy name.
The raw component score is based on observers' video ratings that range between 1 and 4 with 1 using superficial types of explanations and 4 using deep types of explanations.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by the mean classroom scores for the quality of explanations.
Source: OECD, Global Teaching InSights Database.

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Teachers and students had positive views about instructional practices

The views of teachers and students on instructional practices matter. They can reveal their perceptions or awareness of what occurs in the classroom, and thus provide valuable information to complement video observation and teaching material-based findings. For example, observers can determine whether the class as a group is engaged in cognitively demanding subject matter, while student reports can help infer to what extent each individual student is engaged in thinking about mathematics through questions on how they felt and behaved during the lessons.

At the end of the unit on quadratic equations, teachers and students were asked about several instructional practices, representing all four sub-domains of instruction:

- Quality of subject matter: setting goals at the beginning of lessons.
- Cognitive engagement of students: self-reported cognitive engagement during the unit on quadratic equations.
- Assessment of and response to students: feedback given by teachers.
- Discourse: student participation in discourse and teachers' explanations of mathematical procedures.

Setting goals at the beginning of instruction was reported as a common practice

Both students and teachers were asked how often the teacher had "set goals at the beginning of instruction" during the unit on quadratic equations. Response options were never or almost never (1), occasionally (2), frequently (3) and always (4) (see Annex 5.A, Table 5.A.24).

Setting goals seems to be a routine, executed in most classrooms. Over two thirds of students in B-M-V (Chile), Colombia, England (UK), K-S-T (Japan), Madrid (Spain), Mexico and Shanghai (China) reported that their teacher always or frequently set goals at the beginning of lessons. In Germany*, however, more than two thirds of students reported that goals were never or occasionally stated in the beginning of the lesson. These country differences were mirrored in teachers' reports, although teachers reported higher frequencies of goal setting at the beginning of instruction than students.

Most students felt cognitively engaged

Students were asked to indicate their level of cognitive engagement at the end of the unit on quadratic equations. This can complement observation data on whether the class as a group is engaged in cognitively demanding subject matter.

Across participating countries/economies, more students reported engaging with mathematical tasks than developing their own ideas on mathematics (Table 5.2). This difference was especially large in Germany* and in England (UK). Students in Shanghai (China) seemed exceptionally engaged in understanding tasks, thinking about the mathematical content and developing their own ideas. These mental activities keep students engaged in learning the mathematics and help them thrive in the classroom.

Table 5.2. Students' self-reported cognitive activity

Percentage of students who agreed or strongly agreed with the respective statements on how they felt and behaved during mathematics instruction during the unit on quadratic equations

	I kept thinking about tasks until I really understood them	I was thinking intensively about the mathematical content	I developed my own ideas
B-M-V (Chile)	63	55	54
Colombia	73	71	60
England (UK)	77	57	51
Germany*	65	48	38
K-S-T (Japan)	73	81	53
Madrid (Spain)	81	65	60
Mexico	70	55	67
Shanghai (China)	91	90	84

Notes: The wording given is the student version. In the Teacher Questionnaire, "Our mathematics teacher" was replaced by "I", and "us" was replaced by "these students".
Response scale: Strongly disagree – Disagree – Agree – Strongly agree.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Feedback was not given regularly

Students were asked how often the teacher did "tell you about how well you were doing in your mathematics class" and "give you feedback on your strengths and weaknesses". Table 5.3 presents the percentage of students who chose the response "Most lessons" or "Every lesson" for these two items (rather than "some lessons" or "never or hardly ever").

Across countries/economies, at most half of the students reported either type of feedback to be given regularly. Feedback was exceptionally rare in Germany* and K-S-T (Japan) with only 15% and 23% of students respectively reporting its regular use.

Shanghai (China)'s students primarily experienced feedback based on their individual strengths and weaknesses. This kind of feedback can help students understand what exactly they need to improve (OECD, 2014[25]; Klieme, 2020[26]). In B-M-V (Chile), Madrid (Spain) and Mexico, on the other hand, students more often reported being told how well they were doing in comparison to their classmates, which might be both less informative and less supportive for students.

Table 5.3. Students' perceptions on the frequency of feedback received from teachers

Percentage of students who reported the respective type of feedback to be given in most lessons or every lesson during the unit on quadratic equations

	Teacher tells how well you were doing	Teacher gives feedback on strengths and weaknesses
B-M-V (Chile)	51%	42%
Colombia	48%	52%
England (UK)	44%	47%
Germany*	14%	16%
K-S-T (Japan)	23%	23%
Madrid (Spain)	45%	38%
Mexico	49%	40%
Shanghai (China)	37%	49%

Notes: Response scale: Never or hardly ever – Some lessons – Most lessons – Every lesson.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Students took part in the classroom discourse

Teachers and students were asked whether teachers explained why procedures work (Explaining Procedures) and how many opportunities students had to engage actively in questioning, argumentation and discussion (Student Participation in Discourse) (Table 5.4).

Table 5.4. Teacher and student perceived contribution to classroom discourse

Percentage of teachers and students who reported the respective practice to have happened "frequently" or "always" during the unit on quadratic equations

	Our mathematics teacher …					
	…explained why a mathematical procedure works.		…gave us opportunities to explain our ideas.		…required us to engage in discussions among ourselves.	
	Teachers	Students	Teachers	Students	Teachers	Students
B-M-V (Chile)	91	79	88	75	29	29
Colombia	78	76	87	72	67	49
England (UK)	68	68	73	76	55	55
Germany*	64	43	88	69	54	26
K-S-T (Japan)	52	62	74	84	71	71
Madrid (Spain)	67	65	86	68	39	24
Mexico	86	84	95	82	68	60
Shanghai (China)	71	70	98	87	88	71

Notes: The wording given is the student version. In the Teacher Questionnaire, "Our mathematics teacher" was replaced by "I", and "us" was replaced by "these students".
Response scale: Never or almost never – Occasionally – Frequently – Always.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Whole class instruction is the most prominent setting across all countries/economies. Usually this includes frequent teacher questions answered by students either voluntarily or upon being named by the teacher. Therefore, it is no surprise that more than two thirds of the students in all participating countries/economies reported frequent or routine opportunities to "explain their own ideas".

Opportunities for students to exchange mathematical arguments among themselves vary by country/economy. 71% of students reported frequently or always being required to discuss among themselves in K-S-T (Japan) and Shanghai (China), while only about half of students in Colombia, England (UK) and Mexico, and less than a third in Madrid (Spain), Germany* and B-M-V (Chile) reported being required to do so.

Secondary school algebra, including the topic of quadratic equations, includes a good deal of handling mathematical procedures such as transforming equations or applying binomial rules. High quality mathematical discourse in algebra lessons can be characterised, among other features, by its focus on understanding *why* mathematical procedures work in addition to, or instead of practicing procedures in a repetitive way. Teachers frequently or always explained to students why mathematical procedures work according to most students in all participating countries/economies but Germany* where only 43% of students indicated so.

When comparing teachers' explaining procedures with students' engaging in discussions, the former practice is reported to be more frequent than the latter in most countries/economies with the exception of K-S-T (Japan) and Shanghai (China). This pattern may reflect a greater focus on student participation in

discourse in the East Asian countries/economies and a stronger focus on teacher-directed instruction elsewhere.

Teachers are consistently more positive than students on the three statements related to classroom discourse in all participating countries/economies (Table 5.4) except for K-S-T (Japan) where the opposite is true. The largest gap between teacher reports and student reports has been found in Germany*.

Teacher, students and observers perceptions were partially aligned

How much do teachers' views of classroom discourse align with their students' views on the classroom level? To check the strength of this relationship, the indices of Explaining Procedures and Student Participation in Discourse were created.[5]

Teacher and student reports of Explaining Procedures were not aligned within countries/economies: correlations on the classroom level were low in Mexico (0.23) and England (UK) (0.29), and literally zero everywhere else.

Correlations between teacher and student views on Student Participation in Discourse, however, were significant on the classroom level in five countries/economies, ranging from 0.27 in Shanghai (China) through to 0.50 in Germany*. In four of these countries/economies, either teacher judgements or student judgements were also significantly correlated with the video score for "nature of discourse".

The alignment between teacher, student and observer perspective when assessing different aspects of classroom discourse is slightly stronger than for social-emotional support (see Chapter 4), but much weaker than for classroom management (see Chapter 3).

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Annex 5.A. Chapter tables

Annex Table 5.A.1. Domains of instruction (percentiles)

Based on observers' mean classroom video ratings

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Instruction	Domain Mean	98	1.85	0.18	1.50	1.61	1.70	1.82	1.99	2.10	2.31
Colombia	Instruction	Domain Mean	83	1.74	0.23	1.30	1.45	1.50	1.76	1.99	2.04	2.23
England (UK)	Instruction	Domain Mean	85	2.23	0.26	1.68	1.88	2.01	2.24	2.40	2.50	3.18
Germany*	Instruction	Domain Mean	50	2.20	0.22	1.73	1.97	2.04	2.19	2.35	2.50	2.67
K-S-T (Japan)	Instruction	Domain Mean	89	2.24	0.27	1.72	1.92	1.96	2.26	2.45	2.58	3.10
Madrid (Spain)	Instruction	Domain Mean	85	1.96	0.23	1.33	1.68	1.80	1.98	2.15	2.23	2.49
Mexico	Instruction	Domain Mean	103	1.92	0.27	1.27	1.62	1.68	1.91	2.13	2.27	2.58
Shanghai (China)	Instruction	Domain Mean	85	2.15	0.18	1.69	1.93	2.02	2.14	2.30	2.38	2.82
B-M-V (Chile)	Discourse	Domain Mean	98	2.10	0.24	1.46	1.82	1.92	2.08	2.29	2.35	2.73
Colombia	Discourse	Domain Mean	83	1.85	0.28	1.35	1.46	1.57	1.84	2.15	2.23	2.43
England (UK)	Discourse	Domain Mean	85	2.44	0.26	2.00	2.09	2.21	2.47	2.61	2.68	3.39
Germany*	Discourse	Domain Mean	50	2.54	0.24	1.86	2.24	2.41	2.53	2.69	2.78	3.08

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
K-S-T (Japan)	Discourse	Domain Mean	89	2.52	0.30	2.00	2.19	2.24	2.50	2.81	2.87	3.31
Madrid (Spain)	Discourse	Domain Mean	85	2.27	0.30	1.42	1.85	2.07	2.33	2.48	2.60	2.82
Mexico	Discourse	Domain Mean	103	2.11	0.30	1.25	1.75	1.86	2.09	2.37	2.52	3.06
Shanghai (China)	Discourse	Domain Mean	85	2.27	0.19	1.69	2.03	2.11	2.26	2.42	2.49	2.89
B-M-V (Chile)	Quality of Subject Matter	Domain Mean	98	1.36	0.23	1.00	1.09	1.15	1.32	1.56	1.66	2.05
Colombia	Quality of Subject Matter	Domain Mean	83	1.41	0.20	1.04	1.21	1.25	1.34	1.59	1.69	2.07
England (UK)	Quality of Subject Matter	Domain Mean	85	1.76	0.36	1.13	1.36	1.42	1.75	2.00	2.25	2.74
Germany*	Quality of Subject Matter	Domain Mean	50	1.51	0.22	1.08	1.29	1.33	1.48	1.65	1.79	2.05
K-S-T (Japan)	Quality of Subject Matter	Domain Mean	89	1.70	0.29	1.17	1.41	1.47	1.67	1.89	2.17	2.54
Madrid (Spain)	Quality of Subject Matter	Domain Mean	85	1.53	0.32	1.00	1.21	1.29	1.48	1.75	1.92	2.96
Mexico	Quality of Subject Matter	Domain Mean	103	1.53	0.35	1.00	1.13	1.25	1.46	1.85	2.04	2.58
Shanghai (China)	Quality of Subject Matter	Domain Mean	85	1.97	0.22	1.33	1.75	1.79	1.92	2.13	2.26	2.49
B-M-V (Chile)	Cognitive Engagement	Domain Mean	98	1.48	0.25	1.06	1.15	1.28	1.45	1.67	1.79	2.40
Colombia	Cognitive Engagement	Domain Mean	83	1.49	0.26	1.03	1.17	1.26	1.47	1.71	1.85	2.16
England (UK)	Cognitive Engagement	Domain Mean	85	1.86	0.37	1.25	1.44	1.58	1.81	2.12	2.22	3.33
Germany*	Cognitive Engagement	Domain Mean	50	1.81	0.34	1.26	1.42	1.50	1.78	2.03	2.26	2.81
K-S-T (Japan)	Cognitive Engagement	Domain Mean	89	2.07	0.40	1.28	1.58	1.72	2.06	2.42	2.61	3.28

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Cognitive Engagement	Domain Mean	85	1.53	0.24	1.00	1.26	1.36	1.50	1.70	1.83	2.19
Mexico	Cognitive Engagement	Domain Mean	103	1.61	0.28	1.10	1.29	1.39	1.59	1.83	2.00	2.42
Shanghai (China)	Cognitive Engagement	Domain Mean	85	1.71	0.26	1.25	1.44	1.47	1.67	1.90	2.02	2.50
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Domain Mean	98	2.29	0.26	1.62	1.94	2.06	2.29	2.51	2.66	2.91
Colombia	Assessment of and Responses to Student Understanding	Domain Mean	83	2.11	0.36	1.42	1.67	1.78	2.07	2.51	2.62	2.81
England (UK)	Assessment of and Responses to Student Understanding	Domain Mean	85	2.70	0.24	2.08	2.39	2.50	2.67	2.86	3.04	3.50
Germany*	Assessment of and Responses to Student Understanding	Domain Mean	50	2.70	0.24	2.03	2.43	2.53	2.69	2.92	2.96	3.19
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Domain Mean	89	2.49	0.30	1.75	2.11	2.19	2.50	2.72	2.86	3.14
Madrid (Spain)	Assessment of and Responses to Student Understanding	Domain Mean	85	2.38	0.38	1.22	1.89	2.16	2.39	2.67	2.81	3.11
Mexico	Assessment of and Responses to Student Understanding	Domain Mean	103	2.29	0.34	1.44	1.89	2.01	2.28	2.58	2.74	3.06
Shanghai (China)	Assessment of and Responses to Student Understanding	Domain Mean	85	2.62	0.23	2.07	2.36	2.44	2.61	2.78	2.89	3.36

Notes: 1. The instruction domain is the mean classroom score over four sub-domain scores for Discourse, Quality of Subject Matter, Cognitive Engagement, and Assessment of and Responses to Student Understanding.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.2. Domains of instruction (domain score)

Based on observers' mean classroom video ratings

	Domain[1]	Component	Frequency (domain score)				Percentage (domain score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
B-M-V (Chile)	Instruction	Domain mean	1	97	0	0	1.0	99.0	0.0	0.0
Colombia	Instruction	Domain mean	17	66	0	0	20.5	79.5	0.0	0.0
England (UK)	Instruction	Domain mean	0	76	9	0	0.0	89.4	10.6	0.0
Germany*	Instruction	Domain mean	0	45	5	0	0.0	90.0	10.0	0.0
K-S-T (Japan)	Instruction	Domain mean	0	75	14	0	0.0	84.3	15.7	0.0
Madrid (Spain)	Instruction	Domain mean	5	80	0	0	5.9	94.1	0.0	0.0
Mexico	Instruction	Domain mean	5	94	4	0	4.9	91.3	3.9	0.0
Shanghai (China)	Instruction	Domain mean	0	84	1	0	0.0	98.8	1.2	0.0
B-M-V (Chile)	Discourse	Domain mean	1	90	7	0	1.0	91.8	7.1	0.0
Colombia	Discourse	Domain mean	12	71	0	0	14.5	85.5	0.0	0.0
England (UK)	Discourse	Domain mean	0	47	38	0	0.0	55.3	44.7	0.0
Germany*	Discourse	Domain mean	0	18	32	0	0.0	36.0	64.0	0.0
K-S-T (Japan)	Discourse	Domain mean	0	44	45	0	0.0	49.4	50.6	0.0
Madrid (Spain)	Discourse	Domain mean	1	67	17	0	1.2	78.8	20.0	0.0
Mexico	Discourse	Domain mean	1	88	14	0	1.0	85.4	13.6	0.0
Shanghai (China)	Discourse	Domain mean	0	76	9	0	0.0	89.4	10.6	0.0
B-M-V (Chile)	Quality of Subject Matter	Domain mean	71	27	0	0	72.4	27.6	0.0	0.0
Colombia	Quality of Subject Matter	Domain mean	61	22	0	0	73.5	26.5	0.0	0.0
England (UK)	Quality of Subject Matter	Domain mean	21	61	3	0	24.7	71.8	3.5	0.0
Germany*	Quality of Subject Matter	Domain mean	26	24	0	0	52.0	48.0	0.0	0.0
K-S-T (Japan)	Quality of Subject Matter	Domain mean	19	69	1	0	21.3	77.5	1.1	0.0
Madrid (Spain)	Quality of Subject Matter	Domain mean	43	41	1	0	50.6	48.2	1.2	0.0
Mexico	Quality of Subject Matter	Domain mean	54	48	1	0	52.4	46.6	1.0	0.0
Shanghai (China)	Quality of Subject Matter	Domain mean	2	83	0	0	2.4	97.6	0.0	0.0
B-M-V (Chile)	Cognitive Engagement	Domain mean	54	44	0	0	55.1	44.9	0.0	0.0
Colombia	Cognitive Engagement	Domain mean	46	37	0	0	55.4	44.6	0.0	0.0
England (UK)	Cognitive Engagement	Domain mean	11	71	3	0	12.9	83.5	3.5	0.0

	Domain[1]	Component	Frequency (domain score)				Percentage (domain score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
Germany*	Cognitive Engagement	Domain mean	10	38	2	0	20.0	76.0	4.0	0.0
K-S-T (Japan)	Cognitive Engagement	Domain mean	3	74	12	0	3.4	83.1	13.5	0.0
Madrid (Spain)	Cognitive Engagement	Domain mean	38	47	0	0	44.7	55.3	0.0	0.0
Mexico	Cognitive Engagement	Domain mean	38	65	0	0	36.9	63.1	0.0	0.0
Shanghai (China)	Cognitive Engagement	Domain mean	19	65	1	0	22.4	76.5	1.2	0.0
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Domain mean	0	76	22	0	0.0	77.6	22.4	0.0
Colombia	Assessment of and Responses to Student Understanding	Domain mean	3	63	17	0	3.6	75.9	20.5	0.0
England (UK)	Assessment of and Responses to Student Understanding	Domain mean	0	16	68	1	0.0	18.8	80.0	1.2
Germany*	Assessment of and Responses to Student Understanding	Domain mean	0	9	41	0	0.0	18.0	82.0	0.0
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Domain mean	0	41	48	0	0.0	46.1	53.9	0.0
Madrid (Spain)	Assessment of and Responses to Student Understanding	Domain mean	3	48	34	0	3.5	56.5	40.0	0.0
Mexico	Assessment of and Responses to Student Understanding	Domain mean	1	70	32	0	1.0	68.0	31.1	0.0
Shanghai (China)	Assessment of and Responses to Student Understanding	Domain mean	0	22	63	0	0.0	25.9	74.1	0.0

Notes: 1. The instruction domain is the mean classroom score over four sub-domain scores for Discourse, Quality of Subject Matter, Cognitive Engagement, and Assessment of and Responses to Student Understanding.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.3. Densities of instruction sub-domain scores (discourse and quality of subject matter)

Based on observers' video ratings

	Discourse								Quality of Subject Matter							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.21	0.10	0.10	0.03	0.27	0.43	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.27	0.13	0.13	0.04	0.32	0.49	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.92	0.34	0.15	0.16	0.05	0.38	0.55	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	1.09	0.41	0.18	0.19	0.07	0.44	0.61	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	1.26	0.48	0.21	0.23	0.09	0.51	0.67	0.00
1.10	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	1.40	0.58	0.24	0.28	0.12	0.58	0.73	0.00
1.12	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00	1.51	0.69	0.27	0.33	0.15	0.66	0.79	0.00
1.14	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	1.59	0.85	0.30	0.40	0.18	0.74	0.85	0.00
1.16	0.00	0.02	0.00	0.00	0.00	0.00	0.03	0.00	1.64	1.04	0.34	0.49	0.21	0.82	0.90	0.00
1.18	0.00	0.04	0.00	0.00	0.00	0.00	0.03	0.00	1.67	1.26	0.37	0.59	0.24	0.90	0.96	0.01
1.20	0.00	0.06	0.00	0.00	0.00	0.00	0.03	0.00	1.67	1.49	0.41	0.71	0.28	0.98	1.01	0.01
1.22	0.00	0.08	0.00	0.00	0.00	0.00	0.04	0.00	1.66	1.73	0.44	0.85	0.32	1.06	1.06	0.02
1.24	0.00	0.11	0.00	0.00	0.00	0.01	0.04	0.00	1.64	1.95	0.48	1.00	0.36	1.14	1.10	0.03
1.26	0.00	0.15	0.00	0.00	0.00	0.01	0.04	0.00	1.61	2.14	0.52	1.15	0.41	1.20	1.13	0.04
1.28	0.01	0.20	0.00	0.00	0.00	0.02	0.04	0.00	1.57	2.27	0.57	1.30	0.47	1.26	1.16	0.05
1.30	0.01	0.26	0.00	0.00	0.00	0.03	0.04	0.00	1.54	2.35	0.61	1.43	0.54	1.31	1.18	0.06
1.32	0.02	0.32	0.00	0.00	0.00	0.04	0.04	0.00	1.50	2.36	0.66	1.55	0.61	1.34	1.19	0.07
1.34	0.03	0.40	0.00	0.00	0.00	0.05	0.04	0.00	1.48	2.32	0.70	1.65	0.70	1.37	1.20	0.08
1.36	0.04	0.47	0.00	0.00	0.00	0.07	0.04	0.00	1.45	2.22	0.75	1.74	0.80	1.38	1.20	0.09
1.38	0.05	0.55	0.00	0.00	0.00	0.08	0.05	0.00	1.42	2.07	0.79	1.82	0.90	1.38	1.20	0.09
1.40	0.07	0.62	0.00	0.00	0.00	0.10	0.05	0.00	1.40	1.90	0.83	1.88	1.01	1.37	1.19	0.10
1.42	0.09	0.70	0.00	0.00	0.00	0.12	0.07	0.00	1.37	1.71	0.87	1.94	1.12	1.35	1.18	0.10
1.44	0.11	0.76	0.00	0.00	0.00	0.13	0.08	0.00	1.33	1.52	0.90	1.97	1.22	1.33	1.17	0.11
1.46	0.13	0.81	0.00	0.00	0.00	0.14	0.10	0.00	1.28	1.35	0.92	1.99	1.32	1.31	1.15	0.12
1.48	0.15	0.86	0.00	0.00	0.00	0.15	0.12	0.00	1.23	1.19	0.94	1.97	1.40	1.28	1.13	0.12
1.50	0.16	0.90	0.00	0.00	0.00	0.15	0.15	0.00	1.17	1.07	0.95	1.92	1.47	1.25	1.10	0.13
1.52	0.18	0.93	0.00	0.00	0.00	0.16	0.18	0.00	1.11	0.99	0.95	1.83	1.52	1.22	1.07	0.14

	Discourse								Quality of Subject Matter							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.54	0.18	0.95	0.00	0.00	0.00	0.16	0.21	0.01	1.06	0.93	0.95	1.73	1.56	1.18	1.04	0.15
1.56	0.19	0.97	0.00	0.00	0.00	0.16	0.25	0.01	1.01	0.91	0.95	1.60	1.58	1.15	1.00	0.17
1.58	0.19	0.98	0.00	0.00	0.00	0.16	0.29	0.02	0.96	0.91	0.95	1.47	1.59	1.11	0.96	0.21
1.60	0.19	1.00	0.00	0.00	0.00	0.17	0.33	0.03	0.92	0.91	0.95	1.34	1.58	1.07	0.91	0.26
1.62	0.19	1.02	0.00	0.00	0.00	0.18	0.37	0.04	0.87	0.90	0.95	1.21	1.55	1.04	0.87	0.33
1.64	0.20	1.04	0.00	0.00	0.00	0.19	0.42	0.05	0.82	0.88	0.95	1.11	1.51	1.00	0.82	0.42
1.66	0.22	1.06	0.00	0.00	0.00	0.20	0.47	0.06	0.77	0.85	0.96	1.01	1.47	0.96	0.76	0.53
1.68	0.24	1.08	0.00	0.00	0.00	0.22	0.52	0.07	0.71	0.80	0.96	0.93	1.41	0.93	0.71	0.66
1.70	0.28	1.10	0.00	0.01	0.00	0.25	0.56	0.07	0.64	0.74	0.97	0.87	1.35	0.89	0.67	0.82
1.72	0.33	1.12	0.00	0.01	0.00	0.27	0.61	0.07	0.57	0.67	0.99	0.81	1.28	0.86	0.62	0.99
1.74	0.40	1.14	0.00	0.03	0.01	0.30	0.66	0.07	0.49	0.61	1.00	0.76	1.21	0.82	0.59	1.18
1.76	0.48	1.17	0.01	0.04	0.01	0.33	0.72	0.07	0.42	0.55	1.01	0.71	1.14	0.79	0.55	1.38
1.78	0.58	1.18	0.01	0.07	0.02	0.35	0.77	0.08	0.35	0.49	1.02	0.66	1.07	0.75	0.53	1.57
1.80	0.69	1.20	0.02	0.10	0.03	0.38	0.83	0.10	0.29	0.43	1.04	0.60	1.01	0.72	0.51	1.74
1.82	0.82	1.21	0.03	0.14	0.04	0.41	0.88	0.13	0.23	0.37	1.04	0.54	0.94	0.68	0.50	1.89
1.84	0.96	1.21	0.05	0.18	0.05	0.44	0.94	0.17	0.20	0.32	1.05	0.48	0.88	0.65	0.50	2.00
1.86	1.11	1.20	0.07	0.21	0.07	0.46	0.99	0.22	0.17	0.27	1.05	0.42	0.82	0.61	0.50	2.08
1.88	1.25	1.19	0.11	0.22	0.10	0.48	1.05	0.28	0.15	0.21	1.04	0.37	0.77	0.57	0.51	2.11
1.90	1.37	1.16	0.16	0.22	0.12	0.50	1.10	0.36	0.14	0.17	1.02	0.33	0.71	0.53	0.51	2.10
1.92	1.47	1.13	0.21	0.20	0.16	0.51	1.14	0.44	0.14	0.13	1.00	0.30	0.66	0.49	0.52	2.06
1.94	1.55	1.10	0.28	0.17	0.20	0.53	1.19	0.54	0.14	0.10	0.97	0.28	0.61	0.45	0.53	1.97
1.96	1.59	1.06	0.36	0.14	0.24	0.54	1.23	0.64	0.13	0.08	0.93	0.28	0.56	0.41	0.53	1.86
1.98	1.61	1.02	0.44	0.11	0.30	0.55	1.26	0.76	0.13	0.07	0.89	0.28	0.52	0.37	0.53	1.73
2.00	1.61	0.98	0.52	0.08	0.36	0.58	1.29	0.87	0.12	0.06	0.84	0.28	0.48	0.33	0.52	1.60
2.02	1.60	0.94	0.60	0.07	0.43	0.61	1.31	0.99	0.11	0.06	0.79	0.28	0.46	0.29	0.51	1.47
2.04	1.58	0.91	0.66	0.08	0.50	0.65	1.32	1.10	0.10	0.07	0.73	0.28	0.44	0.26	0.49	1.35
2.06	1.56	0.88	0.72	0.10	0.58	0.70	1.33	1.21	0.08	0.07	0.67	0.26	0.43	0.23	0.46	1.26
2.08	1.54	0.86	0.77	0.14	0.67	0.76	1.33	1.31	0.07	0.07	0.62	0.23	0.42	0.20	0.43	1.17
2.10	1.52	0.84	0.81	0.19	0.76	0.83	1.32	1.41	0.06	0.06	0.56	0.20	0.42	0.18	0.39	1.10
2.12	1.51	0.84	0.84	0.26	0.85	0.89	1.30	1.50	0.04	0.05	0.51	0.17	0.42	0.16	0.35	1.04

	Discourse								Quality of Subject Matter							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.14	1.50	0.83	0.86	0.33	0.94	0.95	1.28	1.60	0.03	0.04	0.47	0.13	0.42	0.15	0.32	0.98
2.16	1.49	0.83	0.88	0.40	1.02	1.00	1.24	1.68	0.02	0.03	0.43	0.10	0.42	0.14	0.28	0.93
2.18	1.48	0.82	0.91	0.46	1.10	1.04	1.20	1.76	0.02	0.02	0.39	0.07	0.42	0.13	0.24	0.89
2.20	1.46	0.81	0.94	0.50	1.17	1.09	1.15	1.82	0.01	0.01	0.37	0.05	0.41	0.12	0.21	0.85
2.22	1.43	0.80	0.97	0.52	1.22	1.13	1.10	1.86	0.01	0.01	0.34	0.03	0.40	0.12	0.18	0.81
2.24	1.39	0.77	1.02	0.52	1.25	1.18	1.05	1.88	0.00	0.00	0.33	0.02	0.38	0.12	0.16	0.77
2.26	1.33	0.73	1.06	0.52	1.26	1.24	1.00	1.89	0.00	0.00	0.31	0.01	0.36	0.11	0.14	0.72
2.28	1.25	0.68	1.11	0.53	1.26	1.30	0.95	1.89	0.00	0.00	0.31	0.01	0.33	0.11	0.13	0.66
2.30	1.16	0.63	1.16	0.56	1.24	1.37	0.90	1.88	0.00	0.00	0.30	0.00	0.31	0.11	0.12	0.61
2.32	1.06	0.57	1.21	0.62	1.20	1.44	0.86	1.86	0.00	0.00	0.30	0.00	0.28	0.10	0.11	0.55
2.34	0.95	0.50	1.26	0.73	1.16	1.51	0.83	1.85	0.00	0.00	0.29	0.00	0.25	0.09	0.10	0.50
2.36	0.84	0.44	1.31	0.89	1.11	1.57	0.79	1.84	0.00	0.00	0.29	0.00	0.22	0.08	0.10	0.45
2.38	0.73	0.37	1.36	1.08	1.06	1.60	0.76	1.80	0.00	0.00	0.29	0.00	0.19	0.07	0.10	0.41
2.40	0.62	0.31	1.40	1.31	1.01	1.62	0.73	1.75	0.00	0.00	0.28	0.00	0.17	0.06	0.09	0.38
2.42	0.54	0.26	1.45	1.55	0.97	1.61	0.71	1.66	0.00	0.00	0.27	0.00	0.14	0.05	0.09	0.35
2.44	0.47	0.21	1.49	1.79	0.93	1.57	0.68	1.54	0.00	0.00	0.26	0.00	0.12	0.04	0.09	0.31
2.46	0.41	0.17	1.54	2.01	0.90	1.50	0.66	1.39	0.00	0.00	0.25	0.00	0.11	0.03	0.09	0.28
2.48	0.37	0.13	1.58	2.19	0.88	1.41	0.63	1.23	0.00	0.00	0.24	0.00	0.09	0.03	0.09	0.24
2.50	0.35	0.10	1.62	2.31	0.86	1.30	0.61	1.07	0.00	0.00	0.22	0.00	0.08	0.02	0.08	0.21
2.52	0.33	0.08	1.64	2.35	0.85	1.19	0.58	0.91	0.00	0.00	0.20	0.00	0.07	0.01	0.08	0.17
2.54	0.31	0.06	1.66	2.32	0.85	1.07	0.55	0.76	0.00	0.00	0.19	0.00	0.07	0.01	0.07	0.13
2.56	0.30	0.04	1.65	2.23	0.85	0.95	0.52	0.63	0.00	0.00	0.17	0.00	0.06	0.01	0.07	0.09
2.58	0.29	0.03	1.62	2.10	0.85	0.85	0.48	0.52	0.00	0.00	0.15	0.00	0.05	0.00	0.06	0.06
2.60	0.27	0.02	1.56	1.94	0.86	0.76	0.44	0.43	0.00	0.00	0.14	0.00	0.04	0.00	0.06	0.04
2.62	0.26	0.01	1.47	1.79	0.88	0.69	0.40	0.35	0.00	0.00	0.12	0.00	0.04	0.00	0.05	0.02
2.64	0.24	0.01	1.36	1.64	0.89	0.63	0.35	0.27	0.00	0.00	0.11	0.00	0.03	0.00	0.05	0.01
2.66	0.21	0.01	1.22	1.51	0.91	0.58	0.31	0.21	0.00	0.00	0.10	0.00	0.02	0.00	0.04	0.01
2.68	0.19	0.00	1.07	1.39	0.93	0.54	0.26	0.16	0.00	0.00	0.09	0.00	0.02	0.00	0.03	0.00
2.70	0.17	0.00	0.92	1.26	0.95	0.50	0.22	0.11	0.00	0.00	0.08	0.00	0.01	0.00	0.03	0.00
2.72	0.14	0.00	0.77	1.13	0.97	0.47	0.19	0.08	0.00	0.00	0.07	0.00	0.01	0.00	0.02	0.00

	Discourse								Quality of Subject Matter							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.74	0.12	0.00	0.63	0.99	0.98	0.43	0.15	0.06	0.00	0.00	0.06	0.00	0.01	0.01	0.02	0.00
2.76	0.09	0.00	0.51	0.84	0.99	0.38	0.13	0.04	0.00	0.00	0.05	0.00	0.00	0.01	0.01	0.00
2.78	0.07	0.00	0.41	0.69	0.98	0.34	0.10	0.04	0.00	0.00	0.05	0.00	0.00	0.01	0.01	0.00
2.80	0.06	0.00	0.33	0.56	0.97	0.29	0.09	0.04	0.00	0.00	0.04	0.00	0.00	0.02	0.01	0.00
2.82	0.04	0.00	0.27	0.46	0.94	0.24	0.07	0.05	0.00	0.00	0.04	0.00	0.00	0.02	0.01	0.00
2.84	0.03	0.00	0.23	0.40	0.91	0.19	0.07	0.05	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00
2.86	0.02	0.00	0.20	0.37	0.86	0.15	0.06	0.06	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00
2.88	0.01	0.00	0.18	0.39	0.80	0.11	0.06	0.07	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00
2.90	0.01	0.00	0.17	0.41	0.74	0.08	0.05	0.06	0.00	0.00	0.02	0.00	0.00	0.04	0.00	0.00
2.92	0.00	0.00	0.17	0.44	0.68	0.06	0.05	0.06	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
2.94	0.00	0.00	0.16	0.46	0.61	0.04	0.05	0.05	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
2.96	0.00	0.00	0.15	0.45	0.55	0.03	0.05	0.04	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
2.98	0.00	0.00	0.14	0.42	0.48	0.02	0.05	0.03	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
3.00	0.00	0.00	0.13	0.37	0.43	0.01	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
3.02	0.00	0.00	0.11	0.32	0.38	0.01	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
3.04	0.00	0.00	0.10	0.27	0.33	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
3.06	0.00	0.00	0.08	0.23	0.30	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
3.08	0.00	0.00	0.07	0.19	0.26	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
3.10	0.00	0.00	0.06	0.15	0.23	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
3.12	0.00	0.00	0.06	0.12	0.21	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
3.14	0.00	0.00	0.06	0.09	0.19	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
3.16	0.00	0.00	0.06	0.06	0.17	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
3.18	0.00	0.00	0.06	0.04	0.16	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
3.20	0.00	0.00	0.06	0.03	0.14	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.22	0.00	0.00	0.06	0.01	0.13	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.24	0.00	0.00	0.06	0.01	0.12	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.26	0.00	0.00	0.06	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.28	0.00	0.00	0.06	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.30	0.00	0.00	0.06	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.32	0.00	0.00	0.06	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Discourse								Quality of Subject Matter							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.34	0.00	0.00	0.06	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.36	0.00	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.38	0.00	0.00	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.40	0.00	0.00	0.06	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.42	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.44	0.00	0.00	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.46	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.48	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.50	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.52	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.54	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.56	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.58	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Discourse								Quality of Subject Matter							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.4. Densities of instruction sub-domain scores (cognitive engagement and assessment of student understanding)

Based on observers' video ratings

	Cognitive Engagement								Assessment of and Responses to Student Understanding							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.26	0.26	0.01	0.01	0.01	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.02	0.34	0.33	0.02	0.02	0.01	0.18	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.04	0.42	0.41	0.02	0.02	0.01	0.21	0.20	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.06	0.51	0.50	0.03	0.03	0.01	0.25	0.24	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
1.08	0.59	0.59	0.04	0.04	0.02	0.29	0.29	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
1.10	0.67	0.68	0.05	0.06	0.02	0.33	0.33	0.05	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00
1.12	0.74	0.78	0.07	0.08	0.03	0.37	0.37	0.07	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00
1.14	0.81	0.88	0.09	0.10	0.03	0.42	0.41	0.09	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00
1.16	0.87	0.97	0.11	0.13	0.04	0.48	0.44	0.12	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.00
1.18	0.93	1.07	0.14	0.16	0.05	0.54	0.48	0.16	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.00
1.20	0.99	1.15	0.17	0.20	0.06	0.61	0.52	0.20	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.00
1.22	1.06	1.23	0.20	0.25	0.07	0.69	0.57	0.24	0.00	0.04	0.00	0.00	0.00	0.06	0.01	0.00
1.24	1.12	1.30	0.24	0.30	0.08	0.77	0.62	0.29	0.00	0.05	0.00	0.00	0.00	0.07	0.01	0.00

	Cognitive Engagement								Assessment of and Responses to Student Understanding							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.26	1.19	1.35	0.28	0.36	0.10	0.86	0.68	0.35	0.00	0.06	0.00	0.00	0.00	0.08	0.01	0.00
1.28	1.27	1.39	0.32	0.42	0.11	0.95	0.75	0.41	0.00	0.08	0.00	0.00	0.00	0.08	0.01	0.00
1.30	1.34	1.41	0.36	0.49	0.13	1.05	0.82	0.48	0.00	0.10	0.00	0.00	0.00	0.09	0.02	0.00
1.32	1.40	1.42	0.40	0.56	0.15	1.16	0.90	0.56	0.00	0.12	0.00	0.00	0.00	0.09	0.02	0.00
1.34	1.46	1.41	0.45	0.62	0.18	1.27	0.98	0.64	0.00	0.14	0.00	0.00	0.00	0.10	0.03	0.00
1.36	1.51	1.39	0.50	0.69	0.20	1.38	1.06	0.74	0.00	0.16	0.00	0.00	0.00	0.11	0.03	0.00
1.38	1.54	1.36	0.54	0.75	0.23	1.49	1.13	0.83	0.00	0.19	0.00	0.00	0.00	0.11	0.04	0.00
1.40	1.56	1.34	0.59	0.80	0.27	1.60	1.19	0.93	0.00	0.21	0.00	0.00	0.00	0.12	0.04	0.00
1.42	1.57	1.31	0.63	0.85	0.30	1.70	1.24	1.03	0.01	0.24	0.00	0.00	0.00	0.12	0.05	0.00
1.44	1.56	1.28	0.67	0.89	0.34	1.79	1.29	1.13	0.01	0.27	0.00	0.00	0.00	0.12	0.06	0.00
1.46	1.55	1.25	0.72	0.93	0.38	1.86	1.32	1.21	0.01	0.29	0.00	0.00	0.00	0.13	0.07	0.00
1.48	1.52	1.24	0.76	0.95	0.42	1.91	1.34	1.29	0.02	0.32	0.00	0.00	0.00	0.13	0.08	0.00
1.50	1.49	1.22	0.80	0.97	0.46	1.92	1.36	1.35	0.02	0.35	0.00	0.00	0.00	0.13	0.09	0.00
1.52	1.46	1.21	0.84	0.99	0.50	1.91	1.38	1.41	0.03	0.37	0.00	0.00	0.00	0.13	0.10	0.00
1.54	1.43	1.20	0.88	1.00	0.54	1.85	1.39	1.46	0.04	0.40	0.00	0.00	0.01	0.13	0.11	0.00
1.56	1.39	1.19	0.92	1.01	0.57	1.77	1.40	1.49	0.05	0.43	0.00	0.00	0.01	0.14	0.13	0.00
1.58	1.36	1.17	0.96	1.02	0.61	1.67	1.41	1.53	0.06	0.46	0.00	0.00	0.01	0.14	0.15	0.00
1.60	1.31	1.14	1.00	1.03	0.65	1.56	1.41	1.55	0.07	0.48	0.00	0.00	0.02	0.15	0.17	0.00
1.62	1.26	1.11	1.03	1.05	0.68	1.46	1.40	1.56	0.09	0.51	0.00	0.00	0.02	0.15	0.19	0.00
1.64	1.20	1.07	1.07	1.06	0.71	1.36	1.39	1.56	0.10	0.54	0.00	0.00	0.03	0.16	0.21	0.00
1.66	1.13	1.03	1.10	1.08	0.74	1.27	1.36	1.54	0.11	0.57	0.00	0.00	0.03	0.17	0.24	0.00
1.68	1.05	0.98	1.12	1.10	0.76	1.19	1.32	1.51	0.13	0.60	0.00	0.00	0.04	0.18	0.26	0.00
1.70	0.96	0.93	1.15	1.12	0.79	1.11	1.27	1.47	0.15	0.63	0.00	0.00	0.05	0.19	0.29	0.00
1.72	0.87	0.88	1.17	1.15	0.81	1.03	1.21	1.42	0.17	0.65	0.00	0.00	0.06	0.20	0.31	0.00
1.74	0.78	0.83	1.18	1.17	0.83	0.94	1.14	1.37	0.20	0.68	0.00	0.00	0.07	0.21	0.34	0.00
1.76	0.70	0.78	1.19	1.18	0.84	0.84	1.07	1.32	0.22	0.71	0.00	0.00	0.08	0.22	0.37	0.00
1.78	0.62	0.73	1.19	1.19	0.85	0.74	0.99	1.26	0.26	0.74	0.00	0.00	0.09	0.24	0.41	0.00
1.80	0.55	0.69	1.18	1.19	0.87	0.65	0.92	1.22	0.30	0.77	0.00	0.00	0.10	0.25	0.44	0.00
1.82	0.49	0.65	1.17	1.18	0.88	0.56	0.85	1.17	0.35	0.80	0.00	0.01	0.12	0.27	0.48	0.00
1.84	0.43	0.62	1.16	1.17	0.89	0.49	0.79	1.13	0.40	0.84	0.00	0.01	0.14	0.28	0.52	0.00

	Cognitive Engagement								Assessment of and Responses to Student Understanding							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.86	0.39	0.58	1.14	1.14	0.89	0.43	0.73	1.09	0.46	0.87	0.00	0.02	0.17	0.29	0.57	0.00
1.88	0.36	0.54	1.11	1.11	0.90	0.39	0.69	1.05	0.52	0.91	0.00	0.03	0.20	0.30	0.62	0.00
1.90	0.33	0.50	1.08	1.07	0.91	0.35	0.65	1.01	0.59	0.94	0.00	0.03	0.23	0.32	0.67	0.01
1.92	0.31	0.47	1.06	1.02	0.91	0.33	0.62	0.96	0.65	0.97	0.01	0.04	0.27	0.33	0.72	0.02
1.94	0.30	0.43	1.03	0.97	0.92	0.30	0.60	0.91	0.72	1.00	0.01	0.06	0.31	0.35	0.77	0.03
1.96	0.29	0.39	1.00	0.91	0.93	0.28	0.57	0.85	0.79	1.03	0.02	0.07	0.36	0.36	0.82	0.05
1.98	0.27	0.35	0.97	0.85	0.93	0.26	0.55	0.79	0.85	1.05	0.03	0.07	0.41	0.38	0.87	0.08
2.00	0.25	0.31	0.94	0.79	0.93	0.25	0.53	0.72	0.92	1.07	0.03	0.08	0.46	0.41	0.91	0.11
2.02	0.23	0.28	0.91	0.74	0.93	0.23	0.51	0.65	0.98	1.08	0.04	0.09	0.52	0.44	0.95	0.14
2.04	0.21	0.24	0.89	0.69	0.93	0.22	0.48	0.58	1.04	1.08	0.05	0.09	0.58	0.47	0.98	0.18
2.06	0.18	0.22	0.86	0.64	0.93	0.22	0.45	0.52	1.09	1.08	0.06	0.09	0.64	0.52	1.00	0.20
2.08	0.15	0.19	0.83	0.60	0.92	0.21	0.42	0.46	1.14	1.07	0.07	0.09	0.70	0.56	1.02	0.22
2.10	0.12	0.17	0.81	0.56	0.92	0.21	0.39	0.40	1.18	1.05	0.08	0.09	0.75	0.62	1.03	0.23
2.12	0.09	0.16	0.78	0.53	0.91	0.20	0.36	0.35	1.21	1.03	0.09	0.10	0.80	0.67	1.04	0.24
2.14	0.07	0.14	0.75	0.50	0.89	0.20	0.33	0.31	1.23	1.01	0.10	0.11	0.85	0.73	1.04	0.24
2.16	0.05	0.13	0.72	0.47	0.88	0.18	0.30	0.27	1.24	0.97	0.12	0.12	0.88	0.79	1.03	0.25
2.18	0.03	0.11	0.68	0.45	0.86	0.16	0.27	0.24	1.25	0.94	0.15	0.14	0.91	0.85	1.02	0.26
2.20	0.02	0.09	0.64	0.43	0.84	0.14	0.24	0.21	1.25	0.90	0.19	0.17	0.92	0.91	1.01	0.29
2.22	0.02	0.08	0.60	0.41	0.82	0.12	0.21	0.19	1.25	0.86	0.23	0.20	0.93	0.96	0.99	0.32
2.24	0.02	0.06	0.56	0.40	0.80	0.09	0.19	0.17	1.25	0.82	0.28	0.24	0.93	1.00	0.98	0.35
2.26	0.02	0.05	0.52	0.38	0.78	0.07	0.16	0.16	1.26	0.78	0.34	0.28	0.93	1.04	0.97	0.39
2.28	0.02	0.04	0.48	0.36	0.76	0.05	0.14	0.15	1.27	0.74	0.40	0.33	0.92	1.08	0.96	0.44
2.30	0.03	0.03	0.43	0.35	0.73	0.03	0.12	0.14	1.29	0.70	0.46	0.39	0.92	1.10	0.95	0.49
2.32	0.03	0.02	0.39	0.34	0.71	0.02	0.10	0.14	1.30	0.67	0.52	0.45	0.92	1.12	0.94	0.56
2.34	0.04	0.01	0.35	0.32	0.69	0.01	0.09	0.14	1.32	0.64	0.58	0.52	0.92	1.13	0.94	0.65
2.36	0.04	0.01	0.32	0.31	0.66	0.01	0.08	0.14	1.33	0.62	0.64	0.59	0.93	1.13	0.95	0.76
2.38	0.04	0.01	0.28	0.30	0.64	0.00	0.07	0.14	1.34	0.60	0.71	0.67	0.95	1.13	0.95	0.88
2.40	0.05	0.00	0.25	0.29	0.62	0.00	0.06	0.13	1.33	0.59	0.79	0.75	0.98	1.13	0.96	1.01
2.42	0.04	0.00	0.22	0.27	0.59	0.00	0.05	0.13	1.31	0.59	0.87	0.83	1.01	1.12	0.97	1.14
2.44	0.04	0.00	0.20	0.26	0.57	0.00	0.05	0.12	1.27	0.58	0.96	0.92	1.04	1.11	0.97	1.27

	Cognitive Engagement								Assessment of and Responses to Student Understanding							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.46	0.04	0.00	0.17	0.25	0.55	0.00	0.04	0.12	1.22	0.59	1.05	1.00	1.08	1.09	0.98	1.40
2.48	0.03	0.00	0.15	0.24	0.52	0.00	0.04	0.11	1.16	0.59	1.14	1.09	1.11	1.08	0.98	1.52
2.50	0.02	0.00	0.13	0.22	0.50	0.00	0.03	0.09	1.10	0.60	1.22	1.17	1.14	1.06	0.97	1.63
2.52	0.02	0.00	0.11	0.21	0.48	0.00	0.02	0.08	1.03	0.61	1.30	1.25	1.17	1.04	0.96	1.73
2.54	0.01	0.00	0.10	0.20	0.45	0.00	0.02	0.07	0.97	0.61	1.38	1.32	1.19	1.02	0.94	1.82
2.56	0.01	0.00	0.09	0.18	0.43	0.00	0.01	0.06	0.91	0.62	1.45	1.38	1.21	1.00	0.91	1.89
2.58	0.01	0.00	0.08	0.17	0.41	0.00	0.01	0.05	0.85	0.62	1.51	1.43	1.22	0.98	0.87	1.93
2.60	0.00	0.00	0.07	0.15	0.38	0.00	0.01	0.04	0.80	0.61	1.57	1.47	1.22	0.96	0.83	1.93
2.62	0.00	0.00	0.06	0.14	0.36	0.00	0.00	0.03	0.75	0.60	1.63	1.49	1.22	0.94	0.78	1.91
2.64	0.00	0.00	0.06	0.13	0.34	0.00	0.00	0.02	0.71	0.58	1.67	1.51	1.20	0.91	0.73	1.87
2.66	0.00	0.00	0.05	0.12	0.32	0.00	0.00	0.01	0.66	0.56	1.70	1.51	1.18	0.88	0.68	1.80
2.68	0.00	0.00	0.05	0.11	0.30	0.00	0.00	0.01	0.61	0.53	1.72	1.51	1.15	0.85	0.62	1.73
2.70	0.00	0.00	0.05	0.11	0.29	0.00	0.00	0.01	0.56	0.50	1.72	1.50	1.11	0.82	0.57	1.65
2.72	0.00	0.00	0.05	0.10	0.27	0.00	0.00	0.00	0.50	0.46	1.71	1.49	1.07	0.79	0.53	1.56
2.74	0.00	0.00	0.05	0.09	0.25	0.00	0.00	0.00	0.45	0.42	1.68	1.48	1.01	0.75	0.48	1.48
2.76	0.00	0.00	0.04	0.09	0.24	0.00	0.00	0.00	0.39	0.38	1.64	1.47	0.95	0.71	0.44	1.38
2.78	0.00	0.00	0.04	0.08	0.22	0.00	0.00	0.00	0.34	0.34	1.58	1.45	0.88	0.67	0.41	1.29
2.80	0.00	0.00	0.04	0.08	0.21	0.00	0.00	0.00	0.29	0.30	1.51	1.44	0.82	0.63	0.38	1.19
2.82	0.00	0.00	0.04	0.08	0.19	0.00	0.00	0.00	0.24	0.26	1.42	1.41	0.75	0.60	0.35	1.09
2.84	0.00	0.00	0.03	0.07	0.18	0.00	0.00	0.00	0.20	0.22	1.32	1.39	0.68	0.56	0.33	1.01
2.86	0.00	0.00	0.03	0.06	0.17	0.00	0.00	0.00	0.17	0.18	1.20	1.35	0.62	0.52	0.31	0.93
2.88	0.00	0.00	0.03	0.06	0.16	0.00	0.00	0.00	0.14	0.15	1.08	1.31	0.56	0.48	0.29	0.86
2.90	0.00	0.00	0.02	0.05	0.15	0.00	0.00	0.00	0.12	0.13	0.96	1.25	0.51	0.45	0.28	0.79
2.92	0.00	0.00	0.02	0.04	0.14	0.00	0.00	0.00	0.09	0.10	0.85	1.19	0.46	0.42	0.26	0.71
2.94	0.00	0.00	0.02	0.04	0.13	0.00	0.00	0.00	0.08	0.08	0.75	1.11	0.42	0.39	0.25	0.63
2.96	0.00	0.00	0.02	0.03	0.12	0.00	0.00	0.00	0.06	0.06	0.67	1.02	0.39	0.36	0.23	0.55
2.98	0.00	0.00	0.03	0.03	0.11	0.00	0.00	0.00	0.05	0.05	0.61	0.93	0.36	0.33	0.22	0.46
3.00	0.00	0.00	0.03	0.02	0.10	0.00	0.00	0.00	0.04	0.04	0.57	0.84	0.34	0.31	0.21	0.37
3.02	0.00	0.00	0.03	0.02	0.10	0.00	0.00	0.00	0.03	0.03	0.55	0.75	0.32	0.28	0.19	0.29
3.04	0.00	0.00	0.03	0.01	0.09	0.00	0.00	0.00	0.02	0.02	0.53	0.66	0.30	0.26	0.18	0.22

	Cognitive Engagement								Assessment of and Responses to Student Understanding							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.06	0.00	0.00	0.04	0.01	0.08	0.00	0.00	0.00	0.01	0.01	0.51	0.58	0.28	0.23	0.16	0.16
3.08	0.00	0.00	0.04	0.01	0.08	0.00	0.00	0.00	0.01	0.01	0.49	0.51	0.27	0.21	0.14	0.11
3.10	0.00	0.00	0.04	0.00	0.07	0.00	0.00	0.00	0.01	0.01	0.46	0.46	0.25	0.18	0.13	0.08
3.12	0.00	0.00	0.05	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.42	0.41	0.23	0.16	0.11	0.06
3.14	0.00	0.00	0.05	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.38	0.36	0.21	0.14	0.10	0.05
3.16	0.00	0.00	0.05	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.34	0.32	0.18	0.12	0.08	0.05
3.18	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.16	0.10	0.07	0.05
3.20	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.14	0.08	0.05	0.06
3.22	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.20	0.22	0.12	0.07	0.04	0.07
3.24	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.16	0.19	0.09	0.05	0.03	0.08
3.26	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.13	0.15	0.07	0.04	0.02	0.09
3.28	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.10	0.12	0.06	0.03	0.02	0.09
3.30	0.00	0.00	0.05	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.08	0.10	0.04	0.02	0.01	0.10
3.32	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.06	0.07	0.03	0.02	0.01	0.10
3.34	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.02	0.01	0.01	0.09
3.36	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.02	0.01	0.00	0.08
3.38	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.01	0.00	0.08
3.40	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00	0.00	0.06
3.42	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.05
3.44	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.04
3.46	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.03
3.48	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.02
3.50	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.01
3.52	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.01
3.54	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
3.56	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
3.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
3.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00

	Cognitive Engagement								Assessment of and Responses to Student Understanding							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.5. Indicators of quality of subject matter, basic averages (percentiles)

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Quality of Subject Matter	Accuracy	Basic Average	1-3	98	2.85	0.16	2.19	2.65	2.76	2.90	2.96	3.00	3.00
Colombia	Quality of Subject Matter	Accuracy	Basic Average	1-3	83	2.91	0.13	2.22	2.77	2.84	2.96	3.00	3.00	3.00
England (UK)	Quality of Subject Matter	Accuracy	Basic Average	1-3	85	2.93	0.07	2.67	2.84	2.88	2.96	3.00	3.00	3.00
Germany*	Quality of Subject Matter	Accuracy	Basic Average	1-3	50	2.90	0.09	2.63	2.79	2.83	2.93	2.97	3.00	3.00
K-S-T (Japan)	Quality of Subject Matter	Accuracy	Basic Average	1-3	89	2.94	0.07	2.60	2.87	2.90	2.96	3.00	3.00	3.00
Madrid (Spain)	Quality of Subject Matter	Accuracy	Basic Average	1-3	85	2.94	0.07	2.67	2.86	2.90	2.96	3.00	3.00	3.00
Mexico	Quality of Subject Matter	Accuracy	Basic Average	1-3	103	2.85	0.16	2.25	2.62	2.73	2.89	3.00	3.00	3.00
Shanghai (China)	Quality of Subject Matter	Accuracy	Basic Average	1-3	85	2.96	0.05	2.75	2.90	2.94	3.00	3.00	3.00	3.00
B-M-V (Chile)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	98	1.11	0.12	1.00	1.00	1.00	1.06	1.20	1.27	1.55
Colombia	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	83	1.12	0.13	1.00	1.00	1.01	1.08	1.18	1.23	1.75

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
England (UK)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	85	1.07	0.09	1.00	1.00	1.00	1.04	1.11	1.21	1.41
Germany*	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	50	1.14	0.14	1.00	1.00	1.02	1.09	1.24	1.33	1.54
K-S-T (Japan)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	89	1.12	0.14	1.00	1.00	1.00	1.07	1.25	1.33	1.54
Madrid (Spain)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	85	1.18	0.12	1.00	1.04	1.08	1.17	1.29	1.35	1.59
Mexico	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	103	1.15	0.19	1.00	1.00	1.00	1.06	1.26	1.41	1.80
Shanghai (China)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	1-3	85	1.16	0.15	1.00	1.00	1.00	1.15	1.30	1.35	1.55
B-M-V (Chile)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	98	2.63	0.38	1.50	2.00	2.27	2.75	3.00	3.00	3.00
Colombia	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	83	2.19	0.45	1.00	1.66	1.78	2.18	2.50	2.94	3.00
England (UK)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	85	2.30	0.50	1.00	1.76	1.91	2.39	2.75	2.92	3.00
Germany*	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	50	2.21	0.35	1.45	1.75	1.95	2.24	2.50	2.68	2.75
K-S-T (Japan)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	89	2.21	0.28	1.67	1.88	2.00	2.25	2.46	2.50	3.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	85	1.96	0.30	1.25	1.54	1.75	2.00	2.22	2.30	2.75
Mexico	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	103	2.39	0.54	1.00	1.68	1.98	2.50	3.00	3.00	3.00
Shanghai (China)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1-3	85	2.68	0.22	2.13	2.43	2.49	2.70	2.95	3.00	3.00
B-M-V (Chile)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	98	1.92	0.30	1.32	1.53	1.65	1.91	2.19	2.32	2.75
Colombia	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	83	2.39	0.35	1.59	1.94	2.07	2.43	2.73	2.83	3.00
England (UK)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	85	1.91	0.29	1.08	1.54	1.73	1.92	2.13	2.24	2.58
Germany*	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	50	1.91	0.25	1.17	1.64	1.76	1.90	2.10	2.16	2.67
K-S-T (Japan)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	89	1.95	0.33	1.25	1.49	1.62	1.97	2.25	2.42	2.67
Madrid (Spain)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	85	2.09	0.39	1.00	1.57	1.77	2.13	2.44	2.55	2.79
Mexico	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	103	2.06	0.40	1.15	1.61	1.70	2.13	2.35	2.54	3.00
Shanghai (China)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	1-3	85	2.27	0.28	1.60	1.95	2.04	2.30	2.46	2.65	2.85

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Quality of Subject Matter	Real World Connections	Basic Average	1-3	98	1.09	0.17	1.00	1.00	1.00	1.03	1.13	1.21	1.90
Colombia	Quality of Subject Matter	Real World Connections	Basic Average	1-3	83	1.12	0.15	1.00	1.00	1.00	1.04	1.23	1.33	1.60
England (UK)	Quality of Subject Matter	Real World Connections	Basic Average	1-3	85	1.04	0.10	1.00	1.00	1.00	1.00	1.04	1.12	1.75
Germany*	Quality of Subject Matter	Real World Connections	Basic Average	1-3	50	1.27	0.29	1.00	1.00	1.00	1.12	1.51	1.75	2.00
K-S-T (Japan)	Quality of Subject Matter	Real World Connections	Basic Average	1-3	89	1.16	0.22	1.00	1.00	1.00	1.04	1.33	1.51	1.96
Madrid (Spain)	Quality of Subject Matter	Real World Connections	Basic Average	1-3	85	1.06	0.12	1.00	1.00	1.00	1.00	1.11	1.21	1.69
Mexico	Quality of Subject Matter	Real World Connections	Basic Average	1-3	103	1.25	0.35	1.00	1.00	1.00	1.08	1.42	1.79	2.55
Shanghai (China)	Quality of Subject Matter	Real World Connections	Basic Average	1-3	85	1.09	0.23	1.00	1.00	1.00	1.00	1.10	1.19	2.10

Notes: 1. These indicators are aggregated to the classroom level by taking averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.6. Indicators of quality of subject matter, basic averages (indicator score)

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Quality of Subject Matter	Accuracy	Basic Average	0	4	94	0.0	4.1	95.9
Colombia	Quality of Subject Matter	Accuracy	Basic Average	0	2	81	0.0	2.4	97.6
England (UK)	Quality of Subject Matter	Accuracy	Basic Average	0	0	85	0.0	0.0	100.0
Germany*	Quality of Subject Matter	Accuracy	Basic Average	0	0	50	0.0	0.0	100.0
K-S-T (Japan)	Quality of Subject Matter	Accuracy	Basic Average	0	0	89	0.0	0.0	100.0
Madrid (Spain)	Quality of Subject Matter	Accuracy	Basic Average	0	0	85	0.0	0.0	100.0
Mexico	Quality of Subject Matter	Accuracy	Basic Average	0	3	100	0.0	2.9	97.1
Shanghai (China)	Quality of Subject Matter	Accuracy	Basic Average	0	0	85	0.0	0.0	100.0
B-M-V (Chile)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	95	3	0	96.9	3.1	0.0
Colombia	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	79	4	0	95.2	4.8	0.0
England (UK)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	85	0	0	100.0	0.0	0.0
Germany*	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	49	1	0	98.0	2.0	0.0
K-S-T (Japan)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	87	2	0	97.8	2.2	0.0
Madrid (Spain)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	83	2	0	97.6	2.4	0.0
Mexico	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	94	9	0	91.3	8.7	0.0
Shanghai (China)	Quality of Subject Matter	Connecting Mathematical Topics	Basic Average	81	4	0	95.3	4.7	0.0
B-M-V (Chile)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	0	23	75	0.0	23.5	76.5
Colombia	Quality of Subject Matter	Explicit Learning Goals	Basic Average	3	62	18	3.6	74.7	21.7
England (UK)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	6	44	35	7.1	51.8	41.2
Germany*	Quality of Subject Matter	Explicit Learning Goals	Basic Average	1	35	14	2.0	70.0	28.0
K-S-T (Japan)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	0	72	17	0.0	80.9	19.1
Madrid (Spain)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	4	73	8	4.7	85.9	9.4
Mexico	Quality of Subject Matter	Explicit Learning Goals	Basic Average	8	40	55	7.8	38.8	53.4
Shanghai (China)	Quality of Subject Matter	Explicit Learning Goals	Basic Average	0	17	68	0.0	20.0	80.0
B-M-V (Chile)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	9	86	3	9.2	87.8	3.1
Colombia	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	0	49	34	0.0	59.0	41.0
England (UK)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	6	77	2	7.1	90.6	2.4

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
Germany*	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	4	45	1	8.0	90.0	2.0
K-S-T (Japan)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	9	77	3	10.1	86.5	3.4
Madrid (Spain)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	7	65	13	8.2	76.5	15.3
Mexico	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	10	80	13	9.7	77.7	12.6
Shanghai (China)	Quality of Subject Matter	Organisation of Procedural Instruction	Basic Average	0	68	17	0.0	80.0	20.0
B-M-V (Chile)	Quality of Subject Matter	Real World Connections	Basic Average	92	6	0	93.9	6.1	0.0
Colombia	Quality of Subject Matter	Real World Connections	Basic Average	80	3	0	96.4	3.6	0.0
England (UK)	Quality of Subject Matter	Real World Connections	Basic Average	84	1	0	98.8	1.2	0.0
Germany*	Quality of Subject Matter	Real World Connections	Basic Average	39	11	0	78.0	22.0	0.0
K-S-T (Japan)	Quality of Subject Matter	Real World Connections	Basic Average	79	10	0	88.8	11.2	0.0
Madrid (Spain)	Quality of Subject Matter	Real World Connections	Basic Average	83	2	0	97.6	2.4	0.0
Mexico	Quality of Subject Matter	Real World Connections	Basic Average	84	18	1	81.6	17.5	1.0
Shanghai (China)	Quality of Subject Matter	Real World Connections	Basic Average	79	6	0	92.9	7.1	0.0

Notes: 1. These indicators are aggregated to the classroom level by taking averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.7. Indicators of quality of subject matter, percent present

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Quality of Subject Matter	Graphs	Percent Present	1-2	98	14.98	25.94	0.00	0.00	0.00	0.00	39.00	56.15	100.00
Colombia	Quality of Subject Matter	Graphs	Percent Present	1-2	83	27.70	25.92	0.00	0.00	0.00	25.00	50.00	64.00	95.00
England (UK)	Quality of Subject Matter	Graphs	Percent Present	1-2	85	22.46	21.67	0.00	0.00	0.00	14.29	45.83	50.00	70.00
Germany*	Quality of Subject Matter	Graphs	Percent Present	1-2	50	34.30	27.59	0.00	0.00	7.50	28.19	60.64	75.42	97.50
K-S-T (Japan)	Quality of Subject Matter	Graphs	Percent Present	1-2	89	1.30	6.80	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Madrid (Spain)	Quality of Subject Matter	Graphs	Percent Present	1-2	85	5.48	11.02	0.00	0.00	0.00	0.00	8.67	16.67	52.50
Mexico	Quality of Subject Matter	Graphs	Percent Present	1-2	103	11.18	22.18	0.00	0.00	0.00	0.00	23.75	39.92	100.00
Shanghai (China)	Quality of Subject Matter	Graphs	Percent Present	1-2	85	0.29	1.61	0.00	0.00	0.00	0.00	0.00	0.00	10.00
B-M-V (Chile)	Quality of Subject Matter	Tables	Percent Present	1-2	98	6.82	14.79	0.00	0.00	0.00	0.00	5.97	31.00	60.63
Colombia	Quality of Subject Matter	Tables	Percent Present	1-2	83	13.92	18.30	0.00	0.00	0.00	7.14	27.31	42.08	86.67

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
England (UK)	Quality of Subject Matter	Tables	Percent Present	1-2	85	16.15	20.39	0.00	0.00	0.00	8.33	29.52	47.14	84.52
Germany*	Quality of Subject Matter	Tables	Percent Present	1-2	50	15.00	18.02	0.00	0.00	0.00	7.95	39.24	45.08	50.00
K-S-T (Japan)	Quality of Subject Matter	Tables	Percent Present	1-2	89	3.69	9.23	0.00	0.00	0.00	0.00	0.00	17.50	42.86
Madrid (Spain)	Quality of Subject Matter	Tables	Percent Present	1-2	85	3.78	9.38	0.00	0.00	0.00	0.00	4.33	16.67	50.00
Mexico	Quality of Subject Matter	Tables	Percent Present	1-2	103	17.63	20.51	0.00	0.00	0.00	7.14	38.57	46.43	75.00
Shanghai (China)	Quality of Subject Matter	Tables	Percent Present	1-2	85	1.58	4.85	0.00	0.00	0.00	0.00	0.00	5.00	30.00
B-M-V (Chile)	Quality of Subject Matter	Drawings	Percent Present	1-2	98	9.72	13.79	0.00	0.00	0.00	3.35	15.00	29.69	59.38
Colombia	Quality of Subject Matter	Drawings	Percent Present	1-2	83	9.83	13.11	0.00	0.00	0.00	4.17	20.00	26.39	55.00
England (UK)	Quality of Subject Matter	Drawings	Percent Present	1-2	85	13.56	17.10	0.00	0.00	0.00	7.14	25.48	39.64	75.00
Germany*	Quality of Subject Matter	Drawings	Percent Present	1-2	50	10.64	13.99	0.00	0.00	0.00	4.17	20.55	29.75	50.00
K-S-T (Japan)	Quality of Subject Matter	Drawings	Percent Present	1-2	89	38.01	21.81	0.00	2.86	19.17	37.50	50.00	66.67	95.83

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Quality of Subject Matter	Drawings	Percent Present	1-2	85	8.18	11.54	0.00	0.00	0.00	0.00	17.33	25.00	50.00
Mexico	Quality of Subject Matter	Drawings	Percent Present	1-2	103	23.89	20.04	0.00	0.00	3.54	21.43	39.00	47.55	97.22
Shanghai (China)	Quality of Subject Matter	Drawings	Percent Present	1-2	85	5.12	13.05	0.00	0.00	0.00	0.00	5.00	10.00	65.00
B-M-V (Chile)	Quality of Subject Matter	Equations	Percent Present	1-2	98	97.64	5.03	68.75	93.86	95.83	100.00	100.00	100.00	100.00
Colombia	Quality of Subject Matter	Equations	Percent Present	1-2	83	94.79	6.79	75.00	82.70	88.94	97.73	100.00	100.00	100.00
England (UK)	Quality of Subject Matter	Equations	Percent Present	1-2	85	99.11	2.57	85.71	96.43	100.00	100.00	100.00	100.00	100.00
Germany*	Quality of Subject Matter	Equations	Percent Present	1-2	50	97.33	5.05	75.00	92.34	95.76	100.00	100.00	100.00	100.00
K-S-T (Japan)	Quality of Subject Matter	Equations	Percent Present	1-2	89	88.50	11.89	50.00	70.71	79.17	91.67	100.00	100.00	100.00
Madrid (Spain)	Quality of Subject Matter	Equations	Percent Present	1-2	85	98.42	4.64	75.00	95.33	100.00	100.00	100.00	100.00	100.00
Mexico	Quality of Subject Matter	Equations	Percent Present	1-2	103	91.96	11.78	45.00	75.00	87.84	95.83	100.00	100.00	100.00
Shanghai (China)	Quality of Subject Matter	Equations	Percent Present	1-2	85	99.38	2.93	75.00	100.00	100.00	100.00	100.00	100.00	100.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Quality of Subject Matter	Objects	Percent Present	1-2	98	1.51	6.30	0.00	0.00	0.00	0.00	0.00	0.75	50.00
Colombia	Quality of Subject Matter	Objects	Percent Present	1-2	83	5.91	10.24	0.00	0.00	0.00	0.00	11.67	21.36	44.44
England (UK)	Quality of Subject Matter	Objects	Percent Present	1-2	85	2.44	7.48	0.00	0.00	0.00	0.00	0.42	6.29	41.67
Germany*	Quality of Subject Matter	Objects	Percent Present	1-2	50	2.20	9.02	0.00	0.00	0.00	0.00	0.00	3.27	48.21
K-S-T (Japan)	Quality of Subject Matter	Objects	Percent Present	1-2	89	10.64	19.06	0.00	0.00	0.00	0.00	16.67	43.93	75.00
Madrid (Spain)	Quality of Subject Matter	Objects	Percent Present	1-2	85	3.71	9.79	0.00	0.00	0.00	0.00	0.00	15.00	50.00
Mexico	Quality of Subject Matter	Objects	Percent Present	1-2	103	7.13	12.49	0.00	0.00	0.00	0.00	14.00	25.00	50.00
Shanghai (China)	Quality of Subject Matter	Objects	Percent Present	1-2	85	0.25	1.52	0.00	0.00	0.00	0.00	0.00	0.00	12.50

Notes: 1. The representations indicators were rated by observers with either a 1 (no use of representations) or a 2 (use of representation). For this aggregation method, the percentage of lesson segments each observer assigned any rating greater than 1 (no use of the representation) was found and then averaged over observers and lessons to obtain the percentage of lesson segments for a classroom in which each type of representation was used.

*Germany refers to a convenience sample of volunteer schools.

Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.8. Components of instruction (percentiles)

Based on observers' mean classroom video ratings

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Discourse	Nature of Discourse	98	2.02	0.43	1.13	1.52	1.71	1.97	2.29	2.50	3.44
Colombia	Discourse	Nature of Discourse	83	1.72	0.43	1.00	1.20	1.38	1.75	2.08	2.25	3.00
England (UK)	Discourse	Nature of Discourse	85	2.54	0.35	1.58	2.12	2.33	2.58	2.75	2.83	3.83
Germany*	Discourse	Nature of Discourse	50	2.82	0.44	1.83	2.23	2.46	2.88	3.17	3.42	3.75
K-S-T (Japan)	Discourse	Nature of Discourse	89	2.46	0.49	1.33	1.83	2.00	2.42	2.87	3.02	3.67
Madrid (Spain)	Discourse	Nature of Discourse	85	2.53	0.51	1.25	1.67	2.17	2.63	2.92	3.11	3.83
Mexico	Discourse	Nature of Discourse	103	2.15	0.42	1.08	1.63	1.82	2.17	2.50	2.67	3.58
Shanghai (China)	Discourse	Nature of Discourse	85	2.06	0.34	1.25	1.67	1.83	2.08	2.33	2.48	3.13
B-M-V (Chile)	Discourse	Questioning	98	2.19	0.38	1.25	1.75	1.88	2.16	2.50	2.74	3.00
Colombia	Discourse	Questioning	83	1.73	0.36	1.10	1.25	1.43	1.67	2.09	2.25	2.50
England (UK)	Discourse	Questioning	85	2.51	0.28	2.00	2.17	2.25	2.50	2.67	2.86	3.50
Germany*	Discourse	Questioning	50	2.64	0.35	1.33	2.25	2.36	2.64	2.92	3.08	3.42
K-S-T (Japan)	Discourse	Questioning	89	2.62	0.37	1.67	2.23	2.33	2.58	2.92	3.08	3.58
Madrid (Spain)	Discourse	Questioning	85	2.16	0.39	1.33	1.58	1.78	2.25	2.45	2.63	3.29
Mexico	Discourse	Questioning	103	2.19	0.39	1.08	1.74	1.92	2.17	2.42	2.74	3.17
Shanghai (China)	Discourse	Questioning	85	2.24	0.25	1.50	1.92	2.00	2.25	2.42	2.57	2.92
B-M-V (Chile)	Discourse	Explanations	98	2.08	0.35	1.38	1.65	1.75	2.06	2.38	2.52	3.06
Colombia	Discourse	Explanations	83	2.09	0.28	1.25	1.75	1.92	2.08	2.28	2.44	2.81
England (UK)	Discourse	Explanations	85	2.29	0.31	1.58	2.00	2.00	2.25	2.56	2.67	3.52
Germany*	Discourse	Explanations	50	2.15	0.32	1.58	1.83	1.90	2.09	2.46	2.52	2.95
K-S-T (Japan)	Discourse	Explanations	89	2.47	0.32	1.75	2.00	2.17	2.50	2.75	2.83	3.50

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Discourse	Explanations	85	2.12	0.36	1.25	1.64	1.83	2.13	2.42	2.58	2.75
Mexico	Discourse	Explanations	103	2.00	0.33	1.42	1.58	1.73	1.94	2.29	2.42	2.83
Shanghai (China)	Discourse	Explanations	85	2.49	0.24	1.92	2.18	2.33	2.50	2.67	2.75	3.25
B-M-V (Chile)	Quality of Subject Matter	Explicit Connections	98	1.54	0.39	1.00	1.13	1.19	1.44	1.93	2.13	2.44
Colombia	Quality of Subject Matter	Explicit Connections	83	1.57	0.32	1.00	1.17	1.31	1.54	1.80	2.00	2.50
England (UK)	Quality of Subject Matter	Explicit Connections	85	1.93	0.45	1.13	1.31	1.50	1.94	2.31	2.56	3.10
Germany*	Quality of Subject Matter	Explicit Connections	50	1.77	0.36	1.08	1.41	1.50	1.73	2.00	2.26	2.63
K-S-T (Japan)	Quality of Subject Matter	Explicit Connections	89	1.91	0.36	1.17	1.50	1.67	1.83	2.17	2.35	2.83
Madrid (Spain)	Quality of Subject Matter	Explicit Connections	85	1.72	0.46	1.00	1.25	1.33	1.67	2.08	2.30	3.67
Mexico	Quality of Subject Matter	Explicit Connections	103	1.76	0.61	1.00	1.09	1.25	1.63	2.23	2.66	3.58
Shanghai (China)	Quality of Subject Matter	Explicit Connections	85	1.52	0.33	1.00	1.12	1.24	1.50	1.75	1.99	2.63
B-M-V (Chile)	Quality of Subject Matter	Explicit Patterns and Generalisations	98	1.18	0.20	1.00	1.00	1.00	1.15	1.28	1.38	2.25
Colombia	Quality of Subject Matter	Explicit Patterns and Generalisations	83	1.24	0.22	1.00	1.00	1.06	1.20	1.39	1.50	2.00
England (UK)	Quality of Subject Matter	Explicit Patterns and Generalisations	85	1.59	0.35	1.00	1.17	1.25	1.58	1.83	2.10	2.42
Germany*	Quality of Subject Matter	Explicit Patterns and Generalisations	50	1.25	0.30	1.00	1.00	1.00	1.17	1.40	1.51	2.75
K-S-T (Japan)	Quality of Subject Matter	Explicit Patterns and Generalisations	89	1.49	0.35	1.00	1.08	1.22	1.42	1.75	2.00	2.50

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Quality of Subject Matter	Explicit Patterns and Generalisations	85	1.34	0.25	1.00	1.00	1.12	1.33	1.50	1.61	2.25
Mexico	Quality of Subject Matter	Explicit Patterns and Generalisations	103	1.29	0.32	1.00	1.00	1.00	1.19	1.53	1.63	2.63
Shanghai (China)	Quality of Subject Matter	Explicit Patterns and Generalisations	85	2.41	0.31	1.50	2.14	2.17	2.38	2.67	2.88	3.21
B-M-V (Chile)	Cognitive Engagement	Cognitive Demand	98	1.36	0.37	1.00	1.00	1.02	1.30	1.63	1.94	2.69
Colombia	Cognitive Engagement	Cognitive Demand	83	1.50	0.35	1.00	1.07	1.17	1.48	1.75	1.98	2.35
England (UK)	Cognitive Engagement	Cognitive Demand	85	1.96	0.42	1.25	1.50	1.67	1.92	2.17	2.38	3.50
Germany*	Cognitive Engagement	Cognitive Demand	50	1.93	0.51	1.08	1.25	1.42	1.90	2.37	2.52	3.13
K-S-T (Japan)	Cognitive Engagement	Cognitive Demand	89	2.52	0.51	1.42	1.92	2.00	2.50	3.00	3.18	3.58
Madrid (Spain)	Cognitive Engagement	Cognitive Demand	85	1.63	0.37	1.00	1.17	1.25	1.58	2.01	2.17	2.46
Mexico	Cognitive Engagement	Cognitive Demand	103	1.83	0.46	1.00	1.28	1.38	1.75	2.25	2.41	3.44
Shanghai (China)	Cognitive Engagement	Cognitive Demand	85	1.63	0.35	1.00	1.25	1.25	1.58	1.93	2.13	2.42
B-M-V (Chile)	Cognitive Engagement	Multiple Approaches	98	1.20	0.24	1.00	1.00	1.00	1.10	1.42	1.55	1.95
Colombia	Cognitive Engagement	Multiple Approaches	83	1.19	0.28	1.00	1.00	1.00	1.08	1.35	1.54	2.65
England (UK)	Cognitive Engagement	Multiple Approaches	85	1.46	0.43	1.00	1.00	1.08	1.25	1.83	2.00	3.17
Germany*	Cognitive Engagement	Multiple Approaches	50	1.48	0.47	1.00	1.00	1.08	1.34	1.78	2.15	2.92
K-S-T (Japan)	Cognitive Engagement	Multiple Approaches	89	1.48	0.49	1.00	1.00	1.08	1.33	1.83	2.18	3.17

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Cognitive Engagement	Multiple Approaches	85	1.27	0.29	1.00	1.00	1.07	1.25	1.38	1.58	2.67
Mexico	Cognitive Engagement	Multiple Approaches	103	1.21	0.30	1.00	1.00	1.00	1.08	1.37	1.68	2.35
Shanghai (China)	Cognitive Engagement	Multiple Approaches	85	1.54	0.40	1.00	1.00	1.17	1.50	1.83	2.00	2.75
B-M-V (Chile)	Cognitive Engagement	Understand Processes	98	1.87	0.45	1.13	1.29	1.45	1.79	2.25	2.44	3.17
Colombia	Cognitive Engagement	Understand Processes	83	1.76	0.38	1.06	1.26	1.45	1.69	2.13	2.29	2.54
England (UK)	Cognitive Engagement	Understand Processes	85	2.18	0.41	1.50	1.68	1.83	2.15	2.45	2.69	3.44
Germany*	Cognitive Engagement	Understand Processes	50	2.03	0.38	1.20	1.55	1.74	2.03	2.33	2.52	2.80
K-S-T (Japan)	Cognitive Engagement	Understand Processes	89	2.22	0.43	1.33	1.67	1.83	2.17	2.67	2.75	3.17
Madrid (Spain)	Cognitive Engagement	Understand Processes	85	1.69	0.34	1.00	1.28	1.42	1.67	1.93	2.15	2.54
Mexico	Cognitive Engagement	Understand Processes	103	1.81	0.37	1.08	1.34	1.50	1.78	2.16	2.31	2.67
Shanghai (China)	Cognitive Engagement	Understand Processes	85	1.95	0.33	1.17	1.50	1.67	1.92	2.25	2.42	2.67
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	98	2.40	0.30	1.69	1.97	2.14	2.40	2.65	2.75	3.13
Colombia	Assessment of and Responses to Student Understanding	Elicit Student Thinking	83	2.28	0.36	1.46	1.76	2.01	2.25	2.58	2.73	3.19
England (UK)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	85	2.83	0.26	2.25	2.50	2.64	2.83	3.00	3.17	3.52

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Germany*	Assessment of and Responses to Student Understanding	Elicit Student Thinking	50	2.90	0.33	2.17	2.50	2.68	2.90	3.17	3.25	3.67
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	89	2.68	0.36	1.75	2.25	2.33	2.67	3.00	3.10	3.50
Madrid (Spain)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	85	2.49	0.44	1.25	1.93	2.25	2.50	2.85	3.00	3.58
Mexico	Assessment of and Responses to Student Understanding	Elicit Student Thinking	103	2.45	0.35	1.58	2.00	2.18	2.42	2.75	2.88	3.44
Shanghai (China)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	85	3.12	0.28	2.50	2.82	2.92	3.08	3.33	3.53	3.83
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Teacher Feedback	98	1.73	0.34	1.06	1.25	1.43	1.75	2.00	2.19	2.56
Colombia	Assessment of and Responses to Student Understanding	Teacher Feedback	83	1.67	0.41	1.00	1.22	1.28	1.58	2.08	2.23	2.98
England (UK)	Assessment of and Responses to Student Understanding	Teacher Feedback	85	2.01	0.32	1.38	1.67	1.75	1.98	2.25	2.33	3.23
Germany*	Assessment of and Responses to Student Understanding	Teacher Feedback	50	2.12	0.28	1.33	1.81	1.91	2.08	2.45	2.50	2.67

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Teacher Feedback	89	1.83	0.39	1.08	1.33	1.47	1.83	2.12	2.35	2.92
Madrid (Spain)	Assessment of and Responses to Student Understanding	Teacher Feedback	85	1.97	0.45	1.00	1.43	1.65	1.92	2.35	2.60	3.00
Mexico	Assessment of and Responses to Student Understanding	Teacher Feedback	103	1.78	0.44	1.06	1.27	1.36	1.75	2.14	2.41	2.88
Shanghai (China)	Assessment of and Responses to Student Understanding	Teacher Feedback	85	1.94	0.34	1.25	1.50	1.62	1.92	2.17	2.33	2.83
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Align to Students	98	2.73	0.41	1.48	2.19	2.39	2.75	3.06	3.25	3.55
Colombia	Assessment of and Responses to Student Understanding	Align to Students	83	2.38	0.46	1.42	1.75	1.99	2.38	2.81	3.00	3.50
England (UK)	Assessment of and Responses to Student Understanding	Align to Students	85	3.25	0.33	2.00	2.92	3.00	3.25	3.50	3.58	4.00
Germany*	Assessment of and Responses to Student Understanding	Align to Students	50	3.09	0.34	2.14	2.66	2.79	3.09	3.42	3.46	3.70
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Align to Students	89	2.96	0.36	2.17	2.48	2.63	3.00	3.33	3.42	3.58

	Domain[1]	Component	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Madrid (Spain)	Assessment of and Responses to Student Understanding	Align to Students	85	2.67	0.50	1.25	2.00	2.33	2.75	3.08	3.22	3.75
Mexico	Assessment of and Responses to Student Understanding	Align to Students	103	2.65	0.40	1.50	2.13	2.39	2.66	2.96	3.13	3.59
Shanghai (China)	Assessment of and Responses to Student Understanding	Align to Students	85	2.78	0.31	2.08	2.33	2.58	2.83	3.04	3.17	3.42

Notes: 1. The instruction domain is the mean classroom score over four sub-domain scores, which each are comprised of two or three components shown in this table.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.9. Components of instruction (component score)

Based on observers' mean classroom video ratings

	Domain[1]	Component	Frequency (component score)				Percentage (component score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
B-M-V (Chile)	Discourse	Nature of Discourse	8	79	11	0	8.2	80.6	11.2	0.0
Colombia	Discourse	Nature of Discourse	28	52	3	0	33.7	62.7	3.6	0.0
England (UK)	Discourse	Nature of Discourse	0	31	53	1	0.0	36.5	62.4	1.2
Germany*	Discourse	Nature of Discourse	0	11	38	1	0.0	22.0	76.0	2.0
K-S-T (Japan)	Discourse	Nature of Discourse	2	44	40	3	2.2	49.4	44.9	3.4
Madrid (Spain)	Discourse	Nature of Discourse	2	34	48	1	2.4	40.0	56.5	1.2
Mexico	Discourse	Nature of Discourse	4	76	22	1	3.9	73.8	21.4	1.0
Shanghai (China)	Discourse	Nature of Discourse	4	72	9	0	4.7	84.7	10.6	0.0
B-M-V (Chile)	Discourse	Questioning	4	73	21	0	4.1	74.5	21.4	0.0
Colombia	Discourse	Questioning	24	58	1	0	28.9	69.9	1.2	0.0
England (UK)	Discourse	Questioning	0	39	45	1	0.0	45.9	52.9	1.2
Germany*	Discourse	Questioning	1	14	35	0	2.0	28.0	70.0	0.0
K-S-T (Japan)	Discourse	Questioning	0	32	54	3	0.0	36.0	60.7	3.4
Madrid (Spain)	Discourse	Questioning	2	66	17	0	2.4	77.6	20.0	0.0
Mexico	Discourse	Questioning	1	83	19	0	1.0	80.6	18.4	0.0
Shanghai (China)	Discourse	Questioning	0	69	16	0	0.0	81.2	18.8	0.0
B-M-V (Chile)	Discourse	Explanations	3	82	13	0	3.1	83.7	13.3	0.0
Colombia	Discourse	Explanations	2	74	7	0	2.4	89.2	8.4	0.0
England (UK)	Discourse	Explanations	0	64	20	1	0.0	75.3	23.5	1.2
Germany*	Discourse	Explanations	0	41	9	0	0.0	82.0	18.0	0.0
K-S-T (Japan)	Discourse	Explanations	0	40	48	1	0.0	44.9	53.9	1.1
Madrid (Spain)	Discourse	Explanations	4	65	16	0	4.7	76.5	18.8	0.0
Mexico	Discourse	Explanations	4	92	7	0	3.9	89.3	6.8	0.0
Shanghai (China)	Discourse	Explanations	0	37	48	0	0.0	43.5	56.5	0.0
B-M-V (Chile)	Quality of Subject Matter	Explicit Connections	55	43	0	0	56.1	43.9	0.0	0.0
Colombia	Quality of Subject Matter	Explicit Connections	34	48	1	0	41.0	57.8	1.2	0.0
England (UK)	Quality of Subject Matter	Explicit Connections	16	58	11	0	18.8	68.2	12.9	0.0

	Domain[1]	Component	Frequency (component score)				Percentage (component score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
Germany*	Quality of Subject Matter	Explicit Connections	9	38	3	0	18.0	76.0	6.0	0.0
K-S-T (Japan)	Quality of Subject Matter	Explicit Connections	7	77	5	0	7.9	86.5	5.6	0.0
Madrid (Spain)	Quality of Subject Matter	Explicit Connections	27	53	4	1	31.8	62.4	4.7	1.2
Mexico	Quality of Subject Matter	Explicit Connections	39	50	13	1	37.9	48.5	12.6	1.0
Shanghai (China)	Quality of Subject Matter	Explicit Connections	41	43	1	0	48.2	50.6	1.2	0.0
B-M-V (Chile)	Quality of Subject Matter	Explicit Patterns and Generalisations	94	4	0	0	95.9	4.1	0.0	0.0
Colombia	Quality of Subject Matter	Explicit Patterns and Generalisations	72	11	0	0	86.7	13.3	0.0	0.0
England (UK)	Quality of Subject Matter	Explicit Patterns and Generalisations	35	50	0	0	41.2	58.8	0.0	0.0
Germany*	Quality of Subject Matter	Explicit Patterns and Generalisations	44	5	1	0	88.0	10.0	2.0	0.0
K-S-T (Japan)	Quality of Subject Matter	Explicit Patterns and Generalisations	52	36	1	0	58.4	40.4	1.1	0.0
Madrid (Spain)	Quality of Subject Matter	Explicit Patterns and Generalisations	60	25	0	0	70.6	29.4	0.0	0.0
Mexico	Quality of Subject Matter	Explicit Patterns and Generalisations	76	26	1	0	73.8	25.2	1.0	0.0
Shanghai (China)	Quality of Subject Matter	Explicit Patterns and Generalisations	0	54	31	0	0.0	63.5	36.5	0.0
B-M-V (Chile)	Cognitive Engagement	Cognitive Demand	70	27	1	0	71.4	27.6	1.0	0.0
Colombia	Cognitive Engagement	Cognitive Demand	42	41	0	0	50.6	49.4	0.0	0.0
England (UK)	Cognitive Engagement	Cognitive Demand	8	70	6	1	9.4	82.4	7.1	1.2
Germany*	Cognitive Engagement	Cognitive Demand	12	32	6	0	24.0	64.0	12.0	0.0
K-S-T (Japan)	Cognitive Engagement	Cognitive Demand	1	41	44	3	1.1	46.1	49.4	3.4
Madrid (Spain)	Cognitive Engagement	Cognitive Demand	31	54	0	0	36.5	63.5	0.0	0.0
Mexico	Cognitive Engagement	Cognitive Demand	26	68	9	0	25.2	66.0	8.7	0.0
Shanghai (China)	Cognitive Engagement	Cognitive Demand	30	55	0	0	35.3	64.7	0.0	0.0
B-M-V (Chile)	Cognitive Engagement	Multiple Approaches	82	16	0	0	83.7	16.3	0.0	0.0
Colombia	Cognitive Engagement	Multiple Approaches	72	10	1	0	86.7	12.0	1.2	0.0
England (UK)	Cognitive Engagement	Multiple Approaches	51	31	3	0	60.0	36.5	3.5	0.0

	Domain[1]	Component	Frequency (component score)				Percentage (component score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
Germany*	Cognitive Engagement	Multiple Approaches	30	17	3	0	60.0	34.0	6.0	0.0
K-S-T (Japan)	Cognitive Engagement	Multiple Approaches	55	30	4	0	61.8	33.7	4.5	0.0
Madrid (Spain)	Cognitive Engagement	Multiple Approaches	71	13	1	0	83.5	15.3	1.2	0.0
Mexico	Cognitive Engagement	Multiple Approaches	87	16	0	0	84.5	15.5	0.0	0.0
Shanghai (China)	Cognitive Engagement	Multiple Approaches	39	43	3	0	45.9	50.6	3.5	0.0
B-M-V (Chile)	Cognitive Engagement	Understand Processes	22	67	9	0	22.4	68.4	9.2	0.0
Colombia	Cognitive Engagement	Understand Processes	18	61	4	0	21.7	73.5	4.8	0.0
England (UK)	Cognitive Engagement	Understand Processes	0	68	17	0	0.0	80.0	20.0	0.0
Germany*	Cognitive Engagement	Understand Processes	4	39	7	0	8.0	78.0	14.0	0.0
K-S-T (Japan)	Cognitive Engagement	Understand Processes	2	61	26	0	2.2	68.5	29.2	0.0
Madrid (Spain)	Cognitive Engagement	Understand Processes	21	61	3	0	24.7	71.8	3.5	0.0
Mexico	Cognitive Engagement	Understand Processes	18	82	3	0	17.5	79.6	2.9	0.0
Shanghai (China)	Cognitive Engagement	Understand Processes	5	74	6	0	5.9	87.1	7.1	0.0
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	0	56	42	0	0.0	57.1	42.9	0.0
Colombia	Assessment of and Responses to Student Understanding	Elicit Student Thinking	2	58	23	0	2.4	69.9	27.7	0.0
England (UK)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	0	6	77	2	0.0	7.1	90.6	2.4
Germany*	Assessment of and Responses to Student Understanding	Elicit Student Thinking	0	5	43	2	0.0	10.0	86.0	4.0

	Domain[1]	Component	Frequency (component score)				Percentage (component score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	0	26	62	1	0.0	29.2	69.7	1.1
Madrid (Spain)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	3	38	42	2	3.5	44.7	49.4	2.4
Mexico	Assessment of and Responses to Student Understanding	Elicit Student Thinking	0	56	47	0	0.0	54.4	45.6	0.0
Shanghai (China)	Assessment of and Responses to Student Understanding	Elicit Student Thinking	0	0	72	13	0.0	0.0	84.7	15.3
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Teacher Feedback	22	74	2	0	22.4	75.5	2.0	0.0
Colombia	Assessment of and Responses to Student Understanding	Teacher Feedback	32	49	2	0	38.6	59.0	2.4	0.0
England (UK)	Assessment of and Responses to Student Understanding	Teacher Feedback	2	76	7	0	2.4	89.4	8.2	0.0
Germany*	Assessment of and Responses to Student Understanding	Teacher Feedback	1	40	9	0	2.0	80.0	18.0	0.0
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Teacher Feedback	18	64	7	0	20.2	71.9	7.9	0.0
Madrid (Spain)	Assessment of and Responses to Student Understanding	Teacher Feedback	10	61	14	0	11.8	71.8	16.5	0.0
Mexico	Assessment of and Responses to Student Understanding	Teacher Feedback	32	64	7	0	31.1	62.1	6.8	0.0

	Domain[1]	Component	Frequency (component score)				Percentage (component score)			
			between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.5	between 3.5 and 4.0
Shanghai (China)	Assessment of and Responses to Student Understanding	Teacher Feedback	5	76	4	0	5.9	89.4	4.7	0.0
B-M-V (Chile)	Assessment of and Responses to Student Understanding	Align to Students	1	25	71	1	1.0	25.5	72.4	1.0
Colombia	Assessment of and Responses to Student Understanding	Align to Students	2	47	33	1	2.4	56.6	39.8	1.2
England (UK)	Assessment of and Responses to Student Understanding	Align to Students	0	2	62	21	0.0	2.4	72.9	24.7
Germany*	Assessment of and Responses to Student Understanding	Align to Students	0	1	44	5	0.0	2.0	88.0	10.0
K-S-T (Japan)	Assessment of and Responses to Student Understanding	Align to Students	0	9	75	5	0.0	10.1	84.3	5.6
Madrid (Spain)	Assessment of and Responses to Student Understanding	Align to Students	1	26	54	4	1.2	30.6	63.5	4.7
Mexico	Assessment of and Responses to Student Understanding	Align to Students	0	28	72	3	0.0	27.2	69.9	2.9
Shanghai (China)	Assessment of and Responses to Student Understanding	Align to Students	0	14	71	0	0.0	16.5	83.5	0.0

Notes: 1. The instruction domain is the mean classroom score over four sub-domain scores, which each are comprised of two or three components shown in this table.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.10. Indicators of discourse, highest achieved (percentiles)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Discourse	Discussion Opportunities	Highest Achieved	1-2	98	1.02	0.07	1.00	1.00	1.00	1.00	1.00	1.00	1.25
Colombia	Discourse	Discussion Opportunities	Highest Achieved	1-2	83	1.03	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.50
England (UK)	Discourse	Discussion Opportunities	Highest Achieved	1-2	85	1.04	0.10	1.00	1.00	1.00	1.00	1.00	1.25	1.50
Germany*	Discourse	Discussion Opportunities	Highest Achieved	1-2	50	1.09	0.15	1.00	1.00	1.00	1.00	1.25	1.25	1.50
K-S-T (Japan)	Discourse	Discussion Opportunities	Highest Achieved	1-2	89	1.02	0.06	1.00	1.00	1.00	1.00	1.00	1.00	1.25
Madrid (Spain)	Discourse	Discussion Opportunities	Highest Achieved	1-2	85	1.00	0.03	1.00	1.00	1.00	1.00	1.00	1.00	1.25
Mexico	Discourse	Discussion Opportunities	Highest Achieved	1-2	103	1.04	0.11	1.00	1.00	1.00	1.00	1.00	1.25	1.50
Shanghai (China)	Discourse	Discussion Opportunities	Highest Achieved	1-2	85	1.03	0.08	1.00	1.00	1.00	1.00	1.00	1.15	1.25

Notes: 1. The discussion opportunities indicator was aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.11. Indicators of discourse, highest achieved (indicator score)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)		Percentage (indicator score)	
				between 1.0 and 1.5	between 1.5 and 2.0	between 1.0 and 1.5	between 1.5 and 2.0
B-M-V (Chile)	Discourse	Discussion Opportunities	Highest Achieved	98	0	100.0	0.0
Colombia	Discourse	Discussion Opportunities	Highest Achieved	82	1	98.8	1.2
England (UK)	Discourse	Discussion Opportunities	Highest Achieved	84	1	98.8	1.2
Germany*	Discourse	Discussion Opportunities	Highest Achieved	47	3	94.0	6.0
K-S-T (Japan)	Discourse	Discussion Opportunities	Highest Achieved	89	0	100.0	0.0
Madrid (Spain)	Discourse	Discussion Opportunities	Highest Achieved	85	0	100.0	0.0
Mexico	Discourse	Discussion Opportunities	Highest Achieved	100	3	97.1	2.9
Shanghai (China)	Discourse	Discussion Opportunities	Highest Achieved	85	0	100.0	0.0

Notes: 1. The discussion opportunities indicator was aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.

*Germany refers to a convenience sample of volunteer schools.

Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.12. Indicators of cognitive engagement, highest achieved (percentiles)

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	98	1.06	0.16	1.00	1.00	1.00	1.00	1.00	1.25	1.75
Colombia	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	83	1.08	0.21	1.00	1.00	1.00	1.00	1.00	1.25	2.00
England (UK)	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	85	1.08	0.18	1.00	1.00	1.00	1.00	1.05	1.25	2.00
Germany*	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	50	1.12	0.22	1.00	1.00	1.00	1.00	1.30	1.50	1.75
K-S-T (Japan)	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	89	1.03	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.50
Madrid (Spain)	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	85	1.03	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.50
Mexico	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	103	1.07	0.18	1.00	1.00	1.00	1.00	1.00	1.25	2.00
Shanghai (China)	Cognitive Engagement	Software For Learning	Highest Achieved	1-2	85	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B-M-V (Chile)	Cognitive Engagement	Metacognition	Highest Achieved	1-3	98	1.03	0.08	1.00	1.00	1.00	1.00	1.00	1.00	1.50
Colombia	Cognitive Engagement	Metacognition	Highest Achieved	1-3	83	1.26	0.30	1.00	1.00	1.00	1.25	1.50	1.75	2.50
England (UK)	Cognitive Engagement	Metacognition	Highest Achieved	1-3	85	1.29	0.42	1.00	1.00	1.00	1.25	1.50	1.75	2.75
Germany*	Cognitive Engagement	Metacognition	Highest Achieved	1-3	50	1.17	0.26	1.00	1.00	1.00	1.00	1.25	1.50	2.25
K-S-T (Japan)	Cognitive Engagement	Metacognition	Highest Achieved	1-3	89	1.56	0.49	1.00	1.00	1.25	1.50	2.00	2.30	2.75
Madrid (Spain)	Cognitive Engagement	Metacognition	Highest Achieved	1-3	85	1.07	0.16	1.00	1.00	1.00	1.00	1.25	1.25	1.75

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum Score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Mexico	Cognitive Engagement	Metacognition	Highest Achieved	1-3	103	1.14	0.23	1.00	1.00	1.00	1.00	1.25	1.50	2.00
Shanghai (China)	Cognitive Engagement	Metacognition	Highest Achieved	1-3	85	1.18	0.21	1.00	1.00	1.00	1.00	1.25	1.50	1.75
B-M-V (Chile)	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	98	2.59	0.55	1.00	1.93	2.00	2.75	3.00	3.00	3.00
Colombia	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	83	1.96	0.63	1.00	1.00	1.25	2.00	2.50	2.75	3.00
England (UK)	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	85	2.96	0.14	2.00	2.75	3.00	3.00	3.00	3.00	3.00
Germany*	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	50	2.45	0.51	1.50	1.75	2.00	2.50	3.00	3.00	3.00
K-S-T (Japan)	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	89	2.05	0.63	1.00	1.25	1.50	2.00	2.60	3.00	3.00
Madrid (Spain)	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	85	2.41	0.52	1.00	1.75	2.00	2.50	3.00	3.00	3.00
Mexico	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	103	2.25	0.55	1.00	1.50	1.75	2.25	2.75	3.00	3.00
Shanghai (China)	Cognitive Engagement	Repetitive Use	Highest Achieved	1-3	85	2.69	0.31	1.50	2.25	2.50	2.75	3.00	3.00	3.00

Notes: 1. These indicators were aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.13. Indicators of cognitive engagement, highest achieved (indicator score)

Based on observers' video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)[2]			Percentage (indicator score)[2]		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Cognitive Engagement	Software For Learning	Highest Achieved	90	8	0	91.8	8.2	0.0
Colombia	Cognitive Engagement	Software For Learning	Highest Achieved	75	8	0	90.4	9.6	0.0
England (UK)	Cognitive Engagement	Software For Learning	Highest Achieved	78	7	0	91.8	8.2	0.0
Germany*	Cognitive Engagement	Software For Learning	Highest Achieved	40	10	0	80.0	20.0	0.0
K-S-T (Japan)	Cognitive Engagement	Software For Learning	Highest Achieved	87	2	0	97.8	2.2	0.0
Madrid (Spain)	Cognitive Engagement	Software For Learning	Highest Achieved	84	1	0	98.8	1.2	0.0
Mexico	Cognitive Engagement	Software For Learning	Highest Achieved	95	8	0	92.2	7.8	0.0
Shanghai (China)	Cognitive Engagement	Software For Learning	Highest Achieved	85	0	0	100.0	0.0	0.0
B-M-V (Chile)	Cognitive Engagement	Metacognition	Highest Achieved	97	1	0	99.0	1.0	0.0
Colombia	Cognitive Engagement	Metacognition	Highest Achieved	61	21	1	73.5	25.3	1.2
England (UK)	Cognitive Engagement	Metacognition	Highest Achieved	65	16	4	76.5	18.8	4.7
Germany*	Cognitive Engagement	Metacognition	Highest Achieved	41	9	0	82.0	18.0	0.0
K-S-T (Japan)	Cognitive Engagement	Metacognition	Highest Achieved	39	41	9	43.8	46.1	10.1
Madrid (Spain)	Cognitive Engagement	Metacognition	Highest Achieved	80	5	0	94.1	5.9	0.0
Mexico	Cognitive Engagement	Metacognition	Highest Achieved	87	16	0	84.5	15.5	0.0
Shanghai (China)	Cognitive Engagement	Metacognition	Highest Achieved	70	15	0	82.4	17.6	0.0
B-M-V (Chile)	Cognitive Engagement	Repetitive Use	Highest Achieved	4	22	72	4.1	22.4	73.5
Colombia	Cognitive Engagement	Repetitive Use	Highest Achieved	20	34	29	24.1	41.0	34.9
England (UK)	Cognitive Engagement	Repetitive Use	Highest Achieved	0	1	84	0.0	1.2	98.8
Germany*	Cognitive Engagement	Repetitive Use	Highest Achieved	0	22	28	0.0	44.0	56.0
K-S-T (Japan)	Cognitive Engagement	Repetitive Use	Highest Achieved	15	44	30	16.9	49.4	33.7
Madrid (Spain)	Cognitive Engagement	Repetitive Use	Highest Achieved	2	33	50	2.4	38.8	58.8

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)[2]			Percentage (indicator score)[2]		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
Mexico	Cognitive Engagement	Repetitive Use	Highest Achieved	7	47	49	6.8	45.6	47.6
Shanghai (China)	Cognitive Engagement	Repetitive Use	Highest Achieved	0	13	72	0.0	15.3	84.7

Notes: 1. These indicators were aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.
2. The Software of Learning indicator is only rated on a 1-2 scale so by definition there will be 0 classrooms scores between 2.5 and 3.0 for this indicator.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.14. Indicators of student technology (cognitive engagement teaching domain), percent present

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	98	0.27	1.89	0.00	0.00	0.00	0.00	0.00	0.00	17.50
Colombia	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	83	0.17	0.79	0.00	0.00	0.00	0.00	0.00	0.00	4.55
England (UK)	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	85	0.60	2.82	0.00	0.00	0.00	0.00	0.00	0.00	17.86
Germany*	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	50	9.23	19.85	0.00	0.00	0.00	0.00	14.48	32.45	93.18
K-S-T (Japan)	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Madrid (Spain)	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	103	1.47	7.82	0.00	0.00	0.00	0.00	0.00	0.00	72.92

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Cognitive Engagement	Stud_GraphingCalc	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-M-V (Chile)	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	98	5.43	10.00	0.00	0.00	0.00	0.00	11.00	17.50	55.90
Colombia	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	83	6.16	11.15	0.00	0.00	0.00	0.00	9.11	22.78	46.88
England (UK)	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	85	23.02	18.72	0.00	0.00	4.17	20.83	37.50	46.31	78.57
Germany*	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	50	33.97	21.85	0.00	4.34	11.67	36.82	56.45	61.27	72.32
K-S-T (Japan)	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	89	0.19	1.77	0.00	0.00	0.00	0.00	0.00	0.00	16.67
Madrid (Spain)	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	85	6.11	12.62	0.00	0.00	0.00	0.00	8.67	24.00	50.00
Mexico	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	103	15.76	19.10	0.00	0.00	0.00	6.82	33.42	45.00	64.29
Shanghai (China)	Cognitive Engagement	Stud_NonGraphingCalc	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-M-V (Chile)	Cognitive Engagement	Stud_Computer	Percent Present	1-2	98	0.94	6.54	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Colombia	Cognitive Engagement	Stud_Computer	Percent Present	1-2	83	1.50	9.14	0.00	0.00	0.00	0.00	0.00	0.00	75.00
England (UK)	Cognitive Engagement	Stud_Computer	Percent Present	1-2	85	1.19	6.93	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Germany*	Cognitive Engagement	Stud_Computer	Percent Present	1-2	50	0.58	4.12	0.00	0.00	0.00	0.00	0.00	0.00	29.17
K-S-T (Japan)	Cognitive Engagement	Stud_Computer	Percent Present	1-2	89	0.21	2.02	0.00	0.00	0.00	0.00	0.00	0.00	19.05
Madrid (Spain)	Cognitive Engagement	Stud_Computer	Percent Present	1-2	85	3.64	13.00	0.00	0.00	0.00	0.00	0.00	0.00	70.00
Mexico	Cognitive Engagement	Stud_Computer	Percent Present	1-2	103	2.28	12.34	0.00	0.00	0.00	0.00	0.00	0.00	100.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Cognitive Engagement	Stud_Computer	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-M-V (Chile)	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colombia	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	83	1.24	5.26	0.00	0.00	0.00	0.00	0.00	0.00	30.00
England (UK)	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	85	2.05	7.38	0.00	0.00	0.00	0.00	0.00	0.00	40.00
Germany*	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	50	0.14	1.01	0.00	0.00	0.00	0.00	0.00	0.00	7.14
K-S-T (Japan)	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	89	0.63	5.93	0.00	0.00	0.00	0.00	0.00	0.00	55.95
Madrid (Spain)	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	85	7.23	20.27	0.00	0.00	0.00	0.00	0.00	37.33	100.00
Mexico	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	103	0.73	5.72	0.00	0.00	0.00	0.00	0.00	0.00	54.17
Shanghai (China)	Cognitive Engagement	Stud_Tablet	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-M-V (Chile)	Cognitive Engagement	Stud_Cell	Percent Present	1-2	98	0.85	4.29	0.00	0.00	0.00	0.00	0.00	0.00	34.38
Colombia	Cognitive Engagement	Stud_Cell	Percent Present	1-2	83	0.64	2.94	0.00	0.00	0.00	0.00	0.00	0.00	21.43
England (UK)	Cognitive Engagement	Stud_Cell	Percent Present	1-2	85	0.37	1.82	0.00	0.00	0.00	0.00	0.00	0.00	12.50
Germany*	Cognitive Engagement	Stud_Cell	Percent Present	1-2	50	1.12	3.92	0.00	0.00	0.00	0.00	0.00	2.27	21.67
K-S-T (Japan)	Cognitive Engagement	Stud_Cell	Percent Present	1-2	89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Madrid (Spain)	Cognitive Engagement	Stud_Cell	Percent Present	1-2	85	1.21	5.45	0.00	0.00	0.00	0.00	0.00	0.00	40.00
Mexico	Cognitive Engagement	Stud_Cell	Percent Present	1-2	103	1.25	7.06	0.00	0.00	0.00	0.00	0.00	0.00	67.86

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Cognitive Engagement	Stud_Cell	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-M-V (Chile)	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	98	92.51	13.19	41.88	77.25	87.50	100.00	100.00	100.00	100.00
Colombia	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	83	91.30	14.35	22.50	69.83	79.50	100.00	100.00	100.00	100.00
England (UK)	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	85	73.76	19.51	21.43	50.24	60.57	71.43	93.45	100.00	100.00
Germany*	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	50	56.23	23.92	6.82	28.27	37.50	53.65	80.42	87.92	100.00
K-S-T (Japan)	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	89	99.06	7.26	33.33	100.00	100.00	100.00	100.00	100.00	100.00
Madrid (Spain)	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	85	82.85	24.81	0.00	50.00	58.10	100.00	100.00	100.00	100.00
Mexico	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	103	79.10	23.98	0.00	46.73	55.00	90.00	100.00	100.00	100.00
Shanghai (China)	Cognitive Engagement	Stud_NoTech	Percent Present	1-2	85	100.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Notes: 1. The student technology device indicators were rated with either a 1 (no use of the device) or a 2 (use of the device). For this aggregation method, the percentage of lesson segments each observer assigned any rating greater than 1 (no use of device) was found and then averaged over observers and lessons to obtain the percentage of lesson segments for a classroom in which each device was used by students.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.15. Instruction densities of domain scores (classroom management and social-emotional support)

Based on observers' video ratings

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.01	0.00
1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.03	0.02	0.00
1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.03	0.02	0.01
1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.03	0.02	0.01
1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.04	0.03	0.02
1.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.00	0.00	0.00	0.04	0.04	0.02
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.00	0.00	0.00	0.04	0.04	0.04
2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.05	0.00	0.00	0.00	0.04	0.05	0.05
2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.01	0.00	0.00	0.04	0.06	0.06
2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.09	0.01	0.00	0.00	0.03	0.06	0.07
2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.11	0.01	0.00	0.00	0.03	0.07	0.08
2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.14	0.01	0.00	0.00	0.03	0.09	0.10
2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.16	0.02	0.00	0.00	0.02	0.10	0.11

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.19	0.03	0.00	0.00	0.02	0.12	0.14
2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.21	0.03	0.00	0.00	0.02	0.15	0.17
2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.24	0.04	0.00	0.00	0.01	0.18	0.22
2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.27	0.05	0.00	0.00	0.01	0.21	0.29
2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.29	0.07	0.00	0.00	0.01	0.25	0.38
2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.32	0.08	0.01	0.00	0.01	0.28	0.47
2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.35	0.09	0.01	0.01	0.01	0.32	0.58
2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.38	0.11	0.01	0.01	0.01	0.36	0.69
2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.41	0.13	0.02	0.01	0.01	0.41	0.80
2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.44	0.14	0.02	0.02	0.01	0.45	0.90
2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.48	0.16	0.03	0.03	0.01	0.49	0.98
2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.52	0.18	0.04	0.03	0.01	0.53	1.05
2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.57	0.19	0.06	0.04	0.01	0.57	1.11
2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.61	0.21	0.08	0.05	0.02	0.62	1.17
2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.66	0.22	0.10	0.06	0.03	0.67	1.23
2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.62	0.71	0.23	0.12	0.07	0.04	0.72	1.30
2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.67	0.75	0.25	0.15	0.08	0.05	0.77	1.37
2.48	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.72	0.80	0.26	0.18	0.10	0.06	0.82	1.46
2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.78	0.84	0.27	0.22	0.11	0.07	0.88	1.54
2.52	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.84	0.88	0.29	0.26	0.12	0.09	0.93	1.60
2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.91	0.92	0.30	0.31	0.14	0.11	0.97	1.66
2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.98	0.95	0.32	0.35	0.15	0.14	1.01	1.69
2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	1.05	0.98	0.34	0.40	0.16	0.16	1.04	1.71
2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.12	1.00	0.37	0.45	0.18	0.19	1.07	1.72
2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.19	1.03	0.40	0.50	0.20	0.23	1.09	1.72
2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.24	1.06	0.42	0.55	0.21	0.26	1.10	1.71
2.66	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.28	1.08	0.46	0.60	0.23	0.30	1.11	1.70
2.68	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.31	1.11	0.49	0.65	0.25	0.34	1.11	1.66
2.70	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.32	1.14	0.52	0.69	0.27	0.38	1.11	1.60
2.72	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	1.33	1.16	0.56	0.73	0.30	0.42	1.12	1.52

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.74	0.03	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.33	1.19	0.60	0.77	0.32	0.46	1.12	1.42
2.76	0.04	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.34	1.21	0.63	0.80	0.35	0.50	1.13	1.30
2.78	0.05	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.35	1.23	0.67	0.83	0.38	0.54	1.15	1.17
2.80	0.06	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.37	1.24	0.70	0.86	0.41	0.58	1.16	1.04
2.82	0.06	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.40	1.24	0.73	0.89	0.44	0.61	1.18	0.92
2.84	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.42	1.24	0.76	0.91	0.47	0.65	1.20	0.83
2.86	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.44	1.22	0.79	0.93	0.50	0.68	1.22	0.76
2.88	0.08	0.00	0.00	0.01	0.00	0.00	0.07	0.00	1.43	1.19	0.81	0.96	0.54	0.71	1.23	0.71
2.90	0.09	0.00	0.00	0.01	0.00	0.00	0.07	0.00	1.41	1.16	0.83	0.98	0.57	0.74	1.23	0.69
2.92	0.11	0.00	0.00	0.02	0.00	0.00	0.07	0.00	1.35	1.11	0.86	1.00	0.60	0.77	1.23	0.67
2.94	0.14	0.00	0.00	0.03	0.00	0.00	0.06	0.00	1.28	1.06	0.87	1.02	0.63	0.80	1.21	0.66
2.96	0.18	0.00	0.00	0.04	0.00	0.00	0.06	0.00	1.18	1.01	0.89	1.04	0.67	0.83	1.19	0.64
2.98	0.22	0.00	0.01	0.06	0.00	0.00	0.06	0.00	1.06	0.96	0.90	1.05	0.70	0.86	1.15	0.61
3.00	0.27	0.00	0.02	0.07	0.00	0.00	0.06	0.00	0.95	0.91	0.92	1.06	0.73	0.89	1.10	0.56
3.02	0.32	0.00	0.03	0.09	0.00	0.00	0.07	0.00	0.84	0.86	0.93	1.07	0.77	0.92	1.04	0.51
3.04	0.38	0.00	0.05	0.10	0.00	0.01	0.08	0.00	0.74	0.82	0.93	1.08	0.81	0.95	0.98	0.44
3.06	0.43	0.00	0.07	0.10	0.00	0.02	0.10	0.00	0.66	0.78	0.94	1.08	0.86	0.97	0.91	0.38
3.08	0.49	0.00	0.10	0.10	0.00	0.03	0.13	0.00	0.60	0.75	0.94	1.08	0.91	0.99	0.84	0.33
3.10	0.54	0.01	0.13	0.10	0.00	0.05	0.16	0.00	0.56	0.73	0.95	1.07	0.97	1.01	0.76	0.28
3.12	0.59	0.02	0.17	0.09	0.00	0.07	0.19	0.00	0.54	0.70	0.95	1.05	1.02	1.02	0.69	0.25
3.14	0.64	0.03	0.21	0.08	0.00	0.10	0.24	0.00	0.53	0.68	0.95	1.03	1.08	1.02	0.62	0.22
3.16	0.68	0.05	0.25	0.08	0.00	0.12	0.29	0.00	0.52	0.66	0.96	1.01	1.13	1.02	0.55	0.19
3.18	0.72	0.08	0.29	0.10	0.00	0.15	0.35	0.00	0.51	0.64	0.96	0.99	1.17	1.01	0.49	0.17
3.20	0.75	0.12	0.31	0.12	0.00	0.17	0.41	0.00	0.49	0.61	0.97	0.96	1.21	1.00	0.43	0.15
3.22	0.78	0.15	0.32	0.17	0.00	0.19	0.48	0.00	0.47	0.58	0.98	0.93	1.23	0.99	0.38	0.12
3.24	0.80	0.19	0.31	0.24	0.00	0.21	0.56	0.00	0.44	0.55	0.98	0.91	1.25	0.99	0.33	0.10
3.26	0.82	0.22	0.29	0.33	0.00	0.22	0.63	0.00	0.41	0.52	0.99	0.88	1.27	0.98	0.30	0.07
3.28	0.83	0.26	0.26	0.43	0.00	0.22	0.70	0.00	0.37	0.49	1.00	0.85	1.27	0.98	0.27	0.05
3.30	0.86	0.30	0.23	0.54	0.00	0.21	0.78	0.00	0.33	0.45	1.01	0.83	1.28	0.98	0.25	0.03
3.32	0.89	0.33	0.22	0.63	0.00	0.21	0.84	0.00	0.30	0.41	1.01	0.81	1.29	0.98	0.23	0.02

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.34	0.94	0.36	0.21	0.71	0.00	0.22	0.91	0.00	0.28	0.37	1.01	0.79	1.30	0.99	0.22	0.01
3.36	1.01	0.37	0.22	0.75	0.01	0.24	0.96	0.00	0.25	0.33	1.00	0.77	1.31	1.00	0.22	0.01
3.38	1.10	0.37	0.24	0.77	0.03	0.28	1.02	0.00	0.24	0.30	0.99	0.76	1.32	1.02	0.21	0.00
3.40	1.21	0.38	0.27	0.78	0.08	0.33	1.07	0.00	0.23	0.26	0.97	0.75	1.34	1.03	0.21	0.00
3.42	1.32	0.41	0.31	0.77	0.14	0.40	1.11	0.00	0.23	0.23	0.95	0.74	1.35	1.04	0.20	0.00
3.44	1.45	0.48	0.36	0.77	0.21	0.48	1.14	0.00	0.23	0.20	0.92	0.73	1.35	1.04	0.20	0.00
3.46	1.57	0.62	0.41	0.79	0.25	0.56	1.18	0.00	0.23	0.18	0.88	0.73	1.34	1.04	0.19	0.00
3.48	1.68	0.81	0.48	0.82	0.27	0.66	1.20	0.00	0.22	0.15	0.84	0.72	1.32	1.04	0.19	0.00
3.50	1.77	1.04	0.56	0.88	0.28	0.79	1.24	0.00	0.21	0.13	0.80	0.71	1.28	1.03	0.18	0.00
3.52	1.84	1.26	0.65	0.95	0.30	0.95	1.27	0.00	0.19	0.11	0.75	0.70	1.23	1.01	0.17	0.00
3.54	1.88	1.46	0.75	1.03	0.35	1.13	1.32	0.00	0.16	0.10	0.70	0.69	1.17	0.98	0.16	0.00
3.56	1.88	1.62	0.84	1.12	0.42	1.33	1.38	0.00	0.14	0.08	0.66	0.67	1.09	0.95	0.16	0.00
3.58	1.85	1.73	0.92	1.22	0.51	1.52	1.46	0.01	0.11	0.07	0.61	0.65	1.00	0.91	0.15	0.00
3.60	1.79	1.82	1.00	1.32	0.64	1.68	1.54	0.08	0.08	0.06	0.56	0.62	0.90	0.86	0.13	0.00
3.62	1.71	1.88	1.07	1.44	0.79	1.80	1.63	0.57	0.06	0.04	0.52	0.59	0.80	0.80	0.12	0.00
3.64	1.61	1.94	1.17	1.56	0.93	1.90	1.72	2.14	0.04	0.04	0.47	0.55	0.71	0.75	0.11	0.00
3.66	1.51	1.98	1.29	1.70	1.04	1.99	1.80	4.25	0.03	0.03	0.43	0.51	0.61	0.68	0.10	0.00
3.68	1.42	2.02	1.45	1.84	1.20	2.08	1.85	5.06	0.02	0.02	0.40	0.46	0.53	0.62	0.09	0.00
3.70	1.33	2.06	1.65	1.99	1.45	2.17	1.88	4.61	0.01	0.02	0.36	0.42	0.45	0.56	0.08	0.00
3.72	1.25	2.12	1.88	2.12	1.76	2.24	1.87	4.82	0.01	0.01	0.33	0.37	0.38	0.50	0.06	0.00
3.74	1.17	2.20	2.13	2.24	2.07	2.28	1.83	5.94	0.00	0.01	0.30	0.33	0.32	0.44	0.05	0.00
3.76	1.09	2.30	2.36	2.32	2.40	2.28	1.76	5.63	0.00	0.01	0.27	0.28	0.26	0.39	0.04	0.00
3.78	1.00	2.40	2.55	2.36	2.80	2.23	1.67	3.97	0.00	0.00	0.25	0.24	0.22	0.34	0.03	0.00
3.80	0.90	2.47	2.67	2.33	3.21	2.13	1.54	3.28	0.00	0.00	0.22	0.20	0.18	0.29	0.03	0.00
3.82	0.79	2.47	2.71	2.24	3.51	2.01	1.40	3.36	0.00	0.00	0.20	0.17	0.15	0.26	0.02	0.00
3.84	0.67	2.38	2.68	2.09	3.64	1.89	1.26	2.79	0.00	0.00	0.17	0.14	0.12	0.22	0.01	0.00
3.86	0.56	2.18	2.58	1.90	3.61	1.77	1.10	1.61	0.00	0.00	0.15	0.11	0.09	0.19	0.01	0.00
3.88	0.45	1.89	2.41	1.67	3.51	1.66	0.95	0.72	0.00	0.00	0.13	0.09	0.07	0.17	0.01	0.00
3.90	0.35	1.55	2.21	1.43	3.35	1.55	0.80	0.45	0.00	0.00	0.11	0.07	0.05	0.15	0.00	0.00
3.92	0.27	1.19	1.96	1.19	3.10	1.45	0.66	0.41	0.00	0.00	0.09	0.05	0.04	0.13	0.00	0.00

	Classroom Management								Social-Emotional Support							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.94	0.20	0.86	1.69	0.96	2.69	1.32	0.54	0.25	0.00	0.00	0.08	0.04	0.03	0.11	0.00	0.00
3.96	0.14	0.60	1.41	0.75	2.14	1.17	0.42	0.08	0.00	0.00	0.06	0.03	0.02	0.10	0.00	0.00
3.98	0.10	0.40	1.13	0.56	1.51	1.00	0.32	0.01	0.00	0.00	0.05	0.02	0.01	0.08	0.00	0.00
4.00	0.07	0.26	0.86	0.41	0.94	0.81	0.24	0.00	0.00	0.00	0.04	0.02	0.01	0.07	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.16. Instruction densities of domain scores

Based on observers' video ratings

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1.10	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
1.12	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00
1.14	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.00
1.16	0.00	0.04	0.00	0.00	0.00	0.01	0.02	0.00
1.18	0.00	0.07	0.00	0.00	0.00	0.01	0.03	0.00
1.20	0.00	0.10	0.00	0.00	0.00	0.02	0.04	0.00
1.22	0.00	0.14	0.00	0.00	0.00	0.03	0.05	0.00
1.24	0.00	0.20	0.00	0.00	0.00	0.04	0.06	0.00
1.26	0.00	0.27	0.00	0.00	0.00	0.06	0.08	0.00
1.28	0.00	0.34	0.00	0.00	0.00	0.08	0.09	0.00
1.30	0.00	0.42	0.00	0.00	0.00	0.10	0.11	0.00
1.32	0.00	0.51	0.00	0.00	0.00	0.13	0.12	0.00
1.34	0.00	0.60	0.00	0.00	0.00	0.15	0.14	0.00
1.36	0.01	0.69	0.00	0.00	0.00	0.18	0.16	0.00
1.38	0.01	0.77	0.00	0.00	0.00	0.21	0.18	0.00
1.40	0.03	0.85	0.00	0.00	0.00	0.24	0.21	0.00
1.42	0.06	0.92	0.00	0.00	0.00	0.26	0.23	0.00
1.44	0.12	0.98	0.00	0.00	0.00	0.28	0.26	0.00
1.46	0.20	1.04	0.00	0.00	0.00	0.28	0.30	0.00
1.48	0.31	1.08	0.00	0.00	0.00	0.28	0.35	0.00
1.50	0.43	1.12	0.01	0.00	0.01	0.28	0.42	0.00
1.52	0.58	1.16	0.01	0.00	0.01	0.27	0.49	0.00
1.54	0.72	1.19	0.01	0.01	0.02	0.27	0.58	0.01
1.56	0.86	1.22	0.02	0.01	0.02	0.28	0.69	0.01
1.58	0.96	1.26	0.03	0.03	0.04	0.30	0.79	0.02
1.60	1.03	1.29	0.04	0.04	0.05	0.34	0.89	0.03
1.62	1.07	1.32	0.06	0.06	0.07	0.40	0.99	0.04
1.64	1.10	1.35	0.08	0.09	0.09	0.47	1.06	0.05
1.66	1.17	1.37	0.10	0.13	0.12	0.56	1.13	0.07
1.68	1.28	1.38	0.13	0.17	0.15	0.66	1.17	0.08
1.70	1.46	1.39	0.16	0.21	0.19	0.77	1.20	0.09
1.72	1.69	1.39	0.21	0.25	0.24	0.87	1.22	0.10
1.74	1.96	1.38	0.27	0.29	0.30	0.98	1.23	0.11
1.76	2.23	1.37	0.34	0.33	0.36	1.08	1.24	0.15
1.78	2.47	1.35	0.42	0.35	0.43	1.17	1.25	0.21
1.80	2.63	1.32	0.50	0.38	0.51	1.25	1.26	0.29
1.82	2.69	1.28	0.59	0.40	0.60	1.33	1.28	0.40
1.84	2.62	1.25	0.67	0.42	0.69	1.39	1.30	0.52
1.86	2.45	1.21	0.74	0.46	0.78	1.45	1.32	0.65
1.88	2.20	1.18	0.80	0.52	0.87	1.50	1.35	0.78
1.90	1.93	1.15	0.84	0.59	0.95	1.55	1.37	0.91
1.92	1.66	1.14	0.88	0.69	1.02	1.59	1.40	1.04

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
1.94	1.44	1.14	0.91	0.81	1.07	1.64	1.42	1.17
1.96	1.27	1.15	0.94	0.95	1.11	1.68	1.43	1.32
1.98	1.15	1.15	0.97	1.10	1.14	1.71	1.45	1.48
2.00	1.05	1.14	1.02	1.25	1.15	1.74	1.45	1.66
2.02	0.97	1.11	1.07	1.40	1.16	1.75	1.43	1.83
2.04	0.88	1.06	1.12	1.53	1.16	1.74	1.40	1.98
2.06	0.79	0.99	1.17	1.64	1.16	1.71	1.35	2.11
2.08	0.70	0.89	1.23	1.74	1.17	1.66	1.29	2.18
2.10	0.63	0.79	1.27	1.81	1.17	1.59	1.21	2.20
2.12	0.58	0.68	1.31	1.87	1.17	1.50	1.12	2.17
2.14	0.54	0.58	1.34	1.91	1.18	1.41	1.02	2.10
2.16	0.50	0.48	1.38	1.93	1.19	1.30	0.91	2.01
2.18	0.47	0.39	1.41	1.93	1.20	1.19	0.81	1.91
2.20	0.44	0.31	1.45	1.91	1.22	1.08	0.72	1.84
2.22	0.43	0.25	1.49	1.87	1.24	0.97	0.63	1.78
2.24	0.42	0.20	1.54	1.81	1.26	0.85	0.56	1.74
2.26	0.41	0.16	1.58	1.73	1.27	0.74	0.49	1.69
2.28	0.39	0.12	1.61	1.64	1.29	0.63	0.44	1.63
2.30	0.34	0.09	1.62	1.53	1.30	0.54	0.39	1.53
2.32	0.27	0.07	1.62	1.42	1.30	0.46	0.35	1.41
2.34	0.19	0.05	1.59	1.30	1.29	0.40	0.32	1.27
2.36	0.12	0.03	1.55	1.18	1.27	0.35	0.30	1.13
2.38	0.07	0.02	1.48	1.05	1.24	0.32	0.28	1.00
2.40	0.04	0.01	1.40	0.93	1.19	0.29	0.27	0.89
2.42	0.02	0.01	1.31	0.82	1.14	0.27	0.27	0.79
2.44	0.01	0.00	1.21	0.72	1.08	0.25	0.26	0.70
2.46	0.00	0.00	1.10	0.64	1.01	0.23	0.26	0.61
2.48	0.00	0.00	0.99	0.58	0.95	0.21	0.26	0.52
2.50	0.00	0.00	0.88	0.54	0.88	0.18	0.26	0.41
2.52	0.00	0.00	0.78	0.52	0.82	0.15	0.25	0.31
2.54	0.00	0.00	0.67	0.51	0.76	0.11	0.24	0.22
2.56	0.00	0.00	0.57	0.50	0.70	0.09	0.22	0.14
2.58	0.00	0.00	0.47	0.49	0.64	0.06	0.19	0.09
2.60	0.00	0.00	0.38	0.47	0.59	0.04	0.16	0.05
2.62	0.00	0.00	0.30	0.45	0.54	0.03	0.14	0.03
2.64	0.00	0.00	0.24	0.42	0.49	0.02	0.11	0.01
2.66	0.00	0.00	0.19	0.37	0.44	0.01	0.08	0.01
2.68	0.00	0.00	0.15	0.33	0.40	0.01	0.06	0.01
2.70	0.00	0.00	0.12	0.27	0.36	0.00	0.04	0.02
2.72	0.00	0.00	0.10	0.22	0.32	0.00	0.03	0.02
2.74	0.00	0.00	0.08	0.17	0.28	0.00	0.02	0.04
2.76	0.00	0.00	0.07	0.13	0.25	0.00	0.01	0.05
2.78	0.00	0.00	0.07	0.09	0.22	0.00	0.01	0.06
2.80	0.00	0.00	0.06	0.06	0.20	0.00	0.00	0.07
2.82	0.00	0.00	0.05	0.04	0.17	0.00	0.00	0.07
2.84	0.00	0.00	0.04	0.02	0.15	0.00	0.00	0.07
2.86	0.00	0.00	0.03	0.01	0.13	0.00	0.00	0.06
2.88	0.00	0.00	0.02	0.01	0.12	0.00	0.00	0.05
2.90	0.00	0.00	0.02	0.00	0.10	0.00	0.00	0.03
2.92	0.00	0.00	0.01	0.00	0.09	0.00	0.00	0.02
2.94	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.01

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
2.96	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.01
2.98	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.00
3.00	0.00	0.00	0.02	0.00	0.06	0.00	0.00	0.00
3.02	0.00	0.00	0.02	0.00	0.05	0.00	0.00	0.00
3.04	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.00
3.06	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00
3.08	0.00	0.00	0.06	0.00	0.05	0.00	0.00	0.00
3.10	0.00	0.00	0.08	0.00	0.05	0.00	0.00	0.00
3.12	0.00	0.00	0.09	0.00	0.05	0.00	0.00	0.00
3.14	0.00	0.00	0.10	0.00	0.04	0.00	0.00	0.00
3.16	0.00	0.00	0.11	0.00	0.04	0.00	0.00	0.00
3.18	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.00
3.20	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.00
3.22	0.00	0.00	0.09	0.00	0.02	0.00	0.00	0.00
3.24	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.00
3.26	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.00
3.28	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00
3.30	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00
3.32	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
3.34	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
3.36	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.38	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Instruction							
	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.17. Indicators of cognitive engagement, basic average (percentiles)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Cognitive Engagement	Metacognition	Basic Average	1-3	98	1.00	0.01	1.00	1.00	1.00	1.00	1.00	1.00	1.06
Colombia	Cognitive Engagement	Metacognition	Basic Average	1-3	83	1.07	0.10	1.00	1.00	1.00	1.04	1.14	1.22	1.45
England (UK)	Cognitive Engagement	Metacognition	Basic Average	1-3	85	1.06	0.10	1.00	1.00	1.00	1.03	1.11	1.16	1.46
Germany*	Cognitive Engagement	Metacognition	Basic Average	1-3	50	1.04	0.07	1.00	1.00	1.00	1.00	1.05	1.12	1.30
K-S-T (Japan)	Cognitive Engagement	Metacognition	Basic Average	1-3	89	1.13	0.13	1.00	1.00	1.04	1.09	1.21	1.31	1.63
Madrid (Spain)	Cognitive Engagement	Metacognition	Basic Average	1-3	85	1.01	0.03	1.00	1.00	1.00	1.00	1.03	1.05	1.13
Mexico	Cognitive Engagement	Metacognition	Basic Average	1-3	103	1.03	0.07	1.00	1.00	1.00	1.00	1.06	1.10	1.46
Shanghai (China)	Cognitive Engagement	Metacognition	Basic Average	1-3	85	1.08	0.12	1.00	1.00	1.00	1.00	1.20	1.25	1.55

Notes: 1. This indicator was aggregated to the classroom by averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.18. Indicators of cognitive engagement, basic average (indictor score)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Cognitive Engagement	Metacognition	Basic Average	98	0	0	100.0	0.0	0.0
Colombia	Cognitive Engagement	Metacognition	Basic Average	83	0	0	100.0	0.0	0.0
England (UK)	Cognitive Engagement	Metacognition	Basic Average	85	0	0	100.0	0.0	0.0
Germany*	Cognitive Engagement	Metacognition	Basic Average	50	0	0	100.0	0.0	0.0
K-S-T (Japan)	Cognitive Engagement	Metacognition	Basic Average	87	2	0	97.8	2.2	0.0
Madrid (Spain)	Cognitive Engagement	Metacognition	Basic Average	85	0	0	100.0	0.0	0.0
Mexico	Cognitive Engagement	Metacognition	Basic Average	103	0	0	100.0	0.0	0.0
Shanghai (China)	Cognitive Engagement	Metacognition	Basic Average	84	1	0	98.8	1.2	0.0

Notes: 1. This indicator was aggregated to the classroom by averaging ratings over observers, segments and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.19. Indicators of classroom technology (cognitive engagement teaching domain), percent present

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	98	30.57	33.61	0.00	0.00	0.00	21.88	64.95	85.63	100.00
Colombia	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	83	22.96	32.66	0.00	0.00	0.00	0.00	55.36	76.43	100.00
England (UK)	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	85	77.05	17.73	16.67	55.00	65.50	75.00	95.83	100.00	100.00
Germany*	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	50	38.88	34.66	0.00	0.00	0.00	35.80	75.45	95.05	100.00
K-S-T (Japan)	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	89	6.87	16.84	0.00	0.00	0.00	0.00	4.17	30.00	80.36
Madrid (Spain)	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	85	31.20	38.02	0.00	0.00	0.00	8.33	71.00	100.00	100.00
Mexico	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	103	22.58	32.46	0.00	0.00	0.00	0.00	50.00	82.14	100.00
Shanghai (China)	Cognitive Engagement	Technology for Understanding	Percent Present	1-4	85	84.97	29.11	0.00	34.00	81.00	100.00	100.00	100.00	100.00
B-M-V (Chile)	Cognitive Engagement	Class_Projector	Percent Present	1-2	98	0.43	3.72	0.00	0.00	0.00	0.00	0.00	0.00	36.67
Colombia	Cognitive Engagement	Class_Projector	Percent Present	1-2	83	0.07	0.46	0.00	0.00	0.00	0.00	0.00	0.00	3.13
England (UK)	Cognitive Engagement	Class_Projector	Percent Present	1-2	85	3.50	9.80	0.00	0.00	0.00	0.00	0.63	12.62	58.33
Germany*	Cognitive Engagement	Class_Projector	Percent Present	1-2	50	18.69	22.06	0.00	0.00	0.00	8.71	37.50	44.15	87.50
K-S-T (Japan)	Cognitive Engagement	Class_Projector	Percent Present	1-2	89	0.23	1.45	0.00	0.00	0.00	0.00	0.00	0.00	12.50
Madrid (Spain)	Cognitive Engagement	Class_Projector	Percent Present	1-2	85	0.09	0.59	0.00	0.00	0.00	0.00	0.00	0.00	4.17

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Mexico	Cognitive Engagement	Class_Projector	Percent Present	1-2	103	0.43	2.56	0.00	0.00	0.00	0.00	0.00	0.00	25.00
Shanghai (China)	Cognitive Engagement	Class_Projector	Percent Present	1-2	85	11.58	15.91	0.00	0.00	0.00	4.17	20.00	35.00	60.00
B-M-V (Chile)	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	98	28.68	31.73	0.00	0.00	0.00	18.47	55.42	75.94	100.00
Colombia	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	83	18.95	31.18	0.00	0.00	0.00	0.00	50.00	75.60	100.00
England (UK)	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	85	84.91	19.42	10.71	61.98	75.00	92.86	100.00	100.00	100.00
Germany*	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	50	21.57	33.21	0.00	0.00	0.00	0.00	37.73	88.94	100.00
K-S-T (Japan)	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	89	4.47	13.27	0.00	0.00	0.00	0.00	0.00	17.50	76.19
Madrid (Spain)	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	85	29.08	37.49	0.00	0.00	0.00	0.00	70.00	98.00	100.00
Mexico	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	103	19.73	31.27	0.00	0.00	0.00	0.00	46.43	78.17	100.00
Shanghai (China)	Cognitive Engagement	Class_Smartboard	Percent Present	1-2	85	79.79	33.31	0.00	9.00	54.00	100.00	100.00	100.00	100.00
B-M-V (Chile)	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	98	0.18	1.16	0.00	0.00	0.00	0.00	0.00	0.00	10.00
Colombia	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
England (UK)	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Germany*	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	50	2.63	9.52	0.00	0.00	0.00	0.00	0.00	2.93	54.09
K-S-T (Japan)	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Madrid (Spain)	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	103	0.51	5.13	0.00	0.00	0.00	0.00	0.00	0.00	52.08

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Cognitive Engagement	Class_GraphingCalc	Percent Present	1-2	85	0.06	0.54	0.00	0.00	0.00	0.00	0.00	0.00	5.00
B-M-V (Chile)	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	98	0.45	1.68	0.00	0.00	0.00	0.00	0.00	0.00	12.50
Colombia	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	83	0.94	3.81	0.00	0.00	0.00	0.00	0.00	2.72	29.55
England (UK)	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	85	4.07	6.55	0.00	0.00	0.00	0.00	10.14	14.71	25.00
Germany*	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	50	0.50	2.66	0.00	0.00	0.00	0.00	0.00	0.00	18.33
K-S-T (Japan)	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Madrid (Spain)	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	85	0.57	1.76	0.00	0.00	0.00	0.00	0.00	2.14	10.00
Mexico	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	103	0.45	2.35	0.00	0.00	0.00	0.00	0.00	0.00	17.86
Shanghai (China)	Cognitive Engagement	Class_NonGraphingCalc	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B-M-V (Chile)	Cognitive Engagement	Class_Computer	Percent Present	1-2	98	0.72	2.95	0.00	0.00	0.00	0.00	0.00	0.00	18.75
Colombia	Cognitive Engagement	Class_Computer	Percent Present	1-2	83	1.54	5.44	0.00	0.00	0.00	0.00	0.00	2.95	32.29
England (UK)	Cognitive Engagement	Class_Computer	Percent Present	1-2	85	0.41	2.91	0.00	0.00	0.00	0.00	0.00	0.00	25.00
Germany*	Cognitive Engagement	Class_Computer	Percent Present	1-2	50	0.42	1.78	0.00	0.00	0.00	0.00	0.00	0.00	10.00
K-S-T (Japan)	Cognitive Engagement	Class_Computer	Percent Present	1-2	89	1.29	5.34	0.00	0.00	0.00	0.00	0.00	0.00	25.00
Madrid (Spain)	Cognitive Engagement	Class_Computer	Percent Present	1-2	85	0.87	3.09	0.00	0.00	0.00	0.00	0.00	0.00	19.17
Mexico	Cognitive Engagement	Class_Computer	Percent Present	1-2	103	1.90	6.54	0.00	0.00	0.00	0.00	0.00	2.86	33.33
Shanghai (China)	Cognitive Engagement	Class_Computer	Percent Present	1-2	85	0.05	0.45	0.00	0.00	0.00	0.00	0.00	0.00	4.17

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Cognitive Engagement	Class_TV	Percent Present	1-2	98	0.15	1.52	0.00	0.00	0.00	0.00	0.00	0.00	15.00
Colombia	Cognitive Engagement	Class_TV	Percent Present	1-2	83	2.62	10.93	0.00	0.00	0.00	0.00	0.00	0.00	60.00
England (UK)	Cognitive Engagement	Class_TV	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Germany*	Cognitive Engagement	Class_TV	Percent Present	1-2	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K-S-T (Japan)	Cognitive Engagement	Class_TV	Percent Present	1-2	89	2.03	7.41	0.00	0.00	0.00	0.00	0.00	0.00	45.83
Madrid (Spain)	Cognitive Engagement	Class_TV	Percent Present	1-2	85	0.49	3.24	0.00	0.00	0.00	0.00	0.00	0.00	25.00
Mexico	Cognitive Engagement	Class_TV	Percent Present	1-2	103	1.33	7.99	0.00	0.00	0.00	0.00	0.00	0.00	71.43
Shanghai (China)	Cognitive Engagement	Class_TV	Percent Present	1-2	85	0.59	5.42	0.00	0.00	0.00	0.00	0.00	0.00	50.00
B-M-V (Chile)	Cognitive Engagement	Class_Tablet	Percent Present	1-2	98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colombia	Cognitive Engagement	Class_Tablet	Percent Present	1-2	83	0.21	1.60	0.00	0.00	0.00	0.00	0.00	0.00	14.29
England (UK)	Cognitive Engagement	Class_Tablet	Percent Present	1-2	85	0.49	2.69	0.00	0.00	0.00	0.00	0.00	0.00	20.00
Germany*	Cognitive Engagement	Class_Tablet	Percent Present	1-2	50	0.46	3.28	0.00	0.00	0.00	0.00	0.00	0.00	23.21
K-S-T (Japan)	Cognitive Engagement	Class_Tablet	Percent Present	1-2	89	0.85	4.36	0.00	0.00	0.00	0.00	0.00	0.00	33.33
Madrid (Spain)	Cognitive Engagement	Class_Tablet	Percent Present	1-2	85	2.41	8.93	0.00	0.00	0.00	0.00	0.00	4.43	54.17
Mexico	Cognitive Engagement	Class_Tablet	Percent Present	1-2	103	0.20	1.36	0.00	0.00	0.00	0.00	0.00	0.00	12.50
Shanghai (China)	Cognitive Engagement	Class_Tablet	Percent Present	1-2	85	0.41	3.29	0.00	0.00	0.00	0.00	0.00	0.00	30.00
B-M-V (Chile)	Cognitive Engagement	Class_Cell	Percent Present	1-2	98	0.03	0.25	0.00	0.00	0.00	0.00	0.00	0.00	2.50

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Colombia	Cognitive Engagement	Class_Cell	Percent Present	1-2	83	0.05	0.46	0.00	0.00	0.00	0.00	0.00	0.00	4.17
England (UK)	Cognitive Engagement	Class_Cell	Percent Present	1-2	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Germany*	Cognitive Engagement	Class_Cell	Percent Present	1-2	50	0.30	1.57	0.00	0.00	0.00	0.00	0.00	0.00	10.00
K-S-T (Japan)	Cognitive Engagement	Class_Cell	Percent Present	1-2	89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Madrid (Spain)	Cognitive Engagement	Class_Cell	Percent Present	1-2	85	1.43	5.20	0.00	0.00	0.00	0.00	0.00	2.50	34.17
Mexico	Cognitive Engagement	Class_Cell	Percent Present	1-2	103	0.06	0.48	0.00	0.00	0.00	0.00	0.00	0.00	4.17
Shanghai (China)	Cognitive Engagement	Class_Cell	Percent Present	1-2	85	2.19	6.92	0.00	0.00	0.00	0.00	0.00	3.75	35.00
B-M-V (Chile)	Cognitive Engagement	Class_NoTech	Percent Present	1-2	98	70.32	32.12	0.00	21.06	41.22	77.95	100.00	100.00	100.00
Colombia	Cognitive Engagement	Class_NoTech	Percent Present	1-2	83	77.32	32.29	0.00	20.55	44.97	100.00	100.00	100.00	100.00
England (UK)	Cognitive Engagement	Class_NoTech	Percent Present	1-2	85	11.41	14.84	0.00	0.00	0.00	7.14	19.26	33.75	70.83
Germany*	Cognitive Engagement	Class_NoTech	Percent Present	1-2	50	60.90	34.42	0.00	8.00	27.33	64.20	98.00	100.00	100.00
K-S-T (Japan)	Cognitive Engagement	Class_NoTech	Percent Present	1-2	89	93.07	17.17	23.81	67.62	100.00	100.00	100.00	100.00	100.00
Madrid (Spain)	Cognitive Engagement	Class_NoTech	Percent Present	1-2	85	68.02	37.11	0.00	1.67	30.00	85.71	100.00	100.00	100.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Mexico	Cognitive Engagement	Class_NoTech	Percent Present	1-2	103	77.54	31.69	0.00	21.83	50.00	100.00	100.00	100.00	100.00
Shanghai (China)	Cognitive Engagement	Class_NoTech	Percent Present	1-2	85	14.58	29.44	0.00	0.00	0.00	0.00	19.05	56.50	100.00

Notes: 1. The technology for understanding indicator was rated by observers on a 1 to 4 scale and the 9 classroom technology device indicators were rated on a 1 to 2 scale. For this aggregation method, the percentage of lesson segments each observer assigned any rating greater than 1 was found and then averaged over observers and lessons to obtain the percentage of lesson segments for a classroom in which technology is used generally (technology for understanding indcator) or a specific device is used.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.20. Indicators of quality of subject matter, highest achieved (percentiles)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	98	1.30	0.42	1.00	1.00	1.00	1.25	1.50	2.00	3.00
Colombia	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	83	1.46	0.49	1.00	1.00	1.00	1.25	2.00	2.00	2.75
England (UK)	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	85	1.15	0.31	1.00	1.00	1.00	1.00	1.25	1.50	2.50
Germany*	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	50	1.57	0.50	1.00	1.00	1.00	1.50	2.00	2.25	2.50
K-S-T (Japan)	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	89	1.35	0.39	1.00	1.00	1.00	1.25	1.75	2.00	2.25
Madrid (Spain)	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	85	1.23	0.40	1.00	1.00	1.00	1.00	1.50	1.75	2.75
Mexico	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	103	1.50	0.51	1.00	1.00	1.00	1.50	2.00	2.20	3.00

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Quality of Subject Matter	Real-World Connections	Highest Achieved	1-3	85	1.22	0.37	1.00	1.00	1.00	1.00	1.50	1.75	2.75
B-M-V (Chile)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	98	1.40	0.35	1.00	1.00	1.00	1.25	1.75	1.75	2.75
Colombia	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	83	1.48	0.40	1.00	1.00	1.10	1.50	1.75	2.00	2.75
England (UK)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	85	1.27	0.30	1.00	1.00	1.00	1.25	1.50	1.75	2.00
Germany*	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	50	1.48	0.35	1.00	1.00	1.25	1.50	1.75	2.00	2.25
K-S-T (Japan)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	89	1.39	0.36	1.00	1.00	1.00	1.25	1.75	2.00	2.25
Madrid (Spain)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	85	1.65	0.35	1.00	1.25	1.25	1.50	2.00	2.25	2.25
Mexico	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	103	1.44	0.46	1.00	1.00	1.00	1.25	1.75	2.00	2.75

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	1-3	85	1.43	0.33	1.00	1.00	1.00	1.50	1.75	1.75	2.25
B-M-V (Chile)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	98	1.68	0.50	1.00	1.00	1.25	1.75	2.00	2.50	3.00
Colombia	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	83	1.52	0.46	1.00	1.00	1.00	1.50	2.00	2.25	2.75
England (UK)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	85	1.35	0.36	1.00	1.00	1.00	1.25	1.75	1.75	2.50
Germany*	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	50	1.65	0.46	1.00	1.25	1.25	1.50	2.00	2.25	2.75
K-S-T (Japan)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	89	2.16	0.46	1.00	1.50	1.75	2.25	2.50	2.75	3.00
Madrid (Spain)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	85	1.29	0.35	1.00	1.00	1.00	1.25	1.50	1.75	2.75
Mexico	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	103	1.39	0.48	1.00	1.00	1.00	1.25	1.75	2.00	2.75

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
Shanghai (China)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	1-3	85	2.74	0.28	1.75	2.50	2.50	2.75	3.00	3.00	3.00

Notes: 1. These indicators were aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.21. Indicators of quality of subject matter, highest achieved (indicator score)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Quality of Subject Matter	Real-World Connections	Highest Achieved	68	28	2	69.4	28.6	2.0
Colombia	Quality of Subject Matter	Real-World Connections	Highest Achieved	43	35	5	51.8	42.2	6.0
England (UK)	Quality of Subject Matter	Real-World Connections	Highest Achieved	71	13	1	83.5	15.3	1.2
Germany*	Quality of Subject Matter	Real-World Connections	Highest Achieved	20	27	3	40.0	54.0	6.0
K-S-T (Japan)	Quality of Subject Matter	Real-World Connections	Highest Achieved	57	32	0	64.0	36.0	0.0
Madrid (Spain)	Quality of Subject Matter	Real-World Connections	Highest Achieved	62	20	3	72.9	23.5	3.5
Mexico	Quality of Subject Matter	Real-World Connections	Highest Achieved	49	47	7	47.6	45.6	6.8
Shanghai (China)	Quality of Subject Matter	Real-World Connections	Highest Achieved	62	21	2	72.9	24.7	2.4
B-M-V (Chile)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	52	44	2	53.1	44.9	2.0
Colombia	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	39	41	3	47.0	49.4	3.6
England (UK)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	62	23	0	72.9	27.1	0.0
Germany*	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	21	29	0	42.0	58.0	0.0

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
K-S-T (Japan)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	50	39	0	56.2	43.8	0.0
Madrid (Spain)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	18	67	0	21.2	78.8	0.0
Mexico	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	53	43	7	51.5	41.7	6.8
Shanghai (China)	Quality of Subject Matter	Connecting Mathematical Topics	Highest Achieved	38	47	0	44.7	55.3	0.0
B-M-V (Chile)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	32	54	12	32.7	55.1	12.2
Colombia	Quality of Subject Matter	Mathematical Summary	Highest Achieved	39	40	4	47.0	48.2	4.8
England (UK)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	53	31	1	62.4	36.5	1.2
Germany*	Quality of Subject Matter	Mathematical Summary	Highest Achieved	16	30	4	32.0	60.0	8.0
K-S-T (Japan)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	2	55	32	2.2	61.8	36.0
Madrid (Spain)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	61	23	1	71.8	27.1	1.2
Mexico	Quality of Subject Matter	Mathematical Summary	Highest Achieved	61	36	6	59.2	35.0	5.8
Shanghai (China)	Quality of Subject Matter	Mathematical Summary	Highest Achieved	0	7	78	0.0	8.2	91.8

Notes: 1. These indicators were aggregated to the classroom level by identifying the highest achieved rating for each lesson for each observer and then averaging these highest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.22. Indicators of quality of subject matter, lowest achieved (percentiles)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Original rating scale	Number of classrooms	Mean score	Standard deviation	Minimum score	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum score
B-M-V (Chile)	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	98	2.41	0.41	1.25	1.75	2.00	2.50	2.75	3.00	3.00
Colombia	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	83	2.62	0.42	1.00	2.25	2.35	2.75	3.00	3.00	3.00
England (UK)	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	85	2.66	0.32	1.75	2.25	2.50	2.75	3.00	3.00	3.00
Germany*	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	50	2.56	0.28	2.00	2.25	2.25	2.50	2.75	3.00	3.00
K-S-T (Japan)	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	89	2.74	0.25	2.00	2.50	2.50	2.75	3.00	3.00	3.00
Madrid (Spain)	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	85	2.75	0.28	1.50	2.50	2.50	2.75	3.00	3.00	3.00
Mexico	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	103	2.44	0.46	1.00	1.75	2.00	2.50	3.00	3.00	3.00
Shanghai (China)	Quality of Subject Matter	Accuracy	Lowest Achieved	1-3	85	2.83	0.20	2.25	2.50	2.75	3.00	3.00	3.00	3.00

Notes: 1. These indicators were aggregated to the classroom level by identifying the lowest achieved rating for each lesson for each observer and then averaging these lowest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.23. Indicators of quality of subject matter, lowest achieved (indicator score)

Based on observers' classroom video ratings

	Domain	Indicator	Aggregation type[1]	Frequency (indicator score)			Percentage (indicator score)		
				between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0	between 1.0 and 1.5	between 1.5 and 2.5	between 2.5 and 3.0
B-M-V (Chile)	Quality of Subject Matter	Accuracy	Lowest Achieved	1	40	57	1.0	40.8	58.2
Colombia	Quality of Subject Matter	Accuracy	Lowest Achieved	2	15	66	2.4	18.1	79.5
England (UK)	Quality of Subject Matter	Accuracy	Lowest Achieved	0	16	69	0.0	18.8	81.2
Germany*	Quality of Subject Matter	Accuracy	Lowest Achieved	0	13	37	0.0	26.0	74.0
K-S-T (Japan)	Quality of Subject Matter	Accuracy	Lowest Achieved	0	6	83	0.0	6.7	93.3
Madrid (Spain)	Quality of Subject Matter	Accuracy	Lowest Achieved	0	6	79	0.0	7.1	92.9
Mexico	Quality of Subject Matter	Accuracy	Lowest Achieved	1	39	63	1.0	37.9	61.2
Shanghai (China)	Quality of Subject Matter	Accuracy	Lowest Achieved	0	1	84	0.0	1.2	98.8

Notes: 1. These indicators were aggregated to the classroom level by identifying the lowest achieved rating for each lesson for each observer and then averaging these lowest achieved ratings over observers and lessons.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.A.24. Teacher and student perceived setting of goals

Percentage of teachers and students who reported the "setting of goals at the beginning of instruction" to have happened "frequently" or "always" during the unit on quadratic equations

	Our mathematics teacher set goals at the beginning of instruction	
	Teachers	Students
B-M-V (Chile)	97	87
Colombia	80	73
England (UK)	79	68
Germany*	62	32
K-S-T (Japan)	86	80
Madrid (Spain)	71	66
Mexico	91	74
Shanghai (China)	100	86

Notes: The wording given is the student version. In the Teacher Questionnaire, "Our mathematics teacher" was replaced by "I".
Response scale: Never or almost never – Occasionally – Frequently – Always.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex 5.B. Teaching material (TM) tables

Annex Table 5.B.1. Explicit learning goals: Extent to which the teacher has explicit mathematical learning goals for students

Based on raters' average teaching materials set ratings

	Explicit Learning Goals									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	2.33	0.59	1.00	1.50	1.75	2.35	3.00	3.00	3.00
Colombia	83	1.92	0.47	1.12	1.38	1.50	1.88	2.33	2.62	3.00
England (UK)	85	2.29	0.45	1.00	1.75	1.88	2.38	2.75	2.88	3.00
Germany*	50	1.94	0.22	1.50	1.74	1.75	2.00	2.12	2.12	2.62
K-S-T (Japan)	89	2.21	0.37	1.00	2.00	2.00	2.25	2.50	2.75	3.00
Madrid (Spain)	85	1.68	0.29	1.00	1.38	1.50	1.62	1.88	2.00	2.50
Mexico	103	2.42	0.57	1.00	1.53	1.88	2.50	3.00	3.00	3.00
Shanghai (China)	85	2.91	0.26	1.50	2.62	3.00	3.00	3.00	3.00	3.00

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.2. Explicit learning goals: Maximum extent to which the teacher has explicit mathematical learning goals for students

Based on the maximum of raters' average teaching materials set ratings

	Explicit Learning Goals									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	2.63	0.56	1.00	2.00	2.00	3.00	3.00	3.00	3.00
Colombia	83	2.48	0.51	1.50	2.00	2.00	2.50	3.00	3.00	3.00
England (UK)	85	2.68	0.42	1.00	2.00	2.50	3.00	3.00	3.00	3.00
Germany*	50	2.26	0.32	2.00	2.00	2.00	2.00	2.50	2.50	3.00
K-S-T (Japan)	89	2.37	0.46	1.00	2.00	2.00	2.50	3.00	3.00	3.00
Madrid (Spain)	85	2.20	0.42	1.00	2.00	2.00	2.00	2.50	3.00	3.00
Mexico	103	2.78	0.46	1.00	2.00	2.50	3.00	3.00	3.00	3.00
Shanghai (China)	85	2.97	0.16	2.00	3.00	3.00	3.00	3.00	3.00	3.00

Notes: The average maximum teaching materials set score obtained by each teacher is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.3. Connecting mathematical representations: Extent to which the teacher has explicit mathematical learning goals for students

Based on raters' average teaching materials set ratings

	Connecting Mathematical Representations									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.86	0.70	1.00	1.00	1.00	1.75	2.50	2.88	3.00
Colombia	83	1.81	0.48	1.00	1.25	1.38	1.75	2.25	2.50	2.88
England (UK)	85	2.14	0.50	1.00	1.43	1.66	2.25	2.62	2.75	3.00
Germany*	50	2.40	0.47	1.00	1.74	2.00	2.50	2.75	2.76	3.00
K-S-T (Japan)	89	2.28	0.52	1.00	1.75	2.00	2.25	2.75	3.00	3.00
Madrid (Spain)	85	1.65	0.42	1.00	1.00	1.25	1.62	2.00	2.22	2.50
Mexico	103	2.28	0.54	1.00	1.50	1.88	2.33	2.75	2.97	3.00
Shanghai (China)	85	1.29	0.35	1.00	1.00	1.00	1.25	1.50	1.75	2.50

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.4. Connecting mathematical representations: Maximum extent to which the teacher has explicit mathematical learning goals for students

Based on the maximum of raters' average teaching materials set ratings

	Connecting Mathematical Representations									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	2.32	0.87	1.00	1.00	1.00	3.00	3.00	3.00	3.00
Colombia	83	2.50	0.59	1.00	1.60	2.00	2.50	3.00	3.00	3.00
England (UK)	85	2.80	0.42	1.00	2.20	2.50	3.00	3.00	3.00	3.00
Germany*	50	2.87	0.41	1.00	2.90	3.00	3.00	3.00	3.00	3.00
K-S-T (Japan)	89	2.76	0.45	1.00	2.50	2.50	3.00	3.00	3.00	3.00
Madrid (Spain)	85	2.54	0.71	1.00	1.00	2.00	3.00	3.00	3.00	3.00
Mexico	103	2.80	0.53	1.00	2.00	3.00	3.00	3.00	3.00	3.00
Shanghai (China)	85	1.78	0.75	1.00	1.00	1.00	1.50	2.50	3.00	3.00

Notes: The average maximum teaching materials set score obtained by each teacher is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.5. Pearson correlations among components and subtopics: B-M-V (Chile)

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.35	0.13	0.18	0.22	0.00	0.10	0.04	0.17	0.02	-0.03	0.29	0.09	0.19	-0.03	0.10	-0.08	-0.08	0.10	0.15
C2. ASKING_EXPLAN_RATE	0.35		0.07	0.20	0.08	0.11	-0.03	0.15	0.17	0.02	0.07	0.38	0.04	0.05	-0.02	0.18	-0.16	-0.09	0.03	0.13
C3. CONN_MATH_REP_RATE	0.13	0.07		-0.05	0.24	0.18	0.21	-0.37	0.67	0.27	0.12	0.12	-0.21	-0.10	0.19	-0.19	-0.34	0.47	-0.07	0.65
C4. ENCRG_SELF_EVAL_RATE	0.18	0.20	-0.05		0.05	0.00	0.05	0.09	0.02	0.08	-0.20	0.11	0.10	0.13	-0.06	0.12	0.07	-0.13	-0.09	-0.02
C5.EXP_LEARN_GOAL_RATE	0.22	0.08	0.24	0.05		0.12	-0.19	0.01	0.18	0.08	-0.17	0.03	0.12	0.19	0.23	0.06	0.21	0.21	0.16	0.23
C6.EXP_PATRN_GEN_RATE	0.00	0.11	0.18	0.00	0.12		-0.06	0.04	0.05	0.35	-0.19	-0.03	-0.05	-0.11	0.12	-0.08	-0.01	0.33	-0.07	0.06
C7.MUL_MATH_METHOD_RATE	0.10	-0.03	0.21	0.05	-0.19	-0.06		0.06	0.22	0.03	0.06	0.18	0.17	0.13	-0.17	0.04	0.04	-0.15	0.00	0.12
C8.OPP_PRACTICE_RATE	0.04	0.15	-0.37	0.09	0.01	0.04	0.06		-0.26	-0.28	-0.06	0.19	0.35	0.27	-0.37	0.39	0.18	-0.34	0.03	-0.32
C9.REAL_WORLD_CON_RATE	0.17	0.17	0.67	0.02	0.18	0.05	0.22	-0.26		0.17	0.11	0.24	-0.05	-0.04	0.14	0.01	-0.19	0.09	-0.02	0.95
C10.TECH_UNDERSTAND_RATE	0.02	0.02	0.27	0.08	0.08	0.35	0.03	-0.28	0.17		-0.06	0.05	-0.10	-0.10	0.12	-0.14	-0.10	0.33	-0.01	0.19
C11. ACCURACY_MATERIAL_RATE	-0.03	0.07	0.12	-0.20	-0.17	-0.19	0.06	-0.06	0.11	-0.06		-0.03	-0.11	-0.13	-0.15	-0.03	-0.30	-0.06	-0.06	0.06
S1. SQE_COMP_SQUARE_RATE	0.29	0.38	0.12	0.11	0.03	-0.03	0.18	0.19	0.24	0.05	-0.03		0.36	0.39	0.11	0.49	-0.04	-0.14	0.19	0.21
S2.SQE_FACTORISING_RATE	0.09	0.04	-0.21	0.10	0.12	-0.05	0.17	0.35	-0.05	-0.10	-0.11	0.36		0.59	-0.02	0.87	0.51	-0.26	0.26	-0.08
S3.SQE_QUADRATIC_RATE	0.19	0.05	-0.10	0.13	0.19	-0.11	0.13	0.27	-0.04	-0.10	-0.13	0.39	0.59		0.07	0.56	0.50	-0.15	0.37	-0.05
S4.SQE_FIND_ROOT_RATE	-0.03	-0.02	0.19	-0.06	0.23	0.12	-0.17	-0.37	0.14	0.12	-0.15	0.11	-0.02	0.07		-0.01	0.10	0.50	0.09	0.29
S5.FACTOR_EXP_RATE	0.10	0.18	-0.19	0.12	0.06	-0.08	0.04	0.39	0.01	-0.14	-0.03	0.49	0.87	0.56	-0.01		0.44	-0.26	0.23	-0.02
S6.DIFF_CASE_RATE	-0.08	-0.16	-0.34	0.07	0.21	-0.01	0.04	0.18	-0.19	-0.10	-0.30	-0.04	0.51	0.50	0.10	0.44		-0.13	0.22	-0.15
S7. EXPLORING_FUNCT_RATE	-0.08	-0.09	0.47	-0.13	0.21	0.33	-0.15	-0.34	0.09	0.33	-0.06	-0.14	-0.26	-0.15	0.50	-0.26	-0.13		0.06	0.21
S8.EXAMINING_REL_RATE	0.10	0.03	-0.07	-0.09	0.16	-0.07	0.00	0.03	-0.02	-0.01	-0.06	0.19	0.26	0.37	0.09	0.23	0.22	0.06		-0.02
S9.APPLY_REAL_WORLD_RATE	0.15	0.13	0.65	-0.02	0.23	0.06	0.12	-0.32	0.95	0.19	0.06	0.21	-0.08	-0.05	0.29	-0.02	-0.15	0.21	-0.02	

Note: Diagonal entries are not shown.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187588

Annex Table 5.B.6. Pearson correlations among components and subtopics: Colombia

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.01	0.08	-0.07	0.05	-0.15	0.02	0.11	-0.06	-0.06	-0.02	-0.01	0.07	0.18	0.06	0.08	0.10	-0.03	0.10	-0.11
C2. ASKING_EXPLAN_RATE	0.01		0.46	0.07	0.19	0.14	0.16	0.14	0.45	0.24	0.21	0.09	-0.06	-0.06	0.27	-0.13	0.08	0.17	0.20	0.35
C3. CONN_MATH_REP_RATE	0.08	0.46		0.04	0.12	0.17	0.25	0.20	0.51	0.26	-0.12	-0.06	-0.26	-0.11	0.62	-0.24	0.05	0.58	0.14	0.48
C4. ENCRG_SELF_EVAL_RATE	-0.07	0.07	0.04		0.24	0.03	-0.06	0.10	0.19	0.04	0.14	0.13	0.02	0.05	0.07	-0.05	0.05	0.08	0.41	0.19
C5.EXP_LEARN_GOAL_RATE	0.05	0.19	0.12	0.24		-0.06	0.01	0.03	0.21	0.20	0.00	-0.10	0.04	0.16	0.10	-0.01	0.22	0.03	0.17	0.22
C6.EXP_PATRN_GEN_RATE	-0.15	0.14	0.17	0.03	-0.06		0.04	0.05	-0.06	0.12	0.06	0.05	0.02	-0.06	0.37	0.01	0.10	0.14	0.01	-0.07
C7.MUL_MATH_METHOD_RATE	0.02	0.16	0.25	-0.06	0.01	0.04		0.51	0.40	0.06	-0.25	0.28	0.25	0.28	0.13	0.19	0.07	-0.03	0.09	0.39
C8.OPP_PRACTICE_RATE	0.11	0.14	0.20	0.10	0.03	0.05	0.51		0.38	0.08	-0.30	0.34	0.19	0.13	0.08	0.14	0.04	-0.05	0.05	0.38
C9.REAL_WORLD_CON_RATE	-0.06	0.45	0.51	0.19	0.21	-0.06	0.40	0.38		0.28	-0.01	0.23	0.03	-0.15	0.15	-0.02	-0.10	0.04	0.18	0.93
C10.TECH_UNDERSTAND_RATE	-0.06	0.24	0.26	0.04	0.20	0.12	0.06	0.08	0.28		0.11	0.05	-0.10	-0.14	0.37	-0.12	0.10	0.27	-0.05	0.33
C11. ACCURACY_MATERIAL_RATE	-0.02	0.21	-0.12	0.14	0.00	0.06	-0.25	-0.30	-0.01	0.11		-0.07	-0.03	-0.21	-0.06	-0.11	0.09	0.08	0.02	-0.03
S1. SQE_COMP_SQUARE_RATE	-0.01	0.09	-0.06	0.13	-0.10	0.05	0.28	0.34	0.23	0.05	-0.07		0.21	0.15	-0.06	0.18	-0.01	-0.15	0.36	0.21
S2.SQE_FACTORIZING_RATE	0.07	-0.06	-0.26	0.02	0.04	0.02	0.25	0.19	0.03	-0.10	-0.03	0.21		0.18	-0.06	0.92	0.14	-0.47	-0.08	0.08
S3.SQE_QUADRATIC_RATE	0.18	-0.06	-0.11	0.05	0.16	-0.06	0.28	0.13	-0.15	-0.14	-0.21	0.15	0.18		-0.11	0.20	0.07	-0.25	0.37	-0.10
S4.SQE_FIND_ROOT_RATE	0.06	0.27	0.62	0.07	0.10	0.37	0.13	0.08	0.15	0.37	-0.06	-0.06	-0.06	-0.11		-0.09	0.30	0.62	0.00	0.12
S5.FACTOR_EXP_RATE	0.08	-0.13	-0.24	-0.05	-0.01	0.01	0.19	0.14	-0.02	-0.12	-0.11	0.18	0.92	0.20	-0.09		0.02	-0.45	-0.13	0.05
S6.DIFF_CASE_RATE	0.10	0.08	0.05	0.05	0.22	0.10	0.07	0.04	-0.10	0.10	0.09	-0.01	0.14	0.07	0.30	0.02		0.09	0.15	-0.12
S7. EXPLORING_FUNCT_RATE	-0.03	0.17	0.58	0.08	0.03	0.14	-0.03	-0.05	0.04	0.27	0.08	-0.15	-0.47	-0.25	0.62	-0.45	0.09		0.01	0.04
S8.EXAMINING_REL_RATE	0.10	0.20	0.14	0.41	0.17	0.01	0.09	0.05	0.18	-0.05	0.02	0.36	-0.08	0.37	0.00	-0.13	0.15	0.01		0.15
S9.APPLY_REAL_WORLD_RATE	-0.11	0.35	0.48	0.19	0.22	-0.07	0.39	0.38	0.93	0.33	-0.03	0.21	0.08	-0.10	0.12	0.05	-0.12	0.04	0.15	

Note: Diagonal entries are not shown.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187607

Annex Table 5.B.7. Pearson correlations among components and subtopics: England (UK)

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.23	0.10	0.35	0.35	0.22	0.08	0.31	-0.05	-0.10	-0.06	-0.04	0.42	0.21	-0.02	0.38	0.18	-0.05	0.16	-0.05
C2. ASKING_EXPLAN_RATE	0.23		0.37	0.08	0.24	0.45	0.23	-0.07	0.18	0.16	-0.36	-0.02	0.20	0.05	0.30	0.21	0.06	0.22	0.03	0.24
C3. CONN_MATH_REP_RATE	0.10	0.37		-0.15	0.17	0.25	0.38	-0.08	0.45	0.15	-0.13	0.07	0.01	-0.07	0.66	-0.02	0.15	0.63	0.07	0.44
C4. ENCRG_SELF_EVAL_RATE	0.35	0.08	-0.15		0.21	0.22	0.07	0.15	-0.13	0.01	-0.05	-0.16	0.19	0.24	-0.06	0.18	0.04	-0.08	0.10	-0.16
C5.EXP_LEARN_GOAL_RATE	0.35	0.24	0.17	0.21		0.24	0.04	0.19	0.09	0.08	-0.18	0.01	0.36	0.21	0.17	0.33	0.11	0.09	0.06	0.08
C6.EXP_PATRN_GEN_RATE	0.22	0.45	0.25	0.22	0.24		0.15	0.21	-0.07	0.00	-0.23	0.09	-0.02	0.02	0.28	-0.04	0.14	0.28	0.13	-0.03
C7.MUL_MATH_METHOD_RATE	0.08	0.23	0.38	0.07	0.04	0.15		0.13	0.25	-0.03	-0.16	0.43	0.26	0.40	0.29	0.18	0.20	0.21	0.08	0.18
C8.OPP_PRACTICE_RATE	0.31	-0.07	-0.08	0.15	0.19	0.21	0.13		-0.12	-0.17	-0.08	0.22	0.15	0.27	-0.08	0.08	0.19	-0.10	0.20	-0.16
C9.REAL_WORLD_CON_RATE	-0.05	0.18	0.45	-0.13	0.09	-0.07	0.25	-0.12		0.12	-0.06	0.13	0.08	0.09	0.22	0.07	0.19	0.18	0.03	0.93
C10.TECH_UNDERSTAND_RATE	-0.10	0.16	0.15	0.01	0.08	0.00	-0.03	-0.17	0.12		0.02	-0.09	-0.01	0.10	0.26	-0.06	-0.02	0.22	-0.03	0.10
C11. ACCURACY_MATERIAL_RATE	-0.06	-0.36	-0.13	-0.05	-0.18	-0.23	-0.16	-0.08	-0.06	0.02		-0.06	-0.10	-0.08	-0.18	-0.05	-0.19	-0.12	0.01	-0.07
S1. SQE_COMP_SQUARE_RATE	-0.04	-0.02	0.07	-0.16	0.01	0.09	0.43	0.22	0.13	-0.09	-0.06		-0.08	0.26	0.05	-0.14	0.03	0.08	0.04	0.12
S2.SQE_FACTORISING_RATE	0.42	0.20	0.01	0.19	0.36	-0.02	0.26	0.15	0.08	-0.01	-0.10	-0.08		0.32	0.09	0.82	0.20	-0.06	-0.02	0.11
S3.SQE_QUADRATIC_RATE	0.21	0.05	-0.07	0.24	0.21	0.02	0.40	0.27	0.09	0.10	-0.08	0.26	0.32		-0.06	0.22	0.22	-0.12	0.30	0.09
S4.SQE_FIND_ROOT_RATE	-0.02	0.30	0.66	-0.06	0.17	0.28	0.29	-0.08	0.22	0.26	-0.18	0.05	0.09	-0.06		-0.03	0.15	0.80	0.12	0.20
S5.FACTOR_EXP_RATE	0.38	0.21	-0.02	0.18	0.33	-0.04	0.18	0.08	0.07	-0.06	-0.05	-0.14	0.82	0.22	-0.03		0.11	-0.08	-0.05	0.10
S6.DIFF_CASE_RATE	0.18	0.06	0.15	0.04	0.11	0.14	0.20	0.19	0.19	-0.02	-0.19	0.03	0.20	0.22	0.15	0.11		0.14	0.45	0.15
S7. EXPLORING_FUNCT_RATE	-0.05	0.22	0.63	-0.08	0.09	0.28	0.21	-0.10	0.18	0.22	-0.12	0.08	-0.06	-0.12	0.80	-0.08	0.14		0.06	0.18
S8.EXAMINING_REL_RATE	0.16	0.03	0.07	0.10	0.06	0.13	0.08	0.20	0.03	-0.03	0.01	0.04	-0.02	0.30	0.12	-0.05	0.45	0.06		0.01
S9.APPLY_REAL_WORLD_RATE	-0.05	0.24	0.44	-0.16	0.08	-0.03	0.18	-0.16	0.93	0.10	-0.07	0.12	0.11	0.09	0.20	0.10	0.15	0.18	0.01	

Note: Diagonal entries are not shown.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187626

Annex Table 5.B.8. Pearson correlations among components and subtopics: Germany*

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		-0.03	0.04	0.17	0.32	0.14	-0.03	-0.24	0.23	0.09	0.02	-0.10	-0.22	0.26	-0.25	-0.24	0.00	-0.10	0.07	0.29
C2. ASKING_EXPLAN_RATE	-0.03		0.48	0.26	-0.03	0.07	0.47	0.11	0.25	0.20	-0.13	-0.04	0.03	-0.11	0.34	0.03	0.16	0.52	0.03	0.21
C3. CONN_MATH_REP_RATE	0.04	0.48		0.20	0.25	-0.02	0.54	0.22	0.45	0.17	0.15	0.03	-0.23	-0.14	0.48	-0.06	-0.02	0.68	0.21	0.43
C4. ENCRG_SELF_EVAL_RATE	0.17	0.26	0.20		-0.09	0.12	0.21	-0.15	0.21	-0.01	0.13	0.04	0.12	0.00	0.08	0.11	0.07	0.27	0.03	0.20
C5.EXP_LEARN_GOAL_RATE	0.32	-0.03	0.25	-0.09		0.24	0.11	0.28	0.21	0.00	0.19	0.14	-0.19	0.12	0.06	0.13	0.32	0.09	0.40	0.24
C6.EXP_PATRN_GEN_RATE	0.14	0.07	-0.02	0.12	0.24		0.01	0.06	-0.04	0.09	0.17	0.05	0.11	0.02	-0.31	0.12	0.59	-0.03	-0.02	-0.03
C7.MUL_MATH_METHOD_RATE	-0.03	0.47	0.54	0.21	0.11	0.01		0.24	0.42	0.32	0.21	0.08	0.03	-0.13	0.50	0.01	0.15	0.56	0.05	0.44
C8.OPP_PRACTICE_RATE	-0.24	0.11	0.22	-0.15	0.28	0.06	0.24		0.11	-0.06	0.16	0.10	-0.14	-0.02	0.09	0.12	0.13	-0.03	0.13	0.11
C9.REAL_WORLD_CON_RATE	0.23	0.25	0.45	0.21	0.21	-0.04	0.42	0.11		0.20	0.09	-0.11	-0.23	-0.09	0.08	-0.13	0.07	0.27	0.02	0.97
C10.TECH_UNDERSTAND_RATE	0.09	0.20	0.17	-0.01	0.00	0.09	0.32	-0.06	0.20		-0.04	-0.31	-0.28	-0.11	0.18	-0.41	0.03	0.24	0.18	0.20
C11. ACCURACY_MATERIAL_RATE	0.02	-0.13	0.15	0.13	0.19	0.17	0.21	0.16	0.09	-0.04		-0.03	-0.29	-0.39	-0.03	-0.19	0.29	0.15	-0.14	0.13
S1. SQE_COMP_SQUARE_RATE	-0.10	-0.04	0.03	0.04	0.14	0.05	0.08	0.10	-0.11	-0.31	-0.03		0.23	0.03	-0.05	0.76	0.19	0.01	-0.13	-0.09
S2.SQE_FACTORISING_RATE	-0.22	0.03	-0.23	0.12	-0.19	0.11	0.03	-0.14	-0.23	-0.28	-0.29	0.23		0.02	0.03	0.53	0.17	-0.01	-0.07	-0.22
S3.SQE_QUADRATIC_RATE	0.26	-0.11	-0.14	0.00	0.12	0.02	-0.13	-0.02	-0.09	-0.11	-0.39	0.03	0.02		-0.18	-0.02	0.00	-0.22	0.53	-0.09
S4.SQE_FIND_ROOT_RATE	-0.25	0.34	0.48	0.08	0.06	-0.31	0.50	0.09	0.08	0.18	-0.03	-0.05	0.03	-0.18		-0.02	-0.06	0.61	0.07	0.10
S5.FACTOR_EXP_RATE	-0.24	0.03	-0.06	0.11	0.13	0.12	0.01	0.12	-0.13	-0.41	-0.19	0.76	0.53	-0.02	-0.02		0.22	-0.07	-0.07	-0.12
S6.DIFF_CASE_RATE	0.00	0.16	-0.02	0.07	0.32	0.59	0.15	0.13	0.07	0.03	0.29	0.19	0.17	0.00	-0.06	0.22		0.15	0.08	0.08
S7. EXPLORING_FUNCT_RATE	-0.10	0.52	0.68	0.27	0.09	-0.03	0.56	-0.03	0.27	0.24	0.15	0.01	-0.01	-0.22	0.61	-0.07	0.15		0.05	0.25
S8.EXAMINING_REL_RATE	0.07	0.03	0.21	0.03	0.40	-0.02	0.05	0.13	0.02	0.18	-0.14	-0.13	-0.07	0.53	0.07	-0.07	0.08	0.05		-0.02
S9.APPLY_REAL_WORLD_RATE	0.29	0.21	0.43	0.20	0.24	-0.03	0.44	0.11	0.97	0.20	0.13	-0.09	-0.22	-0.09	0.10	-0.12	0.08	0.25	-0.02	

Notes: Diagonal entries are not shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187645

Annex Table 5.B.9. Pearson correlations among components and subtopics: K-S-T (Japan)

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.27	0.24	0.07	0.23	0.27	0.28	0.09	0.11	0.04	-0.05	0.28	0.26	-0.06		0.25	0.17	-0.06	0.21	0.16
C2. ASKING_EXPLAN_RATE	0.27		0.31	0.23	0.25	0.46	0.31	0.18	0.26	0.08	0.02	0.10	0.14	0.05		0.15	0.00	0.28	0.20	0.25
C3. CONN_MATH_REP_RATE	0.24	0.31		0.15	0.12	0.35	0.61	-0.37	0.58	0.24	-0.11	-0.06	-0.01	-0.16		0.07	0.17	-0.06	0.04	0.60
C4. ENCRG_SELF_EVAL_RATE	0.07	0.23	0.15		0.18	0.40	0.42	-0.12	-0.06	0.19	-0.04	-0.05	0.02	0.00		0.03	0.02	0.13	-0.06	-0.04
C5.EXP_LEARN_GOAL_RATE	0.23	0.25	0.12	0.18		0.17	0.19	0.02	0.16	0.21	0.02	0.08	0.12	-0.06		0.13	0.02	0.01	0.01	0.17
C6.EXP_PATRN_GEN_RATE	0.27	0.46	0.35	0.40	0.17		0.39	-0.15	0.12	0.17	-0.28	0.06	0.23	0.05		0.28	0.23	0.16	0.08	0.14
C7.MUL_MATH_METHOD_RATE	0.28	0.31	0.61	0.42	0.19	0.39		-0.22	0.39	0.17	-0.10	0.03	0.13	0.03		0.08	0.21	-0.07	-0.07	0.40
C8.OPP_PRACTICE_RATE	0.09	0.18	-0.37	-0.12	0.02	-0.15	-0.22		-0.15	-0.16	0.28	0.27	0.28	0.12		0.20	-0.08	0.14	0.14	-0.17
C9.REAL_WORLD_CON_RATE	0.11	0.26	0.58	-0.06	0.16	0.12	0.39	-0.15		0.18	-0.10	-0.05	-0.01	-0.17		0.01	0.05	0.02	0.06	0.98
C10.TECH_UNDERSTAND_RATE	0.04	0.08	0.24	0.19	0.21	0.17	0.17	-0.16	0.18		0.04	-0.03	0.07	0.01		0.05	-0.03	-0.02	-0.02	0.18
C11. ACCURACY_MATERIAL_RATE	-0.05	0.02	-0.11	-0.04	0.02	-0.28	-0.10	0.28	-0.10	0.04		-0.04	0.10	0.16		-0.03	0.03	0.02	0.02	-0.16
S1. SQE_COMP_SQUARE_RATE	0.28	0.10	-0.06	-0.05	0.08	0.06	0.03	0.27	-0.05	-0.03	-0.04		0.33	0.13		0.40	0.17	0.02	0.02	-0.06
S2.SQE_FACTORISING_RATE	0.26	0.14	-0.01	0.02	0.12	0.23	0.13	0.28	-0.01	0.07	0.10	0.33		-0.18		0.78	-0.03	-0.02	0.09	-0.01
S3.SQE_QUADRATIC_RATE	-0.06	0.05	-0.16	0.00	-0.06	0.05	0.03	0.12	-0.17	0.01	0.16	0.13	-0.18			-0.22	0.13	0.18	0.09	-0.19
S4.SQE_FIND_ROOT_RATE																				
S5.FACTOR_EXP_RATE	0.25	0.15	0.07	0.03	0.13	0.28	0.08	0.20	0.01	0.05	-0.03	0.40	0.78	-0.22			-0.01	0.06	0.06	0.01
S6.DIFF_CASE_RATE	0.17	0.00	0.17	0.02	0.02	0.23	0.21	-0.08	0.05	-0.03	0.03	0.17	-0.03	0.13		-0.01		-0.02	-0.02	0.07
S7. EXPLORING_FUNCT_RATE	-0.06	0.28	-0.06	0.13	0.01	0.16	-0.07	0.14	0.02	-0.02	0.02	0.02	-0.02	0.18		0.06	-0.02		-0.01	0.01
S8.EXAMINING_REL_RATE	0.21	0.20	0.04	-0.06	0.01	0.08	-0.07	0.14	0.06	-0.02	0.02	0.02	0.09	0.09		0.06	-0.02	-0.01		0.09
S9.APPLY_REAL_WORLD_RATE	0.16	0.25	0.60	-0.04	0.17	0.14	0.40	-0.17	0.98	0.18	-0.16	-0.06	-0.01	-0.19		0.01	0.07	0.01	0.09	

Note: Diagonal entries are not shown. Subtopic 4 has no sample variance.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187664

Annex Table 5.B.10. Pearson correlations among components and subtopics: Madrid (Spain)

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.29	0.28	0.07	-0.11	0.13	0.20	0.23	0.35	0.03	0.11	0.13	0.10	0.16	0.23	0.07	-0.05	0.13	0.11	0.36
C2. ASKING_EXPLAN_RATE	0.29		0.07	0.23	-0.04	0.16	0.01	0.19	-0.04	0.12	0.10	-0.05	0.06	0.00	0.19	-0.01	0.04	0.22	0.12	-0.08
C3. CONN_MATH_REP_RATE	0.28	0.07		-0.03	-0.20	0.00	0.66	-0.11	0.68	0.09	0.06	0.08	-0.21	0.15	0.27	-0.20	-0.32	0.35	-0.14	0.63
C4. ENCRG_SELF_EVAL_RATE	0.07	0.23	-0.03		0.05	0.04	0.06	0.14	0.00	0.10	0.09	-0.09	-0.09	-0.26	0.17	-0.09	-0.12	0.10	0.04	0.00
C5.EXP_LEARN_GOAL_RATE	-0.11	-0.04	-0.20	0.05		0.08	-0.10	0.27	0.00	-0.05	0.20	-0.05	0.02	-0.07	-0.11	0.06	0.51	-0.01	0.16	0.05
C6.EXP_PATRN_GEN_RATE	0.13	0.16	0.00	0.04	0.08		-0.17	0.20	0.14	-0.13	-0.22	0.04	-0.05	0.02	-0.10	-0.04	0.18	-0.12	0.21	0.14
C7.MUL_MATH_METHOD_RATE	0.20	0.01	0.66	0.06	-0.10	-0.17		0.19	0.49	0.14	0.10	-0.02	-0.13	0.06	0.25	-0.27	-0.38	0.29	-0.17	0.44
C8.OPP_PRACTICE_RATE	0.23	0.19	-0.11	0.14	0.27	0.20	0.19		0.10	-0.09	-0.13	-0.13	0.18	0.13	0.10	0.06	0.07	0.10	0.03	0.07
C9.REAL_WORLD_CON_RATE	0.35	-0.04	0.68	0.00	0.00	0.14	0.49	0.10		-0.13	0.17	0.01	-0.29	0.23	-0.12	-0.28	-0.15	-0.05	0.03	0.97
C10.TECH_UNDERSTAND_RATE	0.03	0.12	0.09	0.10	-0.05	-0.13	0.14	-0.09	-0.13		0.02	-0.10	-0.10	-0.32	0.34	-0.10	-0.03	0.50	-0.08	-0.10
C11. ACCURACY_MATERIAL_RATE	0.11	0.10	0.06	0.09	0.20	-0.22	0.10	-0.13	0.17	0.02		0.25	-0.16	-0.10	-0.02	-0.09	0.16	-0.04	0.07	0.18
S1. SQE_COMP_SQUARE_RATE	0.13	-0.05	0.08	-0.09	-0.05	0.04	-0.02	-0.13	0.01	-0.10	0.25		-0.06	-0.05	-0.01	0.00	-0.07	-0.07	-0.11	0.00
S2.SQE_FACTORISING_RATE	0.10	0.06	-0.21	-0.09	0.02	-0.05	-0.13	0.18	-0.29	-0.10	-0.16	-0.06		0.22	0.30	0.89	0.34	0.14	0.19	-0.25
S3.SQE_QUADRATIC_RATE	0.16	0.00	0.15	-0.26	-0.07	0.02	0.06	0.13	0.23	-0.32	-0.10	-0.05	0.22		0.04	0.15	0.04	0.08	0.25	0.24
S4.SQE_FIND_ROOT_RATE	0.23	0.19	0.27	0.17	-0.11	-0.10	0.25	0.10	-0.12	0.34	-0.02	-0.01	0.30	0.04		0.24	-0.11	0.74	-0.11	-0.10
S5.FACTOR_EXP_RATE	0.07	-0.01	-0.20	-0.09	0.06	-0.04	-0.27	0.06	-0.28	-0.10	-0.09	0.00	0.89	0.15	0.24		0.41	0.08	0.22	-0.23
S6.DIFF_CASE_RATE	-0.05	0.04	-0.32	-0.12	0.51	0.18	-0.38	0.07	-0.15	-0.03	0.16	-0.07	0.34	0.04	-0.11	0.41		-0.08	0.41	-0.10
S7. EXPLORING_FUNCT_RATE	0.13	0.22	0.35	0.10	-0.01	-0.12	0.29	0.10	-0.05	0.50	-0.04	-0.07	0.14	0.08	0.74	0.08	-0.08		-0.14	-0.02
S8.EXAMINING_REL_RATE	0.11	0.12	-0.14	0.04	0.16	0.21	-0.17	0.03	0.03	-0.08	0.07	-0.11	0.19	0.25	-0.11	0.22	0.41	-0.14		0.10
S9.APPLY_REAL_WORLD_RATE	0.36	-0.08	0.63	0.00	0.05	0.14	0.44	0.07	0.97	-0.10	0.18	0.00	-0.25	0.24	-0.10	-0.23	-0.10	-0.02	0.10	

Note: Diagonal entries are not shown.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.11. Pearson correlations among components and subtopics: Mexico

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.30	0.11	0.08	0.19	0.45	0.14	0.08	0.10	0.01	0.04	-0.02	0.16	0.06	-0.08	0.13	-0.09	-0.12	0.14	0.08
C2. ASKING_EXPLAN_RATE	0.30		0.36	0.33	0.14	0.40	0.31	0.05	0.33	0.37	0.07	-0.09	-0.09	-0.02	0.16	-0.12	0.09	0.27	0.16	0.27
C3. CONN_MATH_REP_RATE	0.11	0.36		0.09	0.21	0.36	0.30	0.11	0.66	0.27	-0.10	-0.29	-0.13	0.06	0.28	-0.12	0.01	0.35	0.27	0.60
C4. ENCRG_SELF_EVAL_RATE	0.08	0.33	0.09		0.26	0.00	0.05	0.09	0.24	0.08	0.00	-0.03	0.03	0.05	-0.03	0.05	0.04	0.02	0.01	0.17
C5.EXP_LEARN_GOAL_RATE	0.19	0.14	0.21	0.26		0.09	0.02	0.08	0.26	0.06	-0.07	-0.16	0.02	0.23	0.05	0.05	0.07	0.01	0.20	0.24
C6.EXP_PATRN_GEN_RATE	0.45	0.40	0.36	0.00	0.09		0.21	0.23	0.12	0.28	-0.03	-0.09	0.07	-0.08	0.09	0.00	-0.02	0.23	0.27	0.08
C7.MUL_MATH_METHOD_RATE	0.14	0.31	0.30	0.05	0.02	0.21		0.07	0.29	0.23	-0.10	-0.01	0.23	-0.07	0.36	0.19	0.12	0.21	0.00	0.26
C8.OPP_PRACTICE_RATE	0.08	0.05	0.11	0.09	0.08	0.23	0.07		0.16	-0.07	-0.07	0.26	0.26	0.23	0.00	0.27	0.26	-0.10	0.24	0.09
C9.REAL_WORLD_CON_RATE	0.10	0.33	0.66	0.24	0.26	0.12	0.29	0.16		0.17	-0.13	-0.17	-0.11	0.38	0.19	-0.11	0.07	0.22	0.45	0.96
C10.TECH_UNDERSTAND_RATE	0.01	0.37	0.27	0.08	0.06	0.28	0.23	-0.07	0.17		0.12	-0.02	-0.02	-0.07	0.36	-0.02	0.14	0.53	0.13	0.17
C11. ACCURACY_MATERIAL_RATE	0.04	0.07	-0.10	0.00	-0.07	-0.03	-0.10	-0.07	-0.13	0.12		0.03	-0.26	-0.08	-0.01	-0.22	-0.05	-0.22	-0.16	-0.12
S1. SQE_COMP_SQUARE_RATE	-0.02	-0.09	-0.29	-0.03	-0.16	-0.09	-0.01	0.26	-0.17	-0.02	0.03		0.42	-0.08	-0.06	0.44	0.23	-0.03	0.00	-0.18
S2.SQE_FACTORISING_RATE	0.16	-0.09	-0.13	0.03	0.02	0.07	0.23	0.26	-0.11	-0.02	-0.26	0.42		-0.08	0.10	0.93	0.17	0.04	0.00	-0.15
S3.SQE_QUADRATIC_RATE	0.06	-0.02	0.06	0.05	0.23	-0.08	-0.07	0.23	0.38	-0.07	-0.08	-0.08	-0.08		-0.10	-0.11	0.13	-0.29	0.57	0.37
S4.SQE_FIND_ROOT_RATE	-0.08	0.16	0.28	-0.03	0.05	0.09	0.36	0.00	0.19	0.36	-0.01	-0.06	0.10	-0.10		0.05	0.19	0.49	0.15	0.16
S5.FACTOR_EXP_RATE	0.13	-0.12	-0.12	0.05	0.05	0.00	0.19	0.27	-0.11	-0.02	-0.22	0.44	0.93	-0.11	0.05		0.16	-0.01	-0.04	-0.14
S6.DIFF_CASE_RATE	-0.09	0.09	0.01	0.04	0.07	-0.02	0.12	0.26	0.07	0.14	-0.05	0.23	0.17	0.13	0.19	0.16		-0.01	0.18	0.04
S7. EXPLORING_FUNCT_RATE	-0.12	0.27	0.35	0.02	0.01	0.23	0.21	-0.10	0.22	0.53	-0.22	-0.03	0.04	-0.29	0.49	-0.01	-0.01		0.06	0.22
S8.EXAMINING_REL_RATE	0.14	0.16	0.27	0.01	0.20	0.27	0.00	0.24	0.45	0.13	-0.16	0.00	0.00	0.57	0.15	-0.04	0.18	0.06		0.42
S9.APPLY_REAL_WORLD_RATE	0.08	0.27	0.60	0.17	0.24	0.08	0.26	0.09	0.96	0.17	-0.12	-0.18	-0.15	0.37	0.16	-0.14	0.04	0.22	0.42	

Note: Diagonal entries are not shown.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.12. Pearson correlations among components and subtopics: Shanghai (China)

Based on the average of raters' teaching materials set ratings

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	S1	S2	S3	S4	S5	S6	S7	S8	S9
C1. ADD_DIVERSE_NEED_RATE		0.27	0.03	0.17	0.15	0.15	-0.01	0.05	0.00	-0.01	-0.02	-0.08	-0.17	-0.15	0.06	-0.14	-0.14	0.11	0.10	0.00
C2. ASKING_EXPLAN_RATE	0.27		-0.29	0.22	0.43	0.37	0.22	0.15	-0.37	-0.06	-0.12	0.31	0.28	0.21	0.08	0.30	0.01	-0.14	0.21	-0.36
C3. CONN_MATH_REP_RATE	0.03	-0.29		-0.01	-0.46	-0.12	0.03	-0.22	0.87	-0.18	0.11	-0.35	-0.09	-0.15	-0.02	-0.08	-0.13	-0.13	-0.16	0.88
C4. ENCRG_SELF_EVAL_RATE	0.17	0.22	-0.01		0.08	0.34	-0.04	-0.03	-0.10	-0.12	0.07	-0.14	-0.14	-0.07	0.29	0.01	-0.07	-0.06	0.16	-0.06
C5.EXP_LEARN_GOAL_RATE	0.15	0.43	-0.46	0.08		0.42	0.15	0.08	-0.45	-0.02	-0.17	0.21	0.13	0.15	-0.10	0.19	0.21	0.08	0.22	-0.42
C6.EXP_PATRN_GEN_RATE	0.15	0.37	-0.12	0.34	0.42		0.10	-0.02	-0.22	-0.15	-0.12	0.20	0.12	0.14	0.12	0.16	0.01	-0.05	0.23	-0.18
C7.MUL_MATH_METHOD_RATE	-0.01	0.22	0.03	-0.04	0.15	0.10		0.11	0.02	0.05	0.09	0.26	0.46	0.01	0.07	0.43	-0.02	-0.14	-0.04	0.07
C8.OPP_PRACTICE_RATE	0.05	0.15	-0.22	-0.03	0.08	-0.02	0.11		-0.17	0.07	-0.05	0.15	0.01	0.02	0.07	0.04	0.02	-0.06	0.15	-0.15
C9.REAL_WORLD_CON_RATE	0.00	-0.37	0.87	-0.10	-0.45	-0.22	0.02	-0.17		-0.18	0.02	-0.33	-0.09	-0.17	-0.12	-0.09	-0.01	-0.11	-0.27	0.98
C10.TECH_UNDERSTAND_RATE	-0.01	-0.06	-0.18	-0.12	-0.02	-0.15	0.05	0.07	-0.18		-0.04	0.17	0.26	0.20	-0.05	0.19	0.20	0.15	-0.01	-0.16
C11. ACCURACY_MATERIAL_RATE	-0.02	-0.12	0.11	0.07	-0.17	-0.12	0.09	-0.05	0.02	-0.04		-0.10	-0.17	-0.09	0.12	-0.11	-0.26	-0.06	-0.03	0.00
S1. SQE_COMP_SQUARE_RATE	-0.08	0.31	-0.35	-0.14	0.21	0.20	0.26	0.15	-0.33	0.17	-0.10		0.36	0.41	0.02	0.38	-0.03	0.02	0.20	-0.35
S2.SQE_FACTORISING_RATE	-0.17	0.28	-0.09	-0.14	0.13	0.12	0.46	0.01	-0.09	0.26	-0.17	0.36		0.29	-0.12	0.87	0.19	0.06	0.07	-0.08
S3.SQE_QUADRATIC_RATE	-0.15	0.21	-0.15	-0.07	0.15	0.14	0.01	0.02	-0.17	0.20	-0.09	0.41	0.29		-0.06	0.35	0.20	0.13	0.53	-0.16
S4.SQE_FIND_ROOT_RATE	0.06	0.08	-0.02	0.29	-0.10	0.12	0.07	0.07	-0.12	-0.05	0.12	0.02	-0.12	-0.06		0.02	-0.14	-0.03	0.09	-0.09
S5.FACTOR_EXP_RATE	-0.14	0.30	-0.08	0.01	0.19	0.16	0.43	0.04	-0.09	0.19	-0.11	0.38	0.87	0.35	0.02		0.12	0.08	0.09	-0.08
S6.DIFF_CASE_RATE	-0.14	0.01	-0.13	-0.07	0.21	0.01	-0.02	0.02	-0.01	0.20	-0.26	-0.03	0.19	0.20	-0.14	0.12		0.07	0.11	-0.02
S7. EXPLORING_FUNCT_RATE	0.11	-0.14	-0.13	-0.06	0.08	-0.05	-0.14	-0.06	-0.11	0.15	-0.06	0.02	0.06	0.13	-0.03	0.08	0.07		0.20	-0.13
S8.EXAMINING_REL_RATE	0.10	0.21	-0.16	0.16	0.22	0.23	-0.04	0.15	-0.27	-0.01	-0.03	0.20	0.07	0.53	0.09	0.09	0.11	0.20		-0.26
S9.APPLY_REAL_WORLD_RATE	0.00	-0.36	0.88	-0.06	-0.42	-0.18	0.07	-0.15	0.98	-0.16	0.00	-0.35	-0.08	-0.16	-0.09	-0.08	-0.02	-0.13	-0.26	

Note: Diagonal entries are not shown.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.13. Explicit patterns and generalisations: The extent to which students are asked to use patterns, or repeated reasoning to understand quantitative relationships, make conjectures, make predictions, or derive general methods or rules

Based on raters' average teaching materials set ratings

	Explicit Patterns and Generalisations									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.07	0.17	1.00	1.00	1.00	1.00	1.12	1.17	2.12
Colombia	83	1.09	0.14	1.00	1.00	1.00	1.00	1.12	1.25	1.62
England (UK)	85	1.32	0.24	1.00	1.00	1.12	1.25	1.50	1.65	2.00
Germany*	50	1.44	0.35	1.00	1.00	1.12	1.38	1.68	1.88	2.62
K-S-T (Japan)	89	1.47	0.36	1.00	1.00	1.25	1.50	1.75	2.00	2.75
Madrid (Spain)	85	1.09	0.17	1.00	1.00	1.00	1.00	1.25	1.25	1.88
Mexico	103	1.33	0.40	1.00	1.00	1.00	1.25	1.62	1.75	3.00
Shanghai (China)	85	1.96	0.29	1.00	1.62	1.75	2.00	2.25	2.25	2.50

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.14. Explicit patterns and generalisations: Maximum extent to which students are asked to use patterns, or repeated reasoning to understand quantitative relationships, make conjectures, make predictions, or derive general methods or rules

Based on the maximum of raters' average teaching materials set ratings

	Explicit Patterns and Generalisations									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.16	0.38	1.00	1.00	1.00	1.00	1.50	1.50	3.00
Colombia	83	1.32	0.46	1.00	1.00	1.00	1.00	1.50	2.00	3.00
England (UK)	85	1.84	0.59	1.00	1.00	1.50	2.00	2.10	2.80	3.00
Germany*	50	1.97	0.63	1.00	1.00	1.50	2.00	2.50	3.00	3.00
K-S-T (Japan)	89	1.66	0.46	1.00	1.00	1.50	1.50	2.00	2.00	3.00
Madrid (Spain)	85	1.33	0.60	1.00	1.00	1.00	1.00	2.00	2.00	3.00
Mexico	103	1.77	0.75	1.00	1.00	1.00	1.50	2.50	3.00	3.00
Shanghai (China)	85	2.41	0.40	1.00	2.00	2.00	2.50	2.50	3.00	3.00

Notes: The average maximum teaching materials set score obtained by each teacher is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.15. Asking for explanations: The extent to which students are asked to explain or justify their thinking about mathematical procedures and concepts

Based on raters' average teaching materials set ratings

	Real World Connections									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.16	0.27	1.00	1.00	1.00	1.00	1.33	1.50	2.50
Colombia	83	1.13	0.19	1.00	1.00	1.00	1.00	1.25	1.38	1.75
England (UK)	85	1.42	0.32	1.00	1.00	1.12	1.38	1.62	1.88	2.62
Germany*	50	1.57	0.38	1.00	1.12	1.25	1.56	1.90	2.00	2.75
K-S-T (Japan)	89	1.62	0.34	1.00	1.25	1.25	1.50	2.00	2.00	2.50
Madrid (Spain)	85	1.06	0.10	1.00	1.00	1.00	1.00	1.12	1.12	1.50
Mexico	103	1.41	0.45	1.00	1.00	1.00	1.25	1.86	2.00	2.75
Shanghai (China)	85	2.02	0.32	1.12	1.62	1.75	2.00	2.25	2.38	2.62

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.16. Asking for explanations: Maximum extent to which students are asked to explain or justify their thinking about mathematical procedures and concepts

Based on the maximum of raters' average teaching materials set ratings

	Asking for Explanations									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.31	0.43	1.00	1.00	1.00	1.00	2.00	2.00	2.50
Colombia	83	1.39	0.49	1.00	1.00	1.00	1.00	2.00	2.00	2.50
England (UK)	85	1.86	0.54	1.00	1.00	1.50	2.00	2.10	2.50	3.00
Germany*	50	2.13	0.60	1.00	1.50	1.50	2.00	2.60	3.00	3.00
K-S-T (Japan)	89	1.81	0.43	1.00	1.50	1.50	1.50	2.00	2.50	3.00
Madrid (Spain)	85	1.21	0.31	1.00	1.00	1.00	1.00	1.50	1.50	2.00
Mexico	103	1.85	0.77	1.00	1.00	1.00	2.00	2.50	3.00	3.00
Shanghai (China)	85	2.55	0.42	1.50	2.00	2.00	2.50	3.00	3.00	3.00

Notes: The average maximum teaching materials set score obtained by each teacher is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.17. Opportunities to practice a skill or procedure: The extent to which the lesson provides students with opportunities to develop fluency with specific mathematical skills or procedures through practice or repetition

Based on raters' average teaching materials set ratings

	Opportunities To Practice A Skill Or Procedure									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	2.48	0.48	1.25	1.69	2.00	2.50	3.00	3.00	3.00
Colombia	83	2.06	0.47	1.00	1.38	1.75	2.12	2.38	2.72	3.00
England (UK)	85	2.84	0.22	2.00	2.62	2.75	2.88	3.00	3.00	3.00
Germany*	50	2.44	0.42	1.62	1.87	2.00	2.50	2.88	3.00	3.00
K-S-T (Japan)	89	2.03	0.53	1.00	1.25	1.50	2.00	2.50	2.75	3.00
Madrid (Spain)	85	2.62	0.29	1.62	2.25	2.38	2.62	2.88	3.00	3.00
Mexico	103	2.24	0.42	1.00	1.75	2.00	2.25	2.62	2.75	3.00
Shanghai (China)	85	2.88	0.13	2.38	2.75	2.75	2.88	3.00	3.00	3.00

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.18. Using multiple mathematical methods: The extent to which students are asked to use more than one method or approach to complete a single mathematical task or activity and to understand the relationships between different methods

Based on raters' average teaching materials set ratings

	Using Multiple Mathematical Methods									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.58	0.36	1.00	1.00	1.25	1.62	2.00	2.00	2.50
Colombia	83	1.54	0.34	1.00	1.00	1.25	1.50	1.88	2.00	2.38
England (UK)	85	1.40	0.33	1.00	1.00	1.12	1.38	1.65	1.88	2.38
Germany*	50	1.89	0.35	1.00	1.50	1.62	1.88	2.15	2.26	2.62
K-S-T (Japan)	89	1.77	0.44	1.00	1.25	1.50	1.75	2.25	2.30	3.00
Madrid (Spain)	85	1.61	0.25	1.12	1.30	1.38	1.62	1.75	2.00	2.38
Mexico	103	1.51	0.35	1.00	1.12	1.25	1.50	1.75	2.00	2.67
Shanghai (China)	85	1.86	0.32	1.17	1.50	1.62	1.88	2.12	2.25	2.88

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.19. Using multiple mathematical methods: Maximum extent to which students are asked to use more than one method or approach to complete a single mathematical task or activity and to understand the relationships between different methods

Based on raters' average teaching materials set ratings

	Using Multiple Mathematical Methods									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.87	0.39	1.00	1.00	1.50	2.00	2.00	2.00	3.00
Colombia	83	2.07	0.58	1.00	1.00	1.50	2.00	2.50	3.00	3.00
England (UK)	85	1.84	0.59	1.00	1.00	1.50	2.00	2.00	2.80	3.00
Germany*	50	2.30	0.43	1.00	2.00	2.00	2.25	2.50	3.00	3.00
K-S-T (Japan)	89	2.12	0.49	1.00	1.50	1.50	2.00	2.50	3.00	3.00
Madrid (Spain)	85	2.16	0.40	1.50	1.70	2.00	2.00	2.50	2.80	3.00
Mexico	103	1.97	0.55	1.00	1.50	1.50	2.00	2.50	2.90	3.00
Shanghai (China)	85	2.60	0.49	1.50	2.00	2.00	3.00	3.00	3.00	3.00

Notes: The average maximum teaching materials set score obtained by each teacher is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 5.B.20. Encourage student self-evaluation: The extent to which students are asked to assess their own understanding of the content that was studied or to reflect on their own learning of the content

Based on raters' average teaching materials set ratings

	Encourage Student Self-Evaluation									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.10	0.33	1.00	1.00	1.00	1.00	1.00	1.18	2.50
Colombia	83	1.01	0.05	1.00	1.00	1.00	1.00	1.00	1.00	1.25
England (UK)	85	1.15	0.29	1.00	1.00	1.00	1.00	1.25	1.50	2.50
Germany*	50	1.11	0.27	1.00	1.00	1.00	1.00	1.12	1.34	2.62
K-S-T (Japan)	89	1.31	0.55	1.00	1.00	1.00	1.00	1.75	2.00	3.00
Madrid (Spain)	85	1.02	0.08	1.00	1.00	1.00	1.00	1.00	1.00	1.50
Mexico	103	1.09	0.27	1.00	1.00	1.00	1.00	1.00	1.32	2.83
Shanghai (China)	85	1.38	0.40	1.00	1.00	1.00	1.25	1.62	1.75	3.00

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187873

Annex Table 5.B.21. Technology for understanding: The extent to which students are given opportunities to use dynamic computerised learning tools as part of their mathematics lessons to make and test conjectures, look for patterns, and develop understanding of mathematical concepts and relationships

Based on raters' average teaching materials set ratings

	Technology for Understanding									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.09	0.20	1.00	1.00	1.00	1.00	1.25	1.33	2.00
Colombia	83	1.08	0.19	1.00	1.00	1.00	1.00	1.12	1.25	2.12
England (UK)	85	1.16	0.23	1.00	1.00	1.00	1.00	1.33	1.45	2.25
Germany*	50	1.29	0.34	1.00	1.00	1.00	1.25	1.53	1.63	2.25
K-S-T (Japan)	89	1.04	0.19	1.00	1.00	1.00	1.00	1.00	1.00	2.50
Madrid (Spain)	85	1.16	0.21	1.00	1.00	1.00	1.00	1.38	1.50	1.75
Mexico	103	1.15	0.29	1.00	1.00	1.00	1.00	1.25	1.38	2.75
Shanghai (China)	85	1.02	0.06	1.00	1.00	1.00	1.00	1.00	1.12	1.38

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187892

Annex Table 5.B.22. Real world connections: The extent to which the mathematics being learnt is connected to or applied to real-world contexts outside of mathematics, and the features of the context are incorporated into the activity

Based on raters' average teaching materials set ratings

	Real World Connections									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.51	0.58	1.00	1.00	1.00	1.29	2.12	2.38	3.00
Colombia	83	1.45	0.48	1.00	1.00	1.00	1.38	1.88	2.25	2.50
England (UK)	85	1.31	0.35	1.00	1.00	1.00	1.25	1.62	1.75	2.38
Germany*	50	1.73	0.57	1.00	1.00	1.10	1.75	2.25	2.50	3.00
K-S-T (Japan)	89	1.91	0.65	1.00	1.00	1.00	2.00	2.50	3.00	3.00
Madrid (Spain)	85	1.45	0.40	1.00	1.00	1.00	1.50	1.78	2.00	2.50
Mexico	103	1.92	0.62	1.00	1.00	1.25	2.00	2.50	2.88	3.00
Shanghai (China)	85	1.36	0.47	1.00	1.00	1.00	1.12	1.65	2.08	2.88

Notes: The average rating of component teaching materials sets across all instructional days is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934187911

Annex Table 5.B.23. Real world connections: Maximum extent to which the mathematics being learnt is connected to or applied to real-world contexts outside of mathematics, and the features of the context are incorporated into the activity

Based on raters' average teaching materials set ratings

	Real World Connections									
	Number of classrooms	Mean	Standard deviation	Minimum	10th percentile	20th percentile	50th percentile	80th percentile	90th percentile	Maximum
B-M-V (Chile)	94	1.94	0.91	1.00	1.00	1.00	1.50	3.00	3.00	3.00
Colombia	83	2.03	0.86	1.00	1.00	1.00	2.00	3.00	3.00	3.00
England (UK)	85	1.81	0.77	1.00	1.00	1.00	1.50	2.50	3.00	3.00
Germany*	50	2.41	0.81	1.00	1.00	1.40	3.00	3.00	3.00	3.00
K-S-T (Japan)	89	2.41	0.83	1.00	1.00	1.00	3.00	3.00	3.00	3.00
Madrid (Spain)	85	2.24	0.90	1.00	1.00	1.00	3.00	3.00	3.00	3.00
Mexico	103	2.55	0.77	1.00	1.00	2.00	3.00	3.00	3.00	3.00
Shanghai (China)	85	1.90	0.93	1.00	1.00	1.00	1.50	3.00	3.00	3.00

Notes: The average maximum teaching materials set score obtained by each teacher is shown.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Notes

[1] As explained in Chapter 1 and detailed more extensively in Chapter 6, countries/economies do not teach even the relatively straightforward topic of quadratic equations with the same mathematical content or ordering of that content. Thus, we must keep in mind that that teachers implement a curriculum that their country/economy specifies. And the amount of teacher discretion allowed in that implementation also varies by country/economy.

[2] Germany* refers to a convenience sample of volunteer schools.

[3] Sub-domain scores are arithmetic averages across segments, observers, components and lessons. Substantive interpretations of the scores should only be carried out at the component level.

[4] It is important to note that country/economy curricula vary (see Chapter 6 for additional detail). One of the most critical variations for interpreting the representations used by teachers and students concerns the degree to which quadratic equations and quadratic functions are separated in the curriculum. In K-S-T (Japan), for example, these are separated. This partially explains why we see almost no graphs used in Japanese classrooms.

[5] The index of Explaining procedures combines the statement on teacher's explanation (Table 5.3) with statements on teacher's use of "concrete examples or graphics" and teacher's "asking questions" to help students understand why procedures work. The index of Student participation in discourse combines the statements on explaining ideas and discussion (Table 5.3) with the statement "Our mathematics teacher encouraged us to question and critique arguments made by other students". For each index, there is a student version, combining student responses across statements, and a teacher version, combining teacher responses across statements. The reliability (Conbach's alpha) for both indices, both samples (teachers and students) and all countries/economies (altogether 32 parameters) was mostly in the range of 0.70-0.87, with five exceptions, where reliability was still acceptable (0.61-0.67). Analysis of measurement invariance revealed that both scales met the conditions for metric invariance, which means that correlations and differences can be compared across countries. (In the case of Student Participation in Discourse, metric invariance holds only if Mexico is excluded, so comparisons with Mexico need to be interpreted with caution).

6 Opportunities to learn

Eckhard Klieme and Jonathan Schweig

This chapter documents what the Study defined to be a "quadratic equations unit" and the degree to which that unit was implemented in similar ways across countries/economies. Variations in intended length and content are highlighted and, using teaching materials and teacher and student reports, variations in approaches to teaching the focal unit are described. Together, they shed light on what and how different types of opportunities to learn manifested in classrooms.

What students learn in the classroom is shaped by the curriculum. The curriculum defines the objectives, contents and expected outcomes of schooling, and embodies a country's vision and aspirations for its citizens. The curriculum is a window into the knowledge and skills students may need to lead a good life, successfully find their pathway in education and professionally, and become responsible citizens. The curriculum is also one of the most powerful tools in educational policy. For schools and teachers, the curriculum provides a road map and a benchmark guiding professional activities. For students and parents, the curriculum is a promise of what teaching offers them.

There is no single approach to the design and delivery of curriculum. Countries will choose different priorities and they will organise curriculum development differently. For example, the balance between national consistency and local diversity in curriculum varies considerably across countries (OECD, 2018[1]). This diversity makes international comparisons as challenging as they are valuable.

Furthermore, the intended curriculum often differs from that which is implemented. What is defined in mandated syllabi and standards, the *intended* curriculum, interacts with decision making at the school and teacher level to create an *implemented* curriculum in the classroom (Travers and Westbury, 1989[2]). This translates into different "opportunities to learn" (OTL) for students, which are a powerful determinant of their achievement growth (Burstein, 1993[3]; Kuger et al., 2017[4]) and later performance in international assessments (Scheerens, 2017[5]; Schmidt and Maier, 2009[6]).The concept of OTL refers to the subject matter as it is taught and experienced by students.

This chapter looks at opportunities to learn the mathematics unit of quadratic equations. By looking at a micro level, we can better understand how the intended curriculum interacts with teaching and becomes actual learning experiences for students. Exploring these variations at an international, comparative level can be valuable. Not only does it offer countries/economies rich insights into their own systems, but it can help them garner new perspectives that may also stimulate revision and reform.

Key findings

- With the exception of Germany*[1], Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), and Shanghai (China), teachers typically spent less time teaching the focal unit than expected based on the official curriculum.
- There are large differences between countries in the total teaching time for the unit, reported by teachers, with around 6 to 7.5 hours reported in Colombia, England (UK), Mexico and Shanghai (China), and 10 to 14 hours in Biobío, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]"), Germany* and K-S-T (Japan).
- Except for in Shanghai (China), significant variation existed within countries/economies between the median and maximum number of lessons teachers spent on the focal unit, the difference being as high as 16 additional lessons in B-M-V (Chile).
- Teachers encouraged more conceptual reasoning in B-M-V (Chile), Madrid (Spain) and Shanghai (China), and more engagement with graphical representations in England (UK) and Germany*. In K-S-T (Japan) and Shanghai (China) graphical materials were almost non-existent.

- Teachers sequenced content in different ways. For example, teachers introduced quadratic functions early on and faded them off in Germany* and Colombia, whilst in B-M-V (Chile) they were more prominent later in the topic.
- The more cognitively demanding aspects of solving quadratic equations were not common across classrooms. “Completing the square” was relatively popular in Germany*, K-S-T (Japan) and Shanghai (China) but otherwise rarely seen, and “finding roots in quadratic functions” was significantly used only in Colombia, England (UK) and Germany*. In Madrid (Spain) and Mexico, both approaches remained very rare.
- Opportunities to engage in reasoning – e.g. to determine the number and kind of solutions of a given equation – were related to students’ perceptions of high-quality mathematics teaching.

Looking deeper into the foundations of mathematics literacy

Traditionally, mathematics education in lower secondary schools focused on algebraic knowledge and skills; but more recently, the focus of mathematics education has shifted towards more fundamental concepts of mathematical reasoning and literacy. PISA 2018 defines mathematical literacy as “an individual’s capacity to formulate, employ and interpret mathematics in a variety of contexts” (OECD, 2019[7]). Manipulating algebraic expressions and equations is considered a tool for employing mathematics in diverse contexts, rather than just a procedural skill.

The Study examines in great detail students’ opportunities to learn quadratic equations, its focal unit. Quadratic equations is one of the most demanding topics in school algebra (Graf et al., 2018[8]; Kabar, 2018[9]; Kaur, 2014[10]). It consists of procedures (e.g. methods for solving equations) with conceptual understanding (e.g. the concepts of variables and equations) and applications both within mathematics and real-world contexts (see Box 6.1), which can be considered foundations of mathematical literacy (Kieran, 2007[11]; OECD, 2019[7]).

Examining opportunities to learn through the lens of quadratic equations offers a window into what international variation exists in terms of the approaches to teaching algebra and to nurturing mathematically literate students. The opportunities to learn algebra – specifically linear and quadratic equations – were a powerful predictor of students’ performance in PISA 2012 (Kuger et al., 2017[4]) and vary considerably across countries (Kuger, 2016[12]; OECD, 2011[13]).

While previous international studies described variations in curriculum at large, the Study examines the opportunities to learn for the selected focal unit through a variety of data. These include teaching materials from the classroom; a Teacher Log where teachers documented the date, duration and coverage of certain subtopics for each individual lesson within the focal unit; and teacher and student questionnaires. Empirical findings based on these data were mapped against the intended curriculum as detailed in official curricula documents, syllabi, standards and textbooks.

The intended curriculum varies across countries

At the start of the Study, mathematics experts from all participating countries/economies submitted official curriculum materials to describe the intended curriculum for quadratic equations (see *Global Teaching InSights Technical Report* [hereafter the "Technical Report"], Chapter 2). The experts agreed on a joint definition of the focal unit, including a common starting point and a list of subtopics. This definition is presented in Box 6.1. As most countries/economies, with the exception of Germany* and Shanghai (China), split quadratic equations up into small sections of the curriculum, experts had to choose that section which most closely fits to the definition of the focal unit in their national context.

The position of the focal unit across grade levels and within the school year is not uniform. In England (UK) and Germany*, the focal unit may officially be taught any time across two or three consecutive school years. In Germany*, the intended curriculum varies across school tracks and states, while in England (UK), and sometimes in Germany*, schools have some flexibility in arranging curriculum across grade levels. On the contrary, in K-S-T (Japan) and Shanghai (China), there is very little variation in when the topic of quadratic equations is taught.

Box 6.1. Focal unit: Quadratic equations

Prerequisite (taught before the start of the unit, maybe years before)**:** Binomial formula $(a \pm b)^2 = a^2 \pm 2ab + b^2$ and other ways of handling algebraic expressions.

Start: Some examples of a quadratic equation are introduced with the goal to "solve for x"**.**

Includes: Solving quadratic equations of a general form such as $ax^2 + bx + c = 0$, either through factorising (e.g. Vieta's rule)**,** through completing the square or through the quadratic formula $x = \left(-b \pm \sqrt{b^2 - 4ac}\right)/2a$**;** and sometimes (B-M-V [Chile], Colombia and Germany*) also through the reduced quadratic formula $x = -p/2 \pm \sqrt{p^2/4 - q}$.

End: Application of quadratic equations to everyday problems**.**

Variations:

- Different kinds of quadratic equations may be transformed into a standard form.
- Different cases depending on values of a, b, c (or with one, two or no real solutions) may be discussed.
- Graphs (of quadratic functions) may be shown and used for approximate solutions ("finding roots").

Note: This definition of the Focal Unit also specifies the subtopics assessed within the Study.
Blue: subtopics covered in the Teacher Log; underlined: subtopics covered by the teaching material codes.

Table 6.1 characterises each country's/economy's intended curriculum for the focal unit in relation to the grade level, student age, number of lessons and use of graphics. It is worth highlighting that:

- The "intended student age" where students would encounter the content of the focal unit is similar in most countries/economies. Quadratic equations are taught around age 14, with the exception of B-M-V (Chile), where students learn this topic at age 16.
- There were different intended lengths for the unit across countries. As an illustration, these might range roughly from about 6 lessons in Madrid (Spain) to 16 in Colombia.
- The inclusion of certain content varied. The curriculum in B-M-V (Chile), Colombia, England (UK) and Germany* integrated quadratic equations with graphical representations (i.e. quadratic functions). In the remaining countries/economies, teachers were expected to teach the focal unit independent of graphical material because quadratic functions would be covered separately in the same grade or even at a different grade level.
- Where the focal unit does include graphical material, higher number of lessons tend to be allocated to quadratic equations. For instance, B-M-V (Chile) and Colombia, who included graphical material in their unit design, envisioned at least 15 lessons while Madrid (Spain), Mexico and Shanghai (China) envisioned 10 lessons at most.

Table 6.1. Characteristics of the intended and the implemented quadratic equations curriculum

	Grade level		Student age		Number of lessons		Unit includes graphical material (quadratic functions)	
	Intended	Implemented	Intended	Implemented	Intended	Implemented	Intended	Implemented
B-M-V (Chile)	11	11	16	16.5	15	9 (max. 25)	Yes	Yes
Colombia	9	9	14	15.1	16	6 (max. 18)	Yes	Yes
England (UK)	8 - 10	8	14-15	14.8	6-12	7 (max. 15)	Yes	Yes
Germany*	8 - 10	9	14 - 15	14.9	11	13 (max. 19)	Yes	Yes
K-S-T (Japan)	9	9	14	14.8	13	12 (max. 18)	No	No
Madrid (Spain)	9	8	14	13.7	6	(Range 1 - 14)	No	Yes
Mexico	9	9	14	14.7	8 - 10	7 (max. 14)	No	Yes
Shanghai (China)	8	8	14	13.6	10	10 (max. 12)	No	No

Notes: **Intended values** were submitted by national mathematics education experts based on their official curricula and standards (if existing), approved teaching materials or range of exemplary school curricula as of June 2016 (see Technical Report, Chapter 2).
Implemented values are calculated from the Study data.
For implemented values, grade level indicates median classroom grade level, student age indicates median classroom mean student age, number of lessons indicates median number of lessons or full hours reported in the Teacher Log with maximum in brackets; "Yes" indicates that OTL for functions accounts for 10% to 30% of teacher-reported content coverage, while "No" indicates less than 2% accounted for by functions.
In Colombia, England (UK) and Germany*, the number of full hours is given instead of the number of lessons, because the length of lessons may vary between classrooms.
According to curricula on the national level in England (UK), the intended number of hours would be 6 – 12, plus some lessons on quadratic functions if integrated with algebra.
In Colombia, the focal unit includes graphical material (quadratic functions) for a sub-population of students which comprises the majority of students in grade 11 in this country.
In Madrid (Spain), the Teacher Log only contained information about more than one lesson for 35 out of the 85 participating classrooms. Therefore, Teacher Log data from Madrid (Spain) will not be interpreted in the present chapter.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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The actual time spent was lower than that expected in the intended curriculum

Across countries/economies, the number of lessons or overall teaching time reported by teachers falls short of that established by their respective intended curriculum (Table 6.1). Only in Germany*, K-S-T (Japan) and Shanghai (China) did the teaching time of the implemented curriculum broadly align with that which was intended.

The total number of hours spent on the focal unit in some countries/economies is about half of that in other countries/economies (see Annex 6.A, Table 6.A.1). In Colombia, England (UK), Mexico and Shanghai (China) the total teaching time reported is around 6 to 7.5 hours. In contrast, teachers in B-M-V (Chile), Germany* and K-S-T (Japan) report spending about 10 to 14 hours on the focal unit.

There are also notable differences in the implemented curriculum within countries/economies. The difference between the typical number (median) of implemented lessons and the maximum number is very large in all countries/economies, with the exception of Shanghai (China). In B-M-V (Chile), for example, the teacher who invested the most teaching time reported 16 additional lessons compared to the 9 lessons of a typical teacher.

The differences in length and time spent on the focal unit might be explained by multiple factors. These include the level of fragmentation of the curriculum within a school year, the level of teacher autonomy in implementing the curriculum, local conditions such as school retreats or unforeseen circumstances. These variations suggest that students' opportunities to learn can be very different within countries.

Previous studies have shown that variations in opportunities to learn can have considerable implications in terms of equity, particularly as they are important drivers of student outcomes (Kuger, 2016[12]; OECD, 2011[13]; Patall, Cooper and Allen, 2010[14]). Schmidt et al. (2015) have argued, drawing upon PISA evidence of inequality in OTL and its relationship to student performance, that unequal opportunity to learn mathematics is "one of the key factors driving inequality in schools" (Schmidt et al., 2015[15]).

Students learn different algebraic procedures

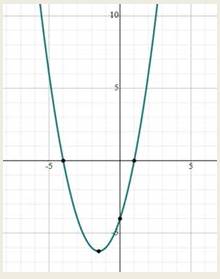
Teachers can prepare students to solve quadratic equations using at least four different approaches: factorising, using the quadratic formula, completing the square and using graphical material. Each of these methods requires different mathematical operations, as detailed in Box 6.2.

Box 6.2. Approaches for solving quadratic equations

As an illustration, the quadratic equation $x^2 + 3x - 4 = 0$ can be solved through the following four approaches:

- Factorising: $x^2 + 3x - 4 = (x + 4)(x - 1)$. The product equals zero if and only if one factor equals zero, which is the case if either $x = -4$ *or* $x = 1$.
- Using the quadratic formula: The solutions of $ax^2 + bx + c = 0$ are $x_{1,2} = (-b \pm \sqrt{b^2 - 4ac}) / 2a$. Substituting $a = 1, b = 3, c = -4$, after some transformations, we get $x_1 = 1$ and $x_2 = -4$.
- Completing the square: $x^2 + 3x - 4 = 0$ is equivalent to $x^2 + 3x = 4$. Adding $(3/2)^2$ to both sides of the equation, we get a squared term on the left, and the equation is equivalent to $(x + 3/2)^2 = 4 + 9/4$. Therefore, $x_1 + 3/2 = \sqrt{4 + 9/4}$ and $x_2 + 3/2 = -\sqrt{4 + 9/4}$. Since $\sqrt{4 + 9/4} = \sqrt{25/4} = 5/2$, applying some algebraic transformations, we get $x_1 = 1$ and $x_2 = -4$.
- The fourth approach applies graphical material:

  The given equation corresponds to the quadratic function $y = f(x) = x^2 + 3x - 4$.



  Inspecting the graph of this function, the roots, i.e. the values of x for which $f(x) = 0$, can be identified as -4 and $+1$. These roots are the solutions of the corresponding quadratic equation.

Teachers' choices of what algebraic procedures to teach and how to sequence the progression of learning has implications for students' opportunities to learn. Graf et al. (2018) identify four levels of skill in solving quadratic equations: i) finding solutions by trial and error ("inspection") with no understanding of any specific method; ii) familiarisation with one rationale to solve quadratic equations, most often the factorising method; iii) procedural competence in factoring rational coefficients, in using the quadratic formula and in finding roots graphically; and iv) full understanding of the correspondence between quadratic equations and functions, and the most demanding approach, completing the square.

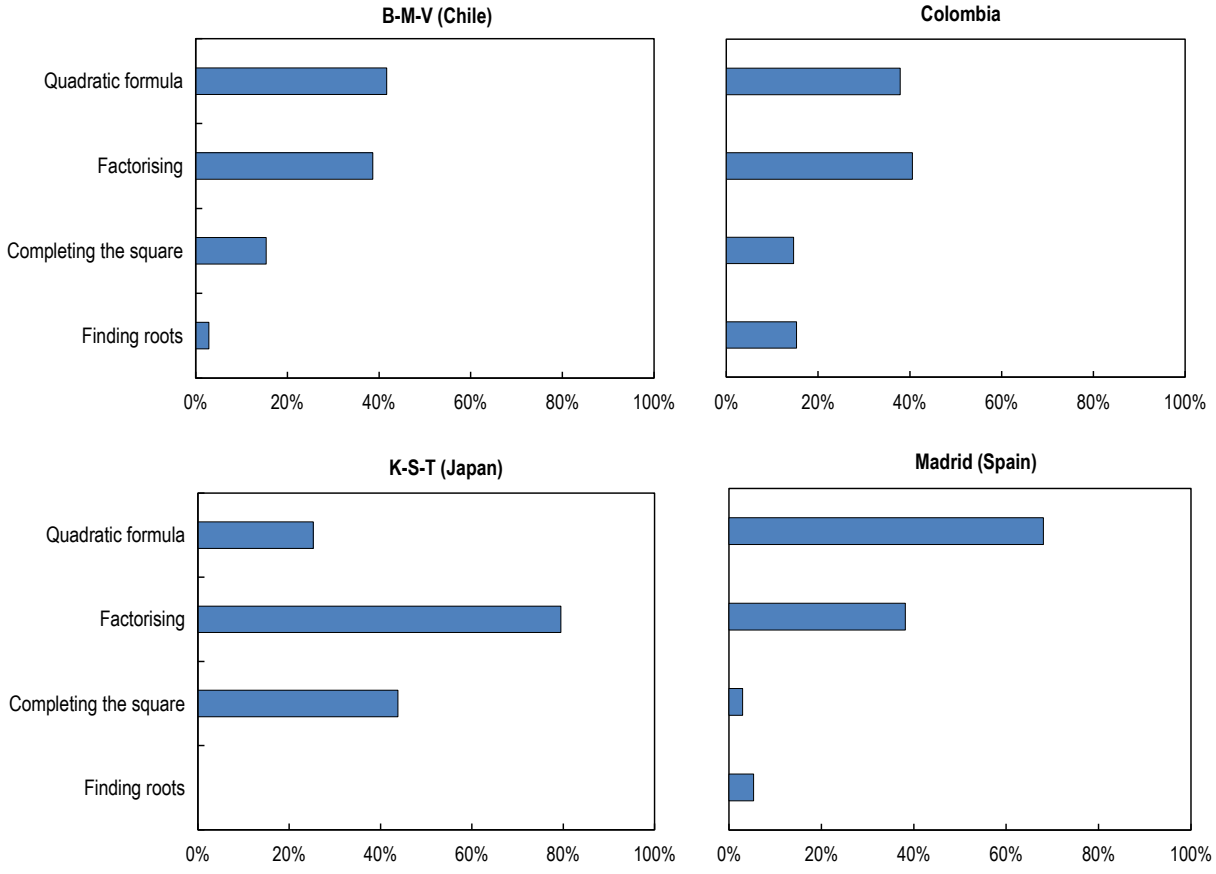
Across countries/economies, the teaching materials submitted by teachers covered minimally demanding approaches, as identified by Graf et al. (2018), more often than highly demanding approaches. However, there are important differences between countries/economies (Figure 6.1). "Factorising" appeared to be the most popular approach in England (UK) and K-S-T (Japan), while "using the quadratic formula" was clearly preferred in Madrid (Spain), Mexico and Germany*.

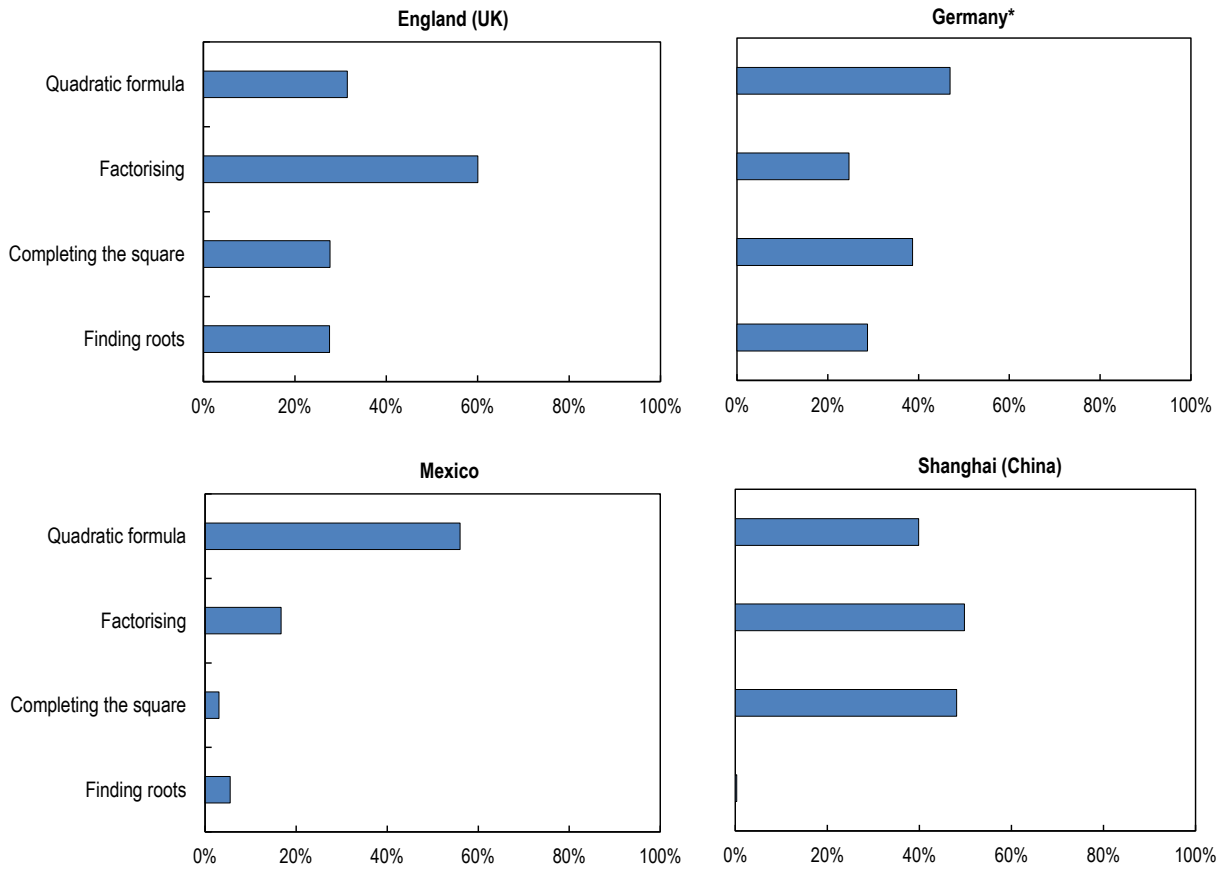
The more demanding procedures of "completing the square" and "finding roots in quadratic functions" are less common across countries/economies. In Madrid (Spain) and Mexico, teaching materials almost never

addressed these approaches. “Completing the square” was relatively popular in Germany*, K-S-T (Japan) and Shanghai (China). “Finding roots in quadratic functions” was significantly used in Colombia, England (UK) and Germany*. These findings from teaching materials are also aligned with teachers’ reports on the methods taught to students, i.e. both are correlated at the classroom level (see Annex 6.A, Table 6.A.2).

Figure 6.1. Methods for solving quadratic equations as present in teaching materials

Proportion of teaching material sets that included the respective method





Notes: Proportion of lessons in which the teaching materials included any reference to the method, averaged across classrooms and raters.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Most notably, students did not learn quadratic equations through graphical material in K-S-T (Japan) and Shanghai (China), and rather seldom in B-M-V (Chile), Madrid (Spain) and Mexico. These differences are related to differences in the intended curriculum (Table 6.1) and suggest specificities in the traditions and cultures of mathematical education in each country/economy. This challenges the long-held assumption in some "Western" mathematics traditions that equations and functions need to be taught and learnt together (Leung et al., 2014[16]).

Teachers used different ways of fostering deeper understanding: conceptual reasoning, graphical representations and real-world applications

Teachers can provide students with richer opportunities to learn, not just by teaching them procedures for solving quadratic equations, but also by helping them to develop a deeper mathematical understanding. For example, students can gain conceptual understanding by comparing different types of quadratic equations and reasoning whether there are one, two or no real solutions. Students can also deepen their understanding through graphical representations, analysing the correspondence between quadratic equations and quadratic functions. They can also learn quadratic equations through real world applications, for example by calculating the area of geometrical spaces representing paths, enclosures etc., or the distance a car has travelled after a certain period of acceleration.

Across countries/economies, there was a strong emphasis on algebraic procedures in teaching quadratic equations according to the teaching materials submitted by teachers (Figure 6.2). This finding is not surprising, since quadratic equations require procedures such as transforming algebraic terms (e.g. transforming $5x + 4x$ into $9x$) and solving for x.

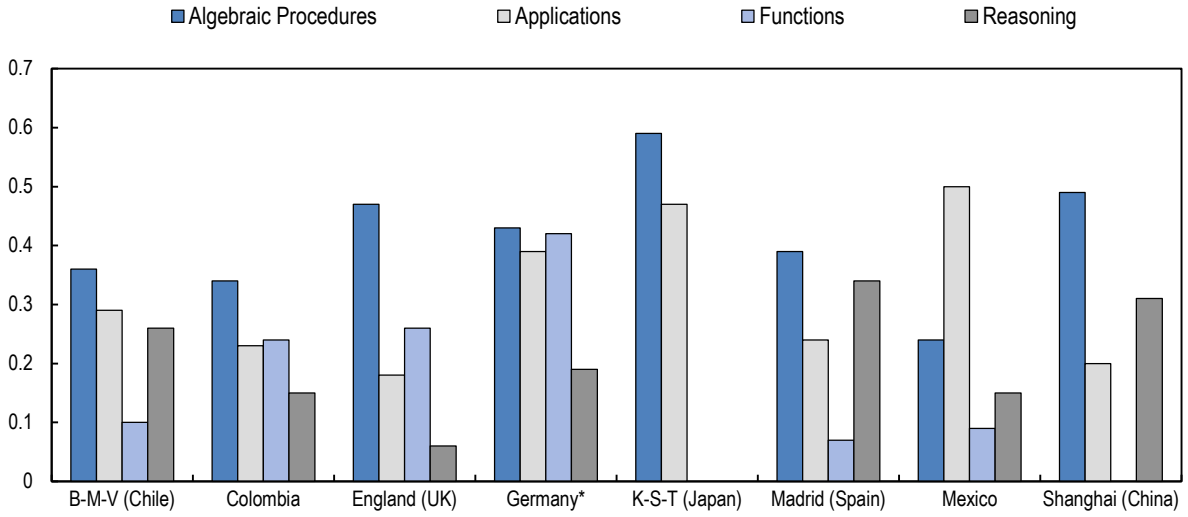
In addition, real-world applications account for a considerable share of learning opportunities in K-S-T (Japan), Germany* and Mexico. Real-world examples in Japanese classrooms are often set in geometrical contexts (with or without diagrams), in line with the traditionally strong focus on geometry (Klieme and Bos, 2000[17]). In Mexico, as documented by the Study's curriculum mapping (see Technical Report), examples typically referred to problems in mechanics.

Across countries/economies there are important differences regarding whether teachers tended to deepen student understanding through conceptual reasoning (comparing types of equations and reasoning about the number of solutions) or through graphical representations (connecting equations with graphs of quadratic functions). For example, teaching materials in B-M-V (Chile), Madrid (Spain) and Shanghai (China) more often provided opportunities to reason about types of equations and solutions, while quadratic functions were used relatively often in England (UK) and Germany*.

By and large, these findings based on the teaching materials submitted by teachers are similar to the information reported by teachers and students (see Annex 6.A, Table 6.A.3). One notable difference is that students reported some experience with quadratic functions and reasoning tasks in K-S-T (Japan). When comparing classrooms, findings from different measures are quite well aligned (see Annex 6.A, Table 6.A.4).

Figure 6.2. Teaching materials including opportunities to learn algebraic procedures, real-world applications, quadratic functions and reasoning

Proportion of lessons in which the teaching materials included any subtopic related to the respective types of OTL, averaged across classrooms, raters and subtopics



Notes: The subtopics are identified in Box 6.1. "Algebraic Procedures" includes the subtopics algebraic expressions, factorising, completing the square and quadratic formula. "Functions" includes the subtopics "graph of quadratic functions" and "finding roots". "Reasoning about types of equations and solutions" includes the subtopics "different cases" and "one, two or no solutions".
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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How teaching of quadratic equations unfolds across the unit varied

One of the biggest challenges in teaching is how to sequence and structure the learning goals of the curriculum unit. The learning progression map developed by (Graf et al., 2018[8]) suggests starting with inspecting some easy kind of quadratic equations, introducing factorisation and/or the quadratic formula later, and using quadratic functions towards the end of the focal unit. Applications should show up increasingly across the unit, as more and more complex modelling problems can be solved. The OTL data from the Teacher Log can be used to test this model. We would expect to find changing patterns of focal subtopics in various stages of the teaching and learning process.

Figure 6.3 provides a sketch of such a process analysis. The Teacher Log from each classroom was divided into three phases: phase 1 included the first 33% of the lessons documented, phase 2 covered the next 33% of lessons and phase 3 covered the rest of the unit. For each phase, an index for the strength of subtopic coverage across all classrooms in the country/economy was calculated. Thus, the lines in Figure 6.3 illustrate the "prototypical development" within each country/economy, rather than individual classrooms. This analysis has not been implemented for Madrid (Spain) because not enough lessons were reported in their Teacher Logs.

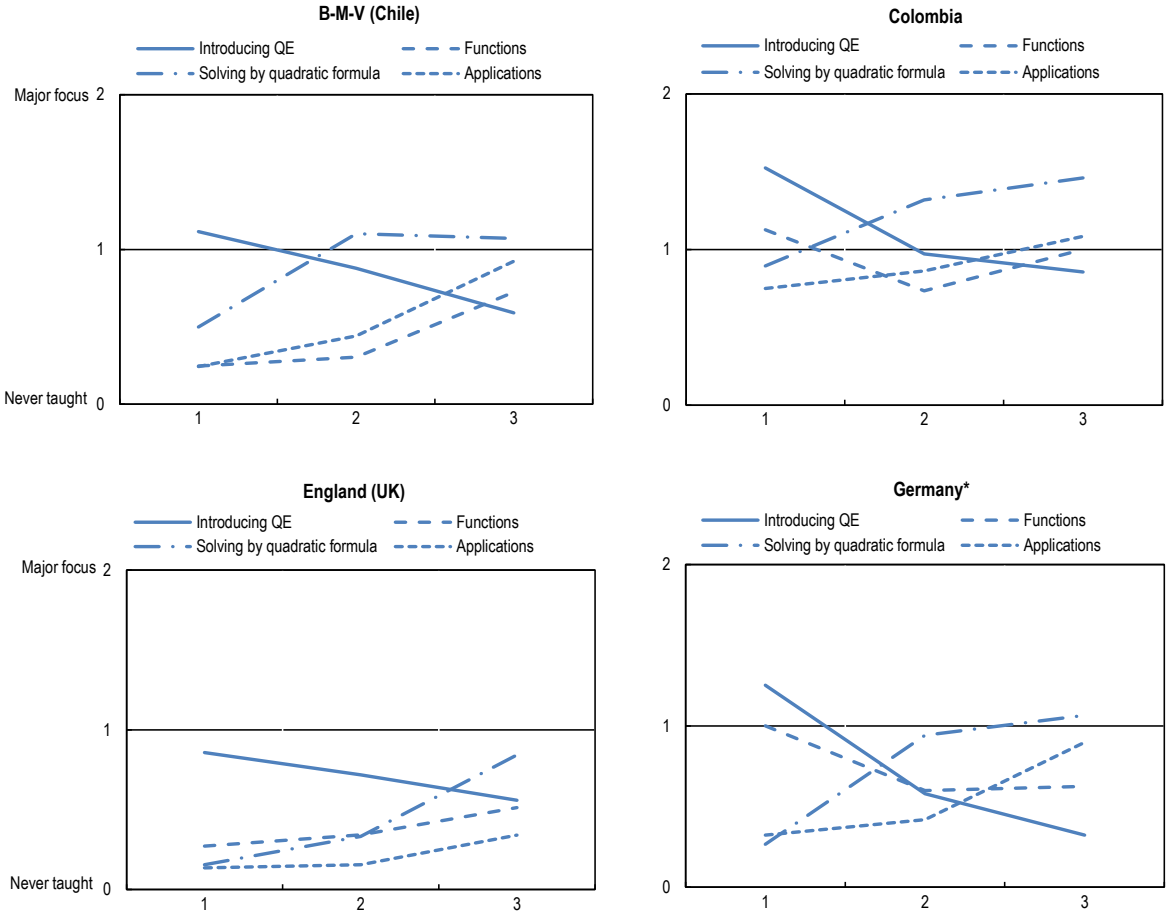
Figure 6.3 includes four subtopics reported by the teachers: introducing some form of quadratic equations, solving equations by the quadratic formula, real-world applications and quadratic functions. For each phase and each subtopic, the coverage of this subtopic, averaged across classrooms and individual lessons, is shown on the vertical (y) axis. This number varies between 0 and 2. A value of 0 means the subtopic was never taught within that phase. A value of 2 means the subtopic was a major focus of instruction in all lessons within that phase. A value of 1 could result from a mix of 0s and 2s, but it can also mean that the subtopic was covered as a minor focus (score 1) across all lessons in the respective phase.

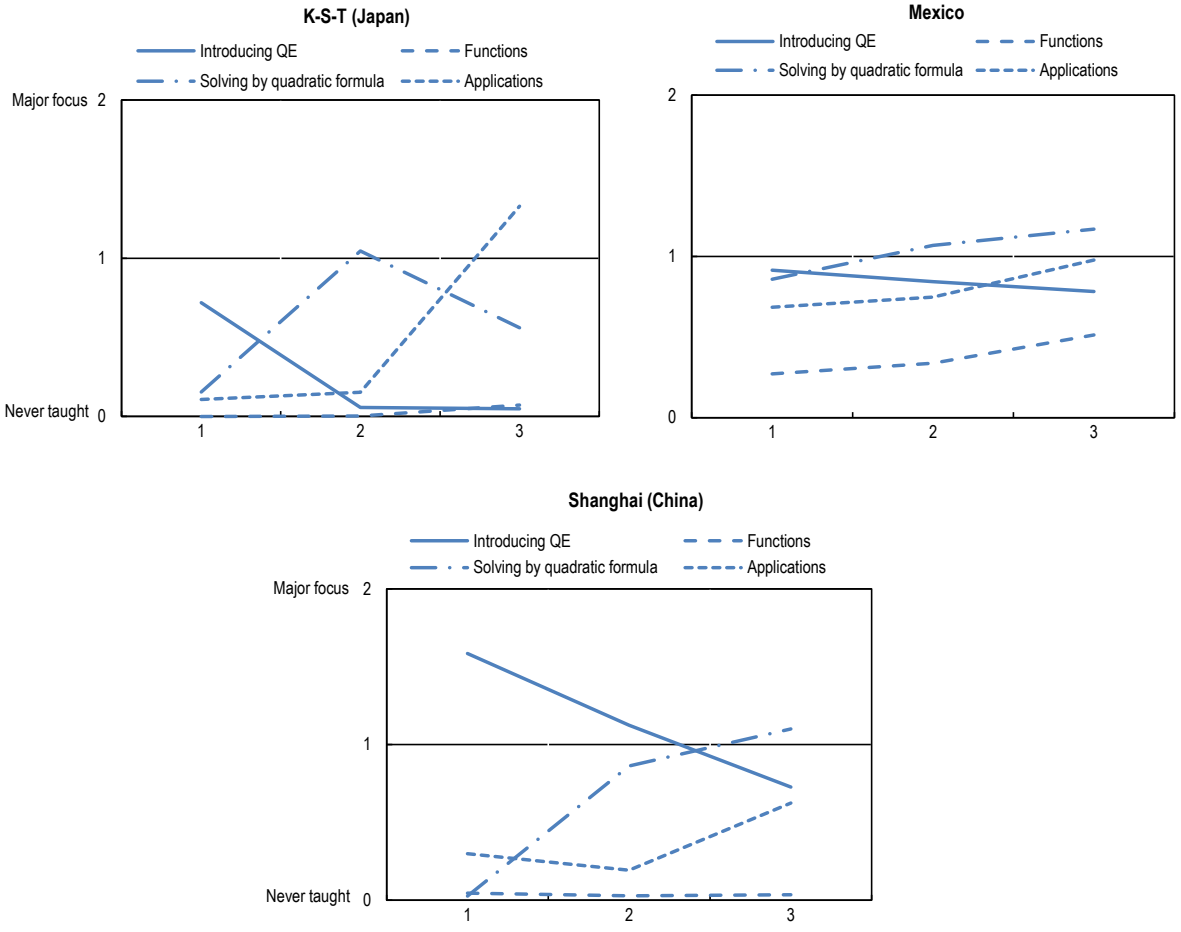
Across the seven countries/economies, the unit typically started with the introduction of different forms of quadratic equations, which was faded out in phase 2 when the quadratic formula was introduced. In phase 3, applications became more and more important, as envisioned by Graf, Fife, Howell and Marquez (2018[8]). This pattern is most clear-cut in K-S-T (Japan) and much less obvious in Mexico.

Figure 6.3 again illustrates differences regarding the use of graphical materials: quadratic functions were important elements of the focal unit in B-M-V (Chile), Colombia, Germany*, and to a lesser degree in England (UK) and Mexico, while they were almost non-existent in K-S-T (Japan) and Shanghai (China). Splitting the focal unit up into three phases helps understand differences between B-M-V (Chile), Colombia and Germany* as well: German and Colombian teachers typically introduced quadratic functions earlier, probably to motivate and support the understanding of equations, and faded them off later. Chilean teachers increased the use of quadratic functions from phase 1 until phase 3, probably to support the understanding of applications at the end of the unit.

Figure 6.3. Sequencing for four subtopics as reported by teachers

OTL for four subtopics as reported by teachers in three consecutive phases of the unit on quadratic equations





Note: *Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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How the content taught relates to students' perceptions of teaching quality

Is what students are taught in the classroom related to their perceptions of teaching quality? Annex 6.A, Table 6.A.5 shows correlations at the classroom level between opportunities to learn (classified as in Figure 6.2: algebraic procedures, real life applications, quadratic functions, reasoning) and teaching quality, both reported by students. The following significant relationships exist:

- The quality of teacher explanations perceived by students – a measure of the quality of subject matter - was related to all opportunities to learn indices except "applications": The more mathematical content students had seen, the more they agreed that their teacher explained *why* certain procedures worked. This suggests that, at least from the student's perception, the quality of subject matter taught is related to content coverage.
- The opportunities indicator for "reasoning" showed an exceptionally strong relationship with "explaining procedures", the correlation being significant in seven out of eight countries/economies. Also, opportunities for reasoning related to students' self-reported "cognitive engagement" in five, and to "student participation in discourse" in four countries/economies. Thus, teachers who introduce reasoning tasks – reflecting on the type and number of solutions, over and above solving

quadratic equations procedurally – may succeed in challenging student thinking. At the same time, this opportunity to learn indicator also related to student-reported measures of social-emotional support and classroom management. Reasoning tasks seem to be a good indicator of high-quality mathematics teaching across domains.

- The opportunities indicator for "algebraic procedures" relates to measures of classroom management and social-emotional support: the more opportunities to learn algebraic procedures reported by students, the lower the level of disruptions, and the higher the level of teacher support indicated by them. This suggests that classroom climate might be better when procedures are taught, it is easier to teach procedures when classrooms are well managed and supported, and/or students tend to perceive an extensive coverage of algebraic procedures as well-managed and supportive teaching.

Curriculum reforms typically have the goal of raising opportunities to learn, particularly with regard to developing conceptual understanding in students. In turn, professional development targets the spreading of rich teaching practices that can be implemented with quality. Combining curriculum reforms with professional development seems to be a promising strategy for improving classroom teaching and learning. By unpacking opportunities to learn in different countries/economies, the Study can support the development of a theory of action for this strategy.

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Annex 6.A. Chapter tables

Annex Table 6.A.1. Total teaching time across the focal unit and duration of the unit as reported by teachers

	Total teaching time across the unit (in hours)		Mean duration of the focal unit (in days)[1]
	Mean	Standard deviation	
B-M-V (Chile)	13.88	6.79	39.36
Colombia	5.56	2.69	15.31
England (UK)	7.55	2.22	16.33
Germany*	13.07	3.24	46.16
K-S-T (Japan)	9.99	2.86	69.02
Madrid (Spain)[2]	2.19	1.89	3.34
Mexico	6.47	2.95	19.23
Shanghai (China)	6.09	1.28	14.55

Notes: 1. Number of days between start date and end date reported in the Teacher Log, including days without any mathematics lessons.
2. The fact that more than 50% of teachers in Madrid (Spain) filled out just one line in the Teacher log warrants severe concerns against OTL data from this sample. Therefore, data from Madrid (Spain) will not be interpreted in the present chapter.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 6.A.2. Alignment between Teacher Log (vertical) and teaching material scores (horizontal) for content coverage

Correlations on teacher level, n = 622

	Completing the square	Factorising	Quadratic formula	Finding roots in functions
Completing the square	0.509***	0.140***	-0.145***	-0.032
Factorising	0.182***	0.221***	-0.180***	0.013
Quadratic formula	0.085*	-0.094**	0.174**	-0.100**
Graphical representation	-0.012	-0.159***	-0.009	0.431***

Source: OECD, Global Teaching InSights Database.

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Annex Table 6.A.3. OTL for algebraic procedures, real life applications, quadratic functions and reasoning about types of equations and solutions – measured in Teacher Logs and Student Questionnaires

	Algebraic procedures (Log)	Applications (Log)	Functions (Log)	Reasoning (Log)	Algebraic procedures (Students)	Applications (Students)	Functions (Students)	Reasoning (Students)
B-M-V (Chile)	7.44	3.02	3.50	3.92	0.93	0.47	0.79	0.91
Colombia	3.82	2.38	2.87	3.01	0.84	0.55	0.82	0.82
England (UK)	6.35	0.86	2.34	2.10	0.82	0.23	0.67	0.72
Germany*	8.86	3.53	5.64	3.84	0.94	0.53	0.89	0.70
K-S-T (Japan)	8.08	3.61	0.26	0.91	0.94	0.30	0.58	0.68
Madrid (Spain)	2.28	0.82	1.56	1.25	0.86	0.34	0.40	0.84
Mexico	5.70	3.08	2.02	3.16	0.86	0.72	0.84	0.88
Shanghai (China)	6.71	1.81	0.22	4.36	0.96	0.31	0.22	0.96

Notes: For a definition of the measures, see Technical Report, Chapter 17h (Teacher Logs) and Chapter 17c (Student Questionnaires).
Measures based on student reports are divided by the respective number of included items to allow for comparability across types of OTL.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934188063

Annex Table 6.A.4. Alignment between scores on teaching materials, Teacher Log and Student Post-Questionnaires on four types of OTL

Correlations on teacher level, n = 586

	Algebraic procedures (Materials)	Algebraic procedures (Log)	Algebraic procedures (Students)	Applications (Materials)	Applications (Log)	Applications (Students)	Functions (Materials)	Functions (Log)	Functions (Students)	Reasoning (Materials)	Reasoning (Log)	Reasoning (Students)
Algebraic procedures (Materials)	1											
Algebraic procedures (Log)	0.128**	1										
Algebraic procedures (Students)	0.212**	0.292**	1									
Applications (Materials)	-0.053	0.064	0.095*	1								
Applications (Log)	-0.054	0.457**	0.193**	0.352**	1							
Applications (Students)	-0.401**	-0.076	-0.067	0.181**	0.228**	1						
Functions (Materials)	-0.146**	-0.009	-0.181**	0.059	0.019	0.161**	1					
Functions (Log)	-0.206**	0.243**	-0.062	0.087*	0.351**	0.258**	0.549**	1				
Functions (Students)	-0.284**	0.062	-0.157**	0.138**	0.200**	0.602**	0.424**	0.464**	1			
Reasoning (Materials)	0.121**	-0.115**	0.121**	-0.029	-0.066	0.019	-0.021	0.067	-0.178**	1		
Reasoning (Log)	-0.099*	0.384**	0.141**	-0.021	0.306**	0.100*	0.053	0.373**	0.014	0.314**	1	
Reasoning (Students)	-0.153**	-0.082*	0.376**	-0.027	-0.011	0.241**	-0.203**	-0.03	-0.076	0.391**	0.322**	1

Notes: For a definition of the measures, see Technical Report, Chapter 17h (Teacher Logs) and Chapter 17c (Student Questionnaires).
There is convergent validity for all four types of OTL across measures (dark blue).
Algebraic Procedures correlate with Reasoning, Applications correlate with Functions (light blue).
All measures from the Teacher Log are correlated, because they are defined as the weighted number of lessons covering the respective kind of content, thus confounded by the number of lessons (grey).
Most other correlations are either negative or low, showing discriminant validity.
* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).
Source: OECD, Global Teaching InSights Database.

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Annex Table 6.A.5. Relationship between OTL and teaching quality as perceived by students

Correlations on the classroom level

Correlated measures		Country							
OTL	Teaching Quality	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
Algebraic Procedures	Disruptions	0.371**	0.300**	0.262*	0.171	0.198	0.110	0.411**	0.272*
	Teacher Support for Learning	0.206*	0.244*	0.227*	0.069	0.271*	0.090	0.362**	0.212
	Teacher-Student-Relationship	0.191	0.183	0.256*	-0.081	0.264*	0.058	0.407**	0.200
	Explaining Procedures	0.254*	0.279*	0.271*	-0.078	0.293**	0.110	0.503**	0.276*
	Student Participation in Discourse	-0.068	0.161	0.180	-0.068	0.172	0.040	0.219*	0.156
	Self-reported Cognitive Engagement	0.166	0.135	0.235*	0.125	0.422**	0.149	0.232*	0.391**
Quadratic Functions	Disruptions	0.164	0.143	0.022	0.051	0.011	0.025	0.323**	-0.067
	Teacher Support for Learning	0.020	0.266*	-0.064	0.112	0.079	-0.017	0.273**	0.046
	Teacher-Student-Relationship	0.023	0.189	-0.009	0.103	0.017	-0.019	0.289**	0.139
	Explaining Procedures	0.258*	0.411**	0.045	0.099	0.352**	0.075	0.426**	0.221*
	Student Participation in Discourse	0.059	0.131	0.042	0.149	-0.001	0.082	0.241*	0.148
	Self-reported Cognitive Engagement	0.047	0.107	0.152	0.076	0.153	-0.009	0.287**	0.192
Reasoning	Disruptions	0.376**	0.199	0.386**	-0.053	0.054	0.052	0.422**	0.279**
	Teacher Support for Learning	0.266**	0.249*	0.280**	0.110	0.158	0.051	0.273**	0.264*
	Teacher-Student-Relationship	0.274**	0.225*	0.308**	0.000	0.248*	0.064	0.254**	0.200
	Explaining Procedures	0.354**	0.379**	0.356**	0.162	0.427**	0.261*	0.374**	0.264*
	Student Participation in Discourse	0.102	0.267*	0.212	0.041	0.220*	0.146	0.210*	0.237*
	Self-reported Cognitive Engagement	0.047	0.312**	0.346**	0.213	0.477**	0.164	0.260**	0.379**
Applications	Disruptions	-0.097	0.007	-0.118	-0.213	-0.221*	-0.042	0.059	-0.127
	Teacher Support for Learning	-0.072	0.098	-0.046	0.166	-0.070	-0.298*	0.118	-0.008
	Teacher-Student-Relationship	-0.059	0.145	-0.023	0.108	-0.169	-0.171	0.090	0.062
	Explaining Procedures	0.101	0.290**	-0.021	0.162	0.194	-0.096	0.204*	0.204

Correlated measures		Country							
OTL	Teaching Quality	B-M-V (Chile)	Colombia	England (UK)	Germany*	K-S-T (Japan)	Madrid (Spain)	Mexico	Shanghai (China)
	Student Participation in Discourse	0.155	0.318**	-0.001	0.196	-0.138	0.038	0.072	0.156
	Self-reported Cognitive Engagement	0.023	0.082	-0.042	0.084	-0.074	0.085	0.107	0.190

Notes: * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).
Rows highlighted in light grey: Weak relationship (Correlations are significant in 4 countries/economies).
Rows highlighted in dark grey: Strong relationship (Correlations are significant in the majority of countries/economies).
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Notes

[1] Germany* refers to a convenience sample of volunteer schools.

7 Relationships between teaching practices and student outcomes

Sy Doan, Kata Mihaly and Daniel F. McCaffrey

This chapter explores how the three domains of mathematics teaching described in prior chapters (classroom management, social-emotional support and instruction) are related to three different student outcome measures (academic achievement, personal interest in mathematics and self-efficacy with mathematics).

A central question in education research is understanding how and to what extent teaching influences student outcomes. Prior research indicates that teachers can have a great impact on a wide range of student outcomes, including academic achievement, social-emotional skills, and post-secondary and labour market attainment (Chetty, Friedman and Rockoff, 2014[1]; Jackson, 2018[2]; Kraft, 2019[3]).

Less understood is which dimensions of teaching are most closely associated with various student outcomes and whether the same teaching practices are effective in all educational settings. A deeper knowledge of the relationship between teaching and learning may help inform several policy decisions to better support student learning and well-being as well as spur reflection among the teaching communities on their own practices.

The present Study aims to shed light on these questions through a pre-post design that measures students' academic performance and dispositions both before and after the observed focal unit of the Study – quadratic equations – is taught. This chapter explores how the three domains of mathematics teaching explored in prior chapters (classroom management, social-emotional support and instruction) are related to three different student outcome measures (mathematic achievement, personal interest in mathematics and self-efficacy with mathematics).

To examine the relationship between teaching practices and student outcomes, regression models of both post-unit scores (levels) and post-unit scores after accounting for pre-unit scores and other student and classroom characteristics (growth) of each student outcome are considered (see the *Global Teaching InSights Technical Report* [hereafter the "Technical Report"]). Specifically, these models estimate the average difference in student outcomes associated with a one-unit increase in a classroom's level of management, social-emotional support and instruction.

Key findings

- Higher performing students were more likely to be in classrooms with higher observed levels of teaching practice. In particular, the differences in instructional quality between high and low performing classrooms were significant in Biobío, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]"), England (UK) and Mexico. However, after accounting for students' background and their prior mathematical knowledge, teaching practices were significantly associated with test scores only in Colombia.
- In half of the countries/economies, students were significantly more likely to have a higher interest in mathematics when their teachers provided social-emotionally supportive environments. A unit increase in social-emotional support was associated with a 0.1 to 0.3 unit increase on a 1-4 scale.
- Classroom management, social-emotional support and instruction were all significant predictors of student self-efficacy in Mexico and Shanghai (China), with a unit increase in these domains relating to a 0.2 to 0.6 unit increase on a 1-4 scale of self-efficacy.
- Student-reported opportunities to learn were statistically significant predictors of student outcomes in several countries/economies, in particular those related to "reasoning".

Teaching practices are related to levels but not growth in student test scores

Students' mastery of academic content can be a valuable building block for their later success in the classroom and throughout their careers, with teaching being among the most important within-school levers for improving these academic skills (Chetty, Friedman and Rockoff, 2014[1]; McCaffrey et al., 2003[4]). Across eight countries/economies, classroom-level observation scores of three domains of teaching practice (classroom management, social-emotional support and instruction) were examined alongside student performance on an assessment of quadratic equation to assess the extent to which, and which types of, teaching practices are most closely related to students' mathematics knowledge.

Measuring student mathematics knowledge

Students were given assessments to measure their mathematics knowledge prior to and after a focal unit on quadratic equations. The pre-unit measure of mathematics knowledge was constructed using a 30-item mathematics assessment of students' general knowledge on the subject. Students' post-unit knowledge was measured using a 24-item assessment that focused specifically on knowledge of topics related to quadratic equations. Specific subtopics measured on the post-test included the ability to solve quadratic equations through factoring, completing the square, and recognising and using the general quadratic equations through factoring. Students' pre- and post-unit test scores are scaled to range from 1-300. As with other outcome measures, students' post-unit test scores serve as the primary outcomes in each regression, with pre-unit scores used as a control variable to model students' growth .

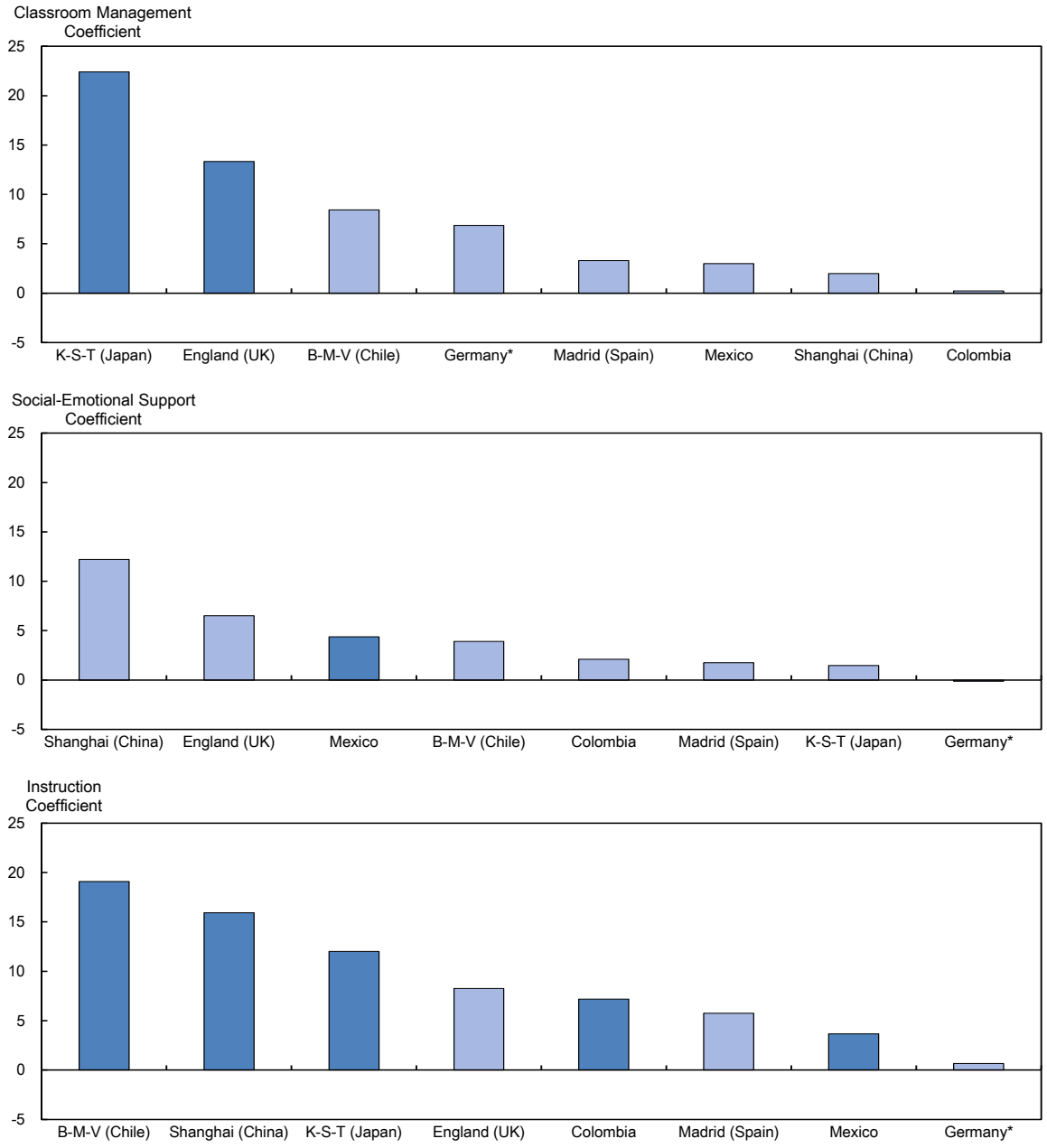
High performing classrooms had better instruction

Examining the relationship between classroom-level teaching and students' performance can help identify which practices are most present in classrooms with high mathematics performance. To do so, regression models are fit separately for each combination of country/economy, domain and outcome in order to examine the extent to which differences in observed domain scores are predictive of student outcomes. Two types of regression models are fit: a "levels" model which estimates the association between post-unit outcome measures and domain scores without accounting for additional characteristics, and a "growth" model which takes into account student's pre-unit scores, background characteristics and classroom averages of these student factors.[1] Figure 7.1 and Figure 7.3 show respectively the results of the "levels" and "growth" models (regression coefficients are available in Annex 7.A).[2]

Without accounting for students' pre-unit test scores and other characteristics, instructional practices were positively associated with post-test scores in many countries/economies. Specifically, in B-M-V (Chile), Colombia, Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), Mexico and Shanghai (China), students in classrooms with higher levels of instruction, on average, performed significantly higher than their peers on the assessment of quadratic equation knowledge. The largest association was observed in B-M-V (Chile), where a one-unit increase in instruction scores was associated with a 19 point, or three-quarters of a standard deviation, increase in post-test scores.

Figure 7.1. Relationships between observed teaching practices and student post-test scores

Regression estimates of the expected change in a scale of students' post-unit mathematics achievement given a one-point increase in classroom management, social-emotional support and instruction domain scores



Notes: Bars represent the estimated increase in student post-test scores associated with a one-unit increase in classroom management (top panel), social-emotional support (middle panel) and instruction (bottom panel) in each country/economy. Darker shading indicates that a given association is statistically significant at the $p < .05$ level. Bars are sorted according to the magnitude of the coefficient, with the largest, most positive coefficients on the left of the figure.

Students' raw responses on both the post-unit assessments were scaled using IRT methods to range from 100 to 300, with a score of 200 representing the average test performance across students and a standard deviation equal to 25 points.

*Germany refers to a convenience sample of volunteer schools.

Countries and economies are ranked in a descending order by coefficient size.

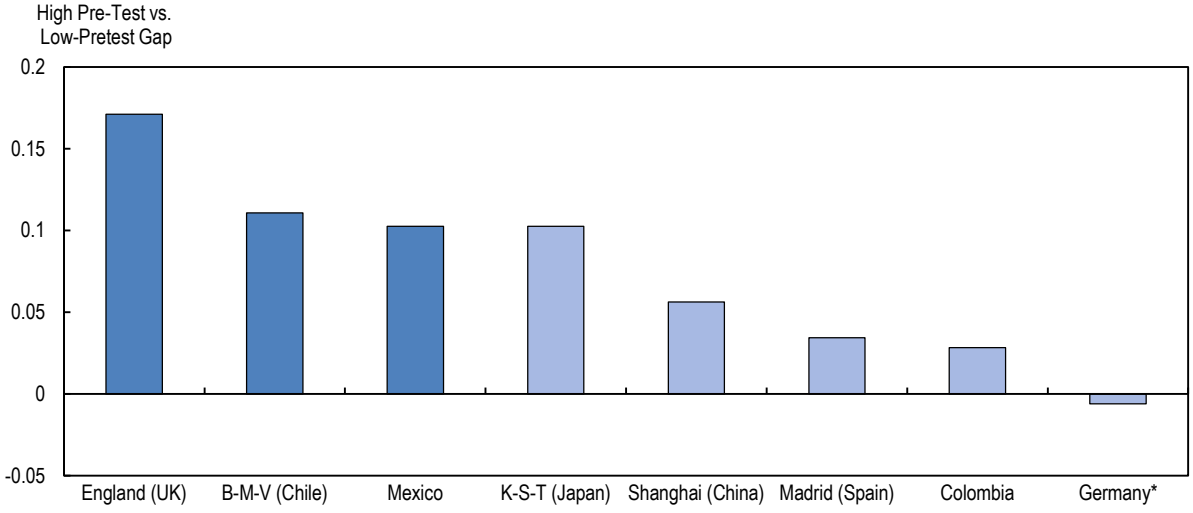
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934188120

Classroom management and social-emotional practices were also positively associated with student post-test scores, albeit in fewer countries/economies at a statistically significant level. In both England (UK) and K-S-T (Japan), classroom management scores were significant positive predictors of post-test scores, with the size of these associations being 22 and 13 test score points, respectively. Social-emotional support was a significant predictor of post-test scores only in Mexico though was positively associated with post-unit scores in all countries/economies except Germany*[3]. This is not surprising given that the instruction domain, as defined in Chapter 5, is focused on teaching practices most directly linked to academic content knowledge (Pianta and Hamre, 2009[5]).

Figure 7.2. Comparing observed instruction between low and high pre-test classrooms

Difference in classroom-level instruction scores between classrooms with above-median ("high") average pre-test test scores and below-median ("low") average pre-test scores



Notes: Figure shows, for each country/economy, the difference in instruction domain scores between classrooms with an above-median average pre-test score for that country-economy ("High Pre-Test") and classrooms with a below-median average pre-test score for that country-economy ("Low Pre-Test"). Darker shading indicates that the difference between low and high pre-test classrooms is statistically significant at the $p < .05$ level. Countries/economies are sorted according to the size of the difference between high pre-test and low pre-test classrooms. Instruction domain scores range from 1-4 and pre-test and post-test scores range from 100-300.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Students enter the classroom with different amounts of knowledge, disposition and home resources. Numerous studies indicate that these "background" characteristics are both highly predictive of not only students' outcomes (Hanushek and Woessmann, 2017[6]), but also, of the types of schools and classrooms students are likely to attend (Kalogrides, Loeb and Beteille, 2013[7]; Givord, 2019[8]).

Indeed, in many participating countries/economies, students' pre-unit measures of knowledge, dispositions and demographic characteristics were often associated with the levels of teaching practice they encountered during the quadratic equations unit. Figure 7.2 shows the difference in the average instruction domain scores among classrooms with above-median ("high") average pre-test scores and classrooms with below-median ("low") average pre-test scores. More positive values indicate that high pre-test classrooms, on average, received higher instruction scores than low pre-test classrooms. This gap is largest among classrooms in England (UK), where high pre-test classrooms had instruction scores that were, on average, .17 units higher than low pre-test classrooms. Overall, the gap in instruction between

high and low pre-test classrooms is statistically significant in three countries/economies: B-M-V (Chile), England (UK) and Mexico.

Certain types of students being more likely to attend classrooms with higher (or lower) levels of teaching quality may reinforce and exacerbate existing gaps and inequities in education. Additionally, the link between students' backgrounds and their exposure to different teaching practices complicates the task of identifying how these practices relate to student outcomes.

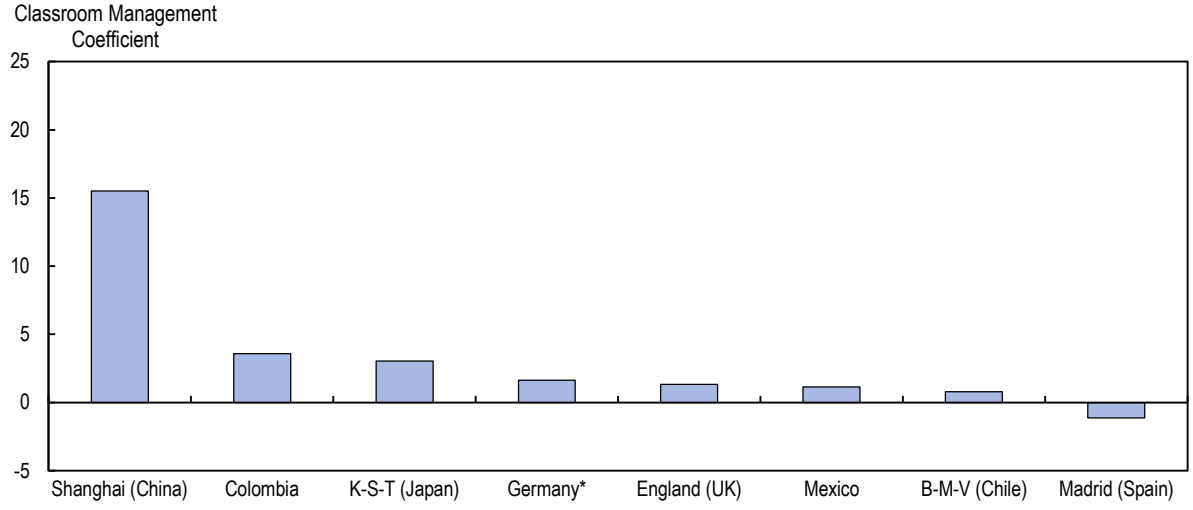
Therefore, to examine the impact of teaching practices on student learning, it is important to take their background into consideration. While domain scores, particularly in instruction, are significantly related to student post-test scores in many countries/economies, these associations may reflect students' background characteristics rather than the quality of teaching if the former are not accounted for. To better examine the effect of teaching on student performance, regression models are fit that account for student's pre-test score in addition to the following: students' home possessions, immigration background, one or both of their parent's highest level of education, and classroom-level averages of pre-unit and background measures. This expanded model is referred to as the "growth" model, as it accounts for students' pre-unit scores on the outcome being analysed.[4]

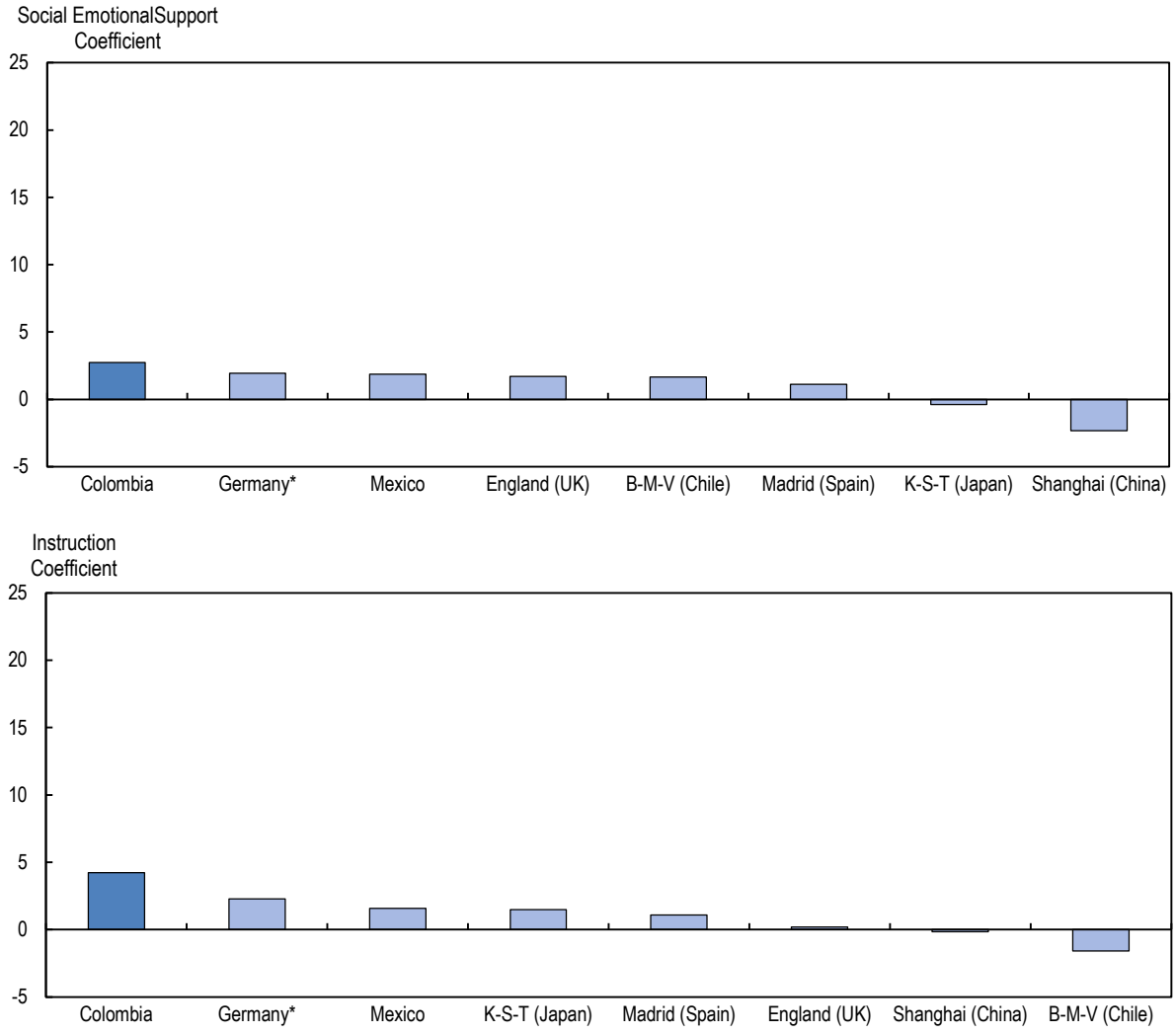
Teaching practices did not explain to students' performance when accounting for their background

Figure 7.3 shows the relationships between teaching practices and student growth in test scores. Specifically, each bar represents the estimated association a unit increase in observed teaching practices in each domain and students' post-test scores, adjusted for students' pre-test scores and background characteristics.

Figure 7.3. Relationships between observed teaching practices and growth in student test scores

Regression estimates of the expected change in a scale of students' post-test scores given a one-point increase in classroom management, social-emotional support and instruction domain scores, adjusting for student and classroom baseline characteristics





Notes: Bars represent the estimated difference in student post-test scores associated with a one-unit increase in classroom management (top panel), social-emotional support (middle panel) and instruction (bottom panel) in each country/economy, adjusted for students' pre-test scores, demographic characteristics and classroom averages of these characteristics. Darker shading indicates that a given association is statistically significant at the $p < .05$ level. Bars are sorted according to the magnitude of the coefficient, with the largest, most positive coefficients on the left of the figure. The coefficient represented by each bar was estimated in a separate country/economy-domain-outcome regression model.

*Germany refers to a convenience sample of volunteer schools.

Source: OECD, Global Teaching InSights Database.

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The relationships with student growth in test scores in Figure 7.3 follow the same direction (i.e. increases in teaching practices are generally positively associated with student test score levels and growth) across countries/economies and domains, but the magnitude and significance of these relationships differ considerably. Whereas instruction was significantly associated with student test score levels in five of eight participating countries/economies, this domain was a significant predictor of test score growth only in Colombia, where a one-unit increase in instruction was associated with a modest 4.2 unit increase in student test score growth. The only other significant test score growth relationship for the other two domains of teaching practice was also found in Colombia, where social-emotional support had a significant, but similarly modest, positive association (2.7 unit increase).

Students predisposed to perform well on the post-test assessment, by virtue of higher pre-test scores, were more likely to be in classrooms that enjoy high levels of each teaching practice (Figure 7.2). After controlling for students' pre-test scores and other background characteristics, the relationship between teaching practices and student test scores diminishes greatly, a result that echoes prior work conducted by Carnoy, et al., (2016[9]).

Several potential reasons might explain the lack of significant relationships between teaching practices and student performance, once students' previous achievement and other background characteristics are accounted for. First, while observed teaching practices may be telling of the levels of achievement of the students in that classroom, these differences in achievement may be more reflective of students' background characteristics rather than the direct contribution of these practices to their achievement. Additionally, the potential student growth over the brief period of time in which the focal unit is taught may be limited, and therefore, more difficult to detect.

Classroom management and social-emotional practices were positively associated with student interest

Developing students' interest in academic content is an important precursor for not only their acquisition of that content, but also, their sustained engagement with academic endeavours in the future (Harackiewicz and Hulleman, 2010[10]). The promotion of students' interest is linked to increases in attention, recall, task persistence, and effort toward both proximate tasks such as classwork and reading comprehension (Ainley, Hidi and Berndorff, 2002[11]; Hidi and Renninger, 2006[12]). Additionally, personal interest is associated with more distal student outcomes such as selection of hobbies and academic courses (Harackiewicz et al., 2002[13]). Beyond performance and attainment, developing student interest in their daily activities serves a critical role in promoting student well-being and satisfaction (Sheldon and Elliot, 1999[14]).

Measuring student personal interest in mathematics topics

To measure their personal interest in mathematics, students were asked to indicate their agreement with a series of statements both prior to and after the focal unit. The pre-unit measure of personal interest was formed by averaging student responses across four items that asked to indicate, on a 1-4 scale ranging from "strongly disagree" to "strongly agree", about their general interest in mathematics under their previous teacher (e.g. "I was interested in mathematics" and "I often thought that what we were talking about in my mathematics class was interesting"). The post-unit measure, on the other hand, used three items that asked about students' interest specifically in quadratic equations with their current teacher (e.g. "I was interested in the topic of quadratic equations" and "I often thought that what we were talking about in my mathematics class during the unit on quadratic equations was interesting") using the same "strongly disagree" to "strongly agree". Student responses to each item were averaged to form a single scale of "personal interest in quadratic equations", ranging from 1-4, with higher values in the scale corresponding to greater personal interest in mathematics. The standard deviation of the post-unit personal interest ranged from 0.6 to 0.8 across countries/economies.

Classroom management and social-emotional support are related to student interest in several countries/economies

Using analogous techniques for test score analyses, regression models of students' personal interest in mathematics are fit to examine whether the variation in personal interest is explained by differences in student exposure to diverse teaching practices.

Teaching practices, particularly those in the classroom management and social-emotional support domains, were related to students' reported interest in quadratic equations. Additionally, unlike for student test scores, the relationships between teaching practices and personal interest were observed for both levels or growth of personal interest. Because of this, estimates examining the relationships between teaching practices and growth in student personal interest are focused upon. Figure 7.4 shows the estimated relationship between a one-unit increase in each domain of teaching practice and student growth in personal interest in quadratic equations in a regression model that takes into consideration students' prior interest in mathematicchiles and their background characteristics. (Annex 7.A presents associations between teaching practices and both levels and growth of personal interest).

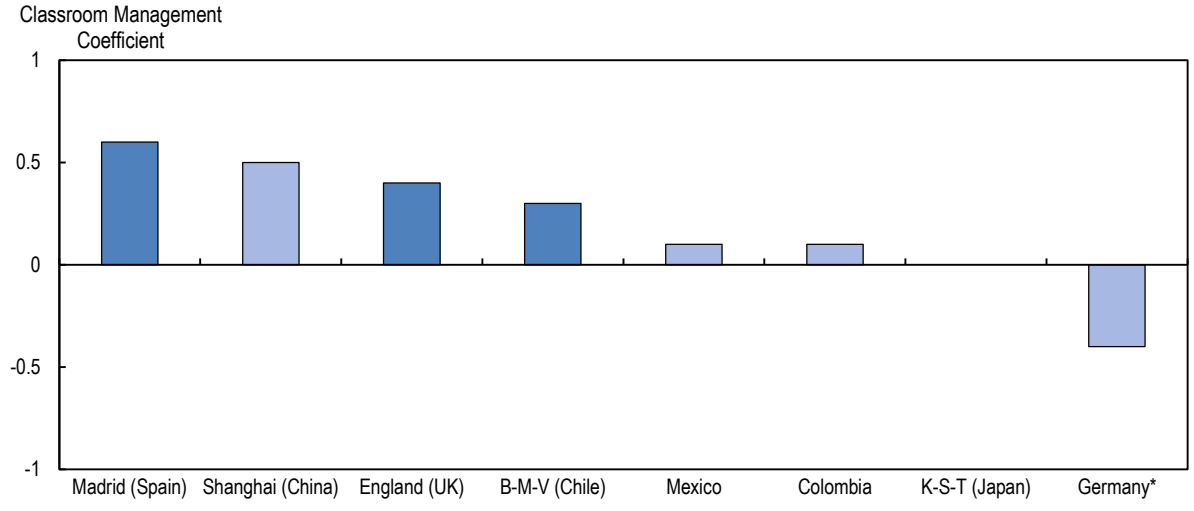
Students in several of the Study countries/economies are significantly more likely to have higher interest in mathematics when their teachers provide for social-emotionally supportive environments. Specifically, half of the countries/economies (B-M-V [Chile], Colombia, Madrid [Spain] and Shanghai [China]) show statistically significant relationships between the level of social-emotional support practices and personal interest in mathematics. In these countries/economies, a unit increase in social-emotional support (on a 1-4 scale) is associated with a 0.1 to 0.3 point increase (on a 1-4 scale) in students' personal interest.

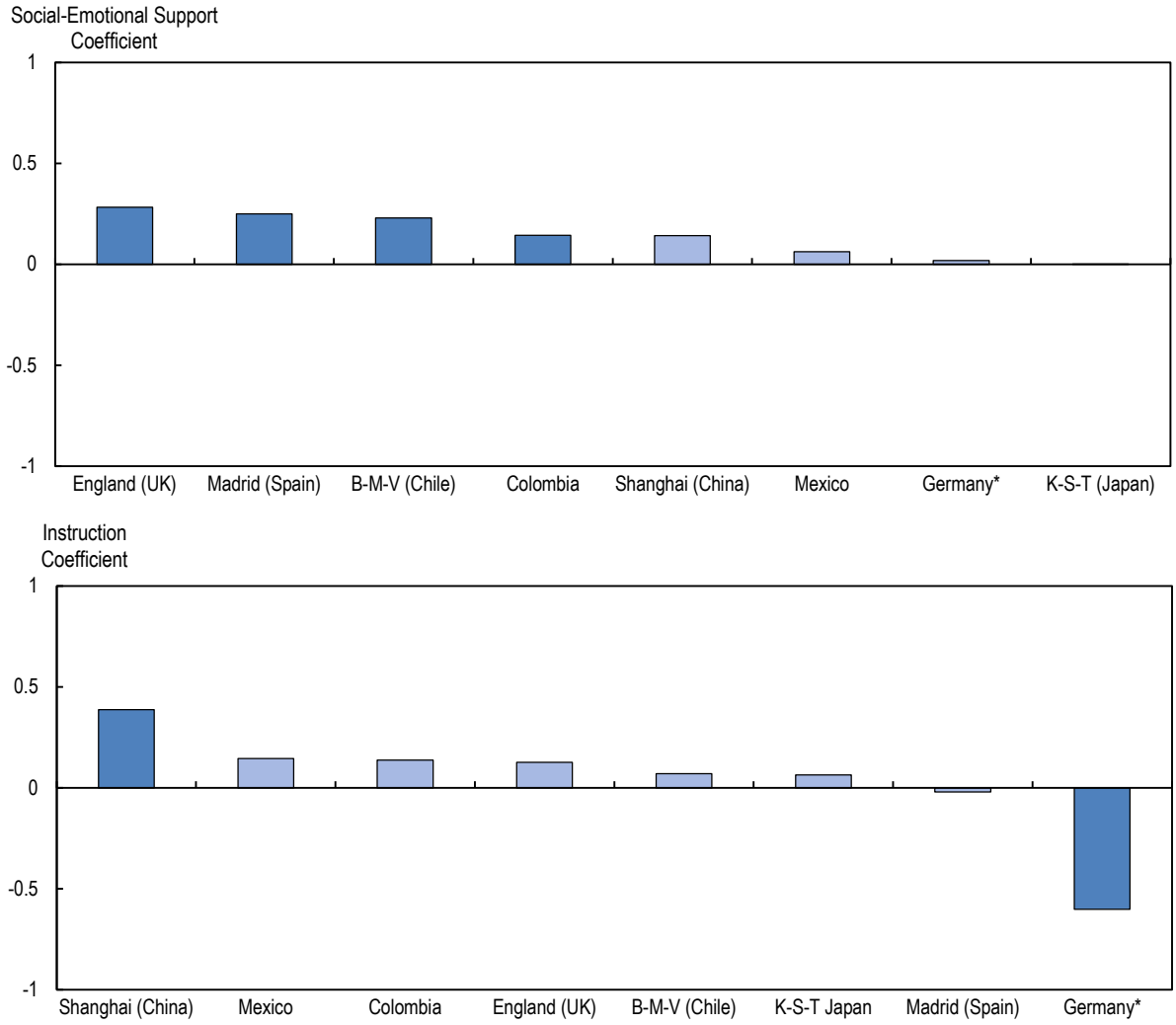
Additionally, students are also likely to significantly report greater interest in mathematics when their classrooms are well-managed. Classroom management scores are significant, positive predictors of student's growth in personal interest in mathematics in B-M-V (Chile), England (UK) and Madrid (Spain), with these associations ranging in size, from a 0.3 to 0.6 unit increase in personal interest for a one-unit increase in classroom management.

The quality of instruction, however, did not appear to have a widely prevalent relationship with students' personal interest in mathematics. Instructional practices are only significantly positively related to students' personal interest in Shanghai (China) and are negatively related in Germany*, where a unit increase in instruction is associated with a 0.6 point decrease in personal interest.

Figure 7.4. Relationships between observed teaching practices and growth in student personal interest

Regression estimates of the expected change in a scale of students' post-unit personal interest in the topic of quadratic equations given a one-point increase in classroom management, social-emotional support and instruction domain scores, adjusting for student and classroom baseline characteristics





Notes: Bars represent the estimated difference in student post-unit personal interest scores associated with a one-unit increase in classroom management (top panel), social-emotional support (middle panel) and instruction (bottom panel) in each country/economy, adjusted for students' pre-unit personal interest scores, demographic characteristics and classroom averages of these characteristics. Darker shading indicates that a given association is statistically significant at the $p < .05$ level. Bars are sorted according to the magnitude of the coefficient, with the largest, most positive coefficients on the left of the figure. The coefficient represented by each bar was estimated in a separate country/economy-domain-outcome regression model.
*Germany refers to a convenience sample of volunteer schools.
Countries and economies are ranked in a descending order by coefficient size.
Source: OECD, Global Teaching InSights Database.

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Teaching practices were positively related to students' self-efficacy

Lastly, research has found that students' self-efficacy, or the extent to which individuals feel confident in their ability to perform tasks that are required of them, is related to their academic and social-emotional outcomes, such as academic achievement and classroom task participation on the one hand, and depression and anxiety on the other (Bandura, 1977[15]; OECD, 2019[16]; Rhew et al., 2018[17]). Both as a scaffold for future learning and in its own right, student self-efficacy is another valuable outcome for stakeholders to consider how best to support through classroom teaching.

Measuring student self-efficacy toward mathematics

Similar to personal interest, two separate measures of self-efficacy are constructed: a "pre-score" measure of students' perceived self-efficacy with regard to general mathematics topics under the previous teacher and a post-score measure of self-efficacy tailored specifically to students' own feelings of self-efficacy toward quadratic equations under their current teacher. Students reported on a four-point scale, ranging from 1 ("Not at all true of me") to 4 ("Extremely true about me"), their agreement with statements such as "I believe I would receive an excellent mark for mathematics/the topic of quadratic equations" and "I was confident I would understand the most difficult material covered in mathematics/during the unit on quadratic equations". Students' scores on each item are averaged together to form pre-unit and post-unit scales of self-efficacy, ranging from 1-4, with the standard deviation of post-unit self-efficacy ranging from 0.6 to 0.8 units across countries/economies.

Teaching practices in all three domains were linked to self-efficacy in half of countries/economies

Teaching practices across all three domains were significantly related to levels and growth of student self-efficacy, with all three domains being significant predictors in Shanghai (China) and Mexico. Figure 7.5 shows that observed classroom management, social-emotional support and instructional practices are positively related to student growth in self-efficacy, even after accounting for student and classroom-level pre-unit measures of self-efficacy and other demographic and socio-economic characteristics. Similar to the presentation of results pertaining to students' personal interest in mathematics, regression results examining growth in student self-efficacy, which are modelled with controls for pre-unit self-efficacy and student background characteristics, are emphasised below. Full results for both the levels and growth models of self-efficacy are available in Annex 7.A.

Classroom management was significantly related to growth in self-efficacy in four out of eight countries/economies (Mexico, England [UK], Madrid [Spain] and Shanghai [China]), with the association of a one-unit increase in classroom management ranging from a 0.2 unit (Mexico) to a 0.6 unit (Shanghai [China]) increase on the 1-4 self-efficacy scale.

In half of the participating countries/economies, social-emotional support was significantly related to student growth in self-efficacy (Colombia, Madrid [Spain], Mexico, Shanghai [China]). Yet, across all countries/economies, the magnitude of these associations was quite modest, with significant relationships ranging from a 0.1 to 0.2 unit increase in self-efficacy for a one-unit increase in social-emotional support.

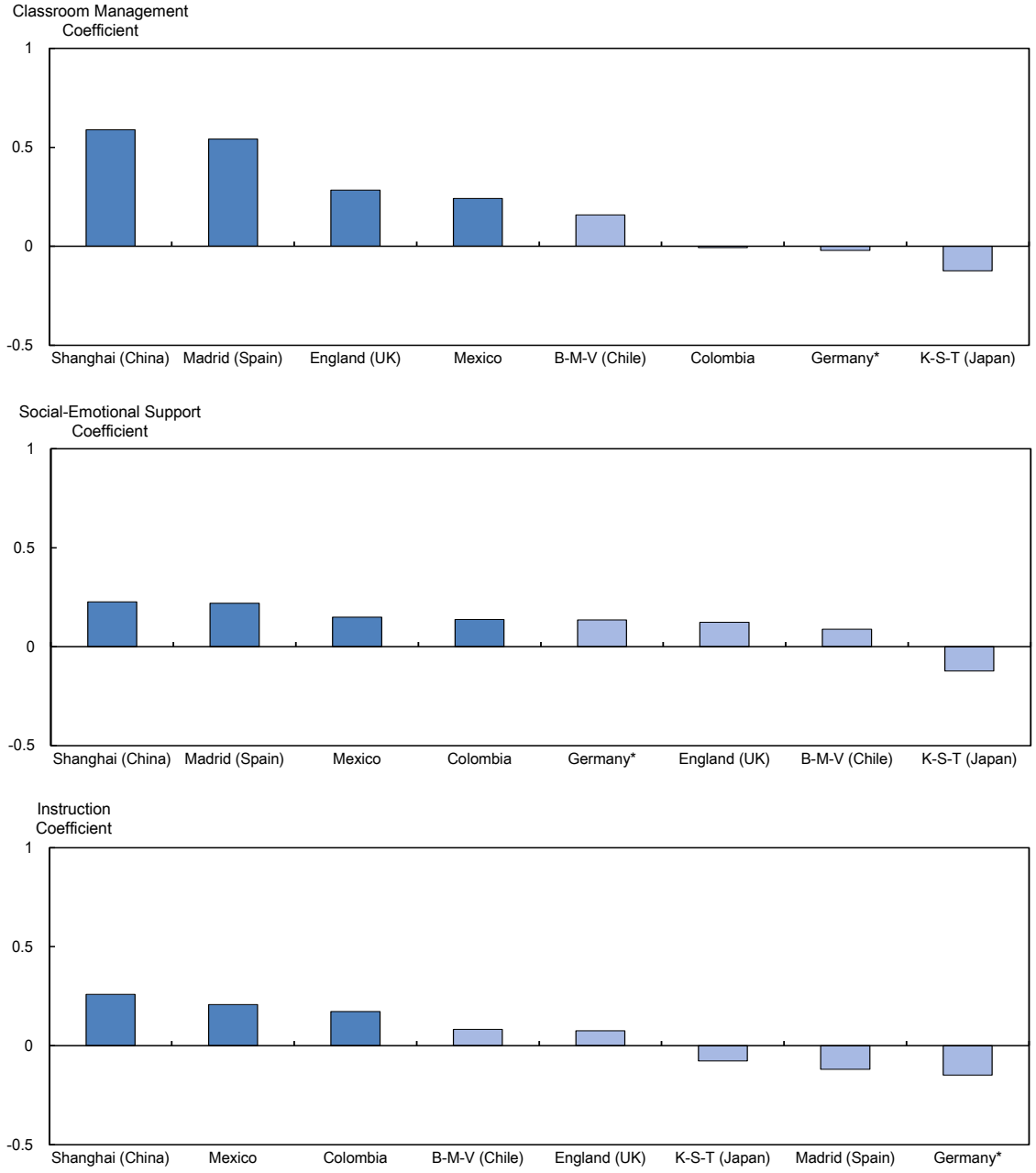
Lastly, students' exposure to different levels of instruction was a significant predictor of self-efficacy growth in Shanghai (China), Mexico and Colombia. Specifically, a unit increase in classroom instruction scores is associated with between a 0.2-0.3 unit increase in student-reported self-efficacy.

Interestingly, while, for any given country/economy, only select domains were significant predictors of students' post-unit test scores and personal interest in mathematics, all three domains of teaching (classroom management, social-emotional support, instruction) were significant predictors of student self-efficacy in two countries/economies: Mexico and Shanghai (China). There were no significant relationships between observed teaching practice in any domain and self-efficacy in B-M-V (Chile), Germany* and K-S-T (Japan).

The relationships with student self-efficacy shown in Figure 7.5, along with those for personal interest growth (Figure 7.4) suggest that there are robust associations between teaching practices and student dispositions that appear regardless of whether levels or growth in these outcomes are examined. As increasing attention is paid to how teaching can influence students in ways beyond academic achievement, the results in this report suggest that teaching practices is potentially an important lever for affecting these key measures of student dispositions.

Figure 7.5. Relationships between observed teaching practices and growth in student self-efficacy

Regression estimates of the expected change in a scale of students' post-unit self-efficacy in the topic of quadratic equations given a one-point increase in classroom management, social-emotional support and instruction domain scores, adjusting for student and classroom baseline characteristics



Notes: Bars represent the estimated difference in student post-unit self-efficacy scores associated with a one-unit increase in classroom management (top panel), social-emotional support (middle panel) and instruction (bottom panel) in each country/economy, adjusted for students' pre-unit self-efficacy scores, demographic characteristics, and classroom averages of these characteristics. Darker shading indicates that a given association is statistically significant at the $p < .05$ level. Bars are sorted according to the magnitude of the coefficient, with the largest, most positive coefficients on the left of the figure. The coefficient represented by each bar was estimated in a separate country/economy-domain-outcome regression model.

*Germany refers to a convenience sample of volunteer schools.

Countries and economies are ranked in a descending order by coefficient size.

Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934188196

Teaching materials and opportunities to learn were not strongly related to student outcomes

In addition to video observations, the Study also measured teaching practice through the use of teaching materials (as reported in Chapters 3, 4 and 5), and both teacher-reported and student-reported measures of Opportunities to Learn (OTL) in four subtopics: real-world contexts, reasoning, quadratic functions and algebraic operations (as reported in Chapter 6). These measures capture different aspects of how students experience teaching in each classroom that are distinct from video observations, and therefore, possibly capture distinct channels through which teaching affects student outcomes. To test whether this is the case, the relationships between teaching materials, teacher and student reported opportunities to learn and student outcomes were modelled using the same "levels" and "growth" regression models used for the video observation domains above.

Generally, teachers' teaching materials and their self-reported measures of opportunities to learn showed little, if any, consistent significant relationships with either levels or growth of the three student outcome measures (see results in the Technical Report). The lack of strong connections between teaching materials and student outcomes potentially signal differences between planned and enacted curriculum. Many teachers' teaching materials indicate how teachers intend to provide instruction but do not, unlike video observations, capture how teaching actually unfolds in the classroom. While teachers' teaching materials are intimately connected to the instruction they eventually provide in the classroom (Charalambous and Hill, 2012[18]), these results suggest that it is the instruction that students ultimately experience in the classroom that is more closely linked to their outcomes.

Similarly, while teacher-reported opportunities to learn was not strongly related to student outcomes, student reports were significant predictors of student outcomes in several countries/economies. This is consistent with earlier work on the connection between student-reported opportunities to learn, student achievement and mathematics literacy (Schmidt et al., 2015[19]). In particular, when looking at growth of student outcomes, the student-reported "reasoning" was a significant positive predictor of test scores, personal interest and self-efficacy in certain countries/economies (Table 7.1). Notably, student-reported "reasoning" was a significant predictor of all three student outcomes in England (UK).

Table 7.1. Relationships between student-reported "reasoning" OTL and growth in student outcomes

Regression estimates of the expected change student post-test scores, post-unit personal interest and post-unit self-efficacy for a one-unit icnrease in student-reported "reasoning" OTL subscale, adjusted for student and classroom baseline characteristics

Country/economy	Test scores		Personal interest		General self-efficacy	
B-M-V (Chile)	6.229	**	0.034		0.179	
	(2.037)		(0.120)		(0.100)	
Colombia	2.403		0.246	**	0.167	*
	(1.415)		(0.088)		(0.077)	
England (UK)	4.045	*	0.252	*	0.172	*
	(1.690)		(0.104)		(0.073)	
Germany*	-3.140		0.149		0.281	*
	(1.729)		(0.159)		(0.128)	
K-S-T (Japan)	-3.869		0.046		0.117	
	(2.834)		(0.105)		(0.083)	
Madrid (Spain)	3.521		0.051		-0.042	
	(2.088)		(0.110)		(0.112)	
Mexico	0.035		0.301	**	0.123	
	(1.291)		(0.104)		(0.081)	
Shanghai (China)	20.627		0.081		0.495	*
	(10.968)		(0.262)		(0.231)	

Notes: * p < . 05, ** p < .01, *** p < .001. Coefficients represent the estimated increase in a given post-score student outcome associated with a one-unit increase in the student-reported OTL "Reasoning" subscale, adjusted for students' pre-unit scores, demographic characteristics and classroom averages of these characteristics.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

StatLink https://doi.org/10.1787/888934188215

OTL, and subtopics within OTL, may impact student learning in two ways. First, OTL can impact student learning by shaping and enabling quality teaching practices. Certain types of content matter may allow for either more efficient teaching practices to be implemented or ubiquitous teaching practices being implemented with higher quality. Framed differently, learning is supposed to depend on the quality of teaching, and the quality of teaching may in turn depend on the implemented curriculum.

Second, how students report their classroom experiences likely has a direct linkage to how well they acquire classroom content. This relationship rests on the assumption that content implemented in class and perceived by the students has a higher probability of being taken up and learnt by the students than content which is either not implemented or not perceived by students. Prior research from Carnoy et al. (2016[9]) which uses international data collected from TIMSS and PISA to connect the amount of time students spend on specific content and its prevalence in the curriculum suggests that this is a valid assumption.

Connections to prior literature on teaching practices and student outcomes

There is a rich literature on the linkage between observed teaching practices and student outcomes. However, few, if any, single studies match the breadth of settings, student outcomes and measurement modes contained in this analysis. Taken together, prior research finds that, similar to this study, observable

measures of teaching are modestly related to student outcomes; but, ultimately, the size and strength of these relationships are highly dependent on the context and design of any particular study.

Lipowsky et al. (2009[20]) examine the relationship between teaching practices and student achievement over the duration of a unit on the Pythagorean theorem, finding that two of the three domains of teaching practice they examined (classroom management and cognitive activation, the latter being akin to the instruction domain used in the present study) were significantly, but modestly, associated with student post-test performance after accounting for pre-test measures and other student characteristics.

With its use of a single focal unit, Lipowsky et al. (2009[20]) is structurally similar to the present Study, albeit only conducted in the context of one country (Germany*) compared to the eight countries/economies included in the present study in addition top other differences in study implementation. The ability to examine relationships, or lack thereof, across multiple educational settings and variation in study implementation across those settings, grants a deeper, more nuanced understanding of how teaching and learning are related that might be missed if studies are conducted only within a single context. Importantly, were this study to focus exclusively on Colombian classrooms, where two out of three domains of teaching practice were significantly associated with student test score growth, the results would be comparable to those in Lipowsky et al. (2009[20]); However, the ability to study classrooms across multiple countries/economies grants insight into the generalisability, or lack thereof, of the relationships between practice and outcomes, highlighting the importance of context when considering how best to support students through classroom instruction.

A number of studies in the United States. settings examine how observation-based measures of classroom instruction relate to student attainment, focusing on student growth over the course of an academic year. Bell et al. (2012[21]) use the Classroom Assessment Scoring System (CLASS) to study how teaching practices and student achievement are related in classrooms teaching algebra, finding that one (classroom organisation) of the three (emotional support, instructional support) domains of practice were significantly related to student test scores, modelled similarly to how the student growth analyses are conducted in this study. Similarly, the multi-state Measures of Effective Teaching (MET) Project (Bill & Melinda Gates Foundation, 2012[22]) calculates correlations between classroom observation scores and test score based "value-added" measures, finding that teachers' total observation scores were not significantly related to value-added measures in either mathematics or English language arts.

While much of the prior literature focused on the relationships between observed teaching practices and test scores, Blazar and Kraft (2017[23]) aggregated data over the course of three years to study how observed measures of mathematics teaching are related to both student test score and dispositional outcomes in nearly 300 elementary classrooms in the United States. The authors use a combination of the CLASS and MQI observation systems to define four domains of mathematics teaching and examine how these measures relate to student performance on both low- and high-stakes assessments of mathematics knowledge, in addition to student-reported dispositional measures of self-efficacy, happiness and behaviour. Similar to the present Study, the authors found that measures of instructional practice were most consistently related to student self-efficacy across the classrooms in their sample, with weaker relationships between practices, happiness and behaviour, and no significant relationships with student performance on a low stakes mathematics assessment.

Several studies support the collection of teachers' teaching materials as a valid process for examining classroom practice and one that can yield information that is distinct from observation-based measures (Borko et al., 2005[24]; Martínez, Borko and Stecher, 2012[25]), though there is a smaller body of literature that directly examines whether these materials successfully predict student achievement scores (Martínez, Borko and Stecher, 2012[25]). To this end, albeit with largely null findings, the present Study contributes substantially to the body of research on teaching materials and student outcomes. Future research on teaching materials should consider the ways teachers interact, modify and implement materials as possible mediating factors in how materials ultimately affect student outcomes.

One study that emphasises the importance of both international and national studies of the relationship between teaching and outcomes is the TALIS-PISA link study (Le Donné, Fraser and Bousquet, 2016[26]). Importantly, the TALIS-PISA link differs from this study in that the study is purely cross-sectional and does not include measures of students' baseline outcomes and it uses teacher reports, rather than video observation and teaching materials, to construct measures of teaching practice (active learning, cognitive activation and teacher-directed instruction). The authors identify significant positive relationships between teachers' reported use of cognitive activation and mathematics achievement in four out of the eight countries included in the Study, but inconsistent significance, magnitude and, for non-test score outcomes, even directionality of relationships between outcomes and teaching practices.

Ultimately, while prior literature in this area speaks to the potential for teaching practices to make a moderate impact on different types of student outcomes, how teaching and learning relate varies greatly across countries and modes of measurement. In finding evidence of prevalent, but not sample-wide, relationships between teaching practices and outcomes, the findings presented in this report emphasise the importance of understanding the unique educational context of different educational settings when developing methods for measuring and improving teaching.

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Annex 7.A. Chapter tables

Annex Table 7.A.1. Relationships between observed teaching practices and post-unit student outcomes

	Test scores						Personal interest in mathematics						Self-efficacy					
	Classroom management		Social-emotional support		Instruction		Classroom management		Social-emotional support		Instruction		Classroom management		Social-emotional support		Instruction	
B-M-V (Chile)	8.43		3.90		19.10	**	0.31	**	0.24	**	0.12		0.24	*	0.11		0.32	*
	(5.52)		(4.37)		(6.44)		(0.11)		(0.08)		(0.11)		(0.11)		(0.08)		(0.13)	
Colombia	0.24		2.10		7.18	**	0.24		0.19	**	0.10		0.10		0.08		0.24	*
	(3.07)		(1.84)		(2.55)		(0.14)		(0.07)		(0.10)		(0.15)		(0.08)		(0.09)	
England (UK)	13.33	**	6.52		8.26		0.34		0.18		0.18		0.21		0.03		0.04	
	(4.39)		(3.55)		(5.08)		(0.18)		(0.10)		(0.10)		(0.18)		(0.09)		(0.12)	
Germany*	6.87		-0.12		0.66		-0.29		0.01		-0.29		-0.04		0.08		-0.06	
	(4.83)		(2.65)		(4.10)		(0.27)		(0.17)		(0.18)		(0.18)		(0.13)		(0.13)	
K-S-T (Japan)	22.41	**	1.48		12.00	***	0.04		0.02		0.14		-0.01		-0.10		0.04	
	(7.01)		(3.93)		(3.15)		(0.24)		(0.11)		(0.09)		(0.19)		(0.09)		(0.07)	
Madrid (Spain)	3.29		1.74		5.75		0.55	*	0.26	**	0.02		0.54	*	0.12		-0.03	
	(4.12)		(1.94)		(3.41)		(0.23)		(0.08)		(0.18)		(0.21)		(0.08)		(0.16)	
Mexico	3.00		4.38	*	3.67	*	0.09		0.06		0.15		0.21	*	0.16	*	0.22	**
	(1.99)		(1.68)		(1.81)		(0.10)		(0.09)		(0.09)		(0.09)		(0.06)		(0.07)	
Shanghai (China)	1.98		12.20		15.92	*	0.49		0.33	***	0.61	***	0.61		0.51	***	0.61	***
	(21.04)		(6.61)		(7.47)		(0.39)		(0.08)		(0.11)		(0.46)		(0.09)		(0.14)	

Notes: * p < . 05, ** p < .01, *** p < .001. Regression coefficients represent the estimated association between a given student outcome and a one-unit increase in the measure of teaching practice. Standard errors are in parentheses below regression coefficients.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Annex Table 7.A.2. Relationships between observed teaching practices and growth in student outcomes, controlling by students' background and pre-unit scores

	Test scores						Personal interest in mathematics						Self-efficacy					
	Classroom management		Social-emotional support		Instruction		Classroom Management		Social-emotional support		Instruction		Classroom management		Social-emotional support		Instruction	
B-M-V (Chile)	0.78		1.65		-1.59		0.29	*	0.23	**	0.07		0.16		0.09		0.08	
	(2.02)		(1.51)		(2.75)		(0.12)		(0.08)		(0.12)		(0.10)		(0.06)		(0.12)	
Colombia	3.58		2.74	*	4.22	**	0.06		0.14	*	0.14		-0.01		0.14	*	0.17	*
	(2.04)		(1.17)		(1.46)		(0.15)		(0.07)		(0.08)		(0.12)		(0.06)		(0.07)	
England (UK)	1.32		1.70		0.18		0.42	*	0.28	**	0.13		0.28	*	0.12		0.07	
	(1.95)		(1.12)		(1.62)		(0.16)		(0.10)		(0.11)		(0.14)		(0.07)		(0.10)	
Germany*	1.63		1.94		2.29		-0.36		0.02		-0.60	***	-0.02		0.14		-0.15	
	(3.21)		(2.06)		(2.55)		(0.19)		(0.14)		(0.16)		(0.16)		(0.12)		(0.13)	
K-S-T (Japan)	3.04		-0.38		1.48		-0.04		0.00		0.06		-0.12		-0.12		-0.08	
	(4.72)		(2.18)		(2.33)		(0.18)		(0.09)		(0.09)		(0.16)		(0.07)		(0.07)	
Madrid (Spain)	-1.13		1.12		1.07		0.56	*	0.25	**	-0.02		0.54	**	0.22	*	-0.12	
	(3.22)		(1.60)		(3.09)		(0.23)		(0.09)		(0.15)		(0.19)		(0.09)		(0.16)	
Mexico	1.15		1.86		1.59		0.12		0.06		0.14		0.24	*	0.15	*	0.21	**
	(1.07)		(1.04)		(1.22)		(0.12)		(0.08)		(0.09)		(0.10)		(0.06)		(0.08)	
Shanghai (China)	15.51		-2.34		-0.16		0.50		0.14		0.39	***	0.59	*	0.23	**	0.26	*
	(12.24)		(3.76)		(4.78)		(0.27)		(0.07)		(0.11)		(0.24)		(0.07)		(0.11)	

Notes: * p < . 05, ** p < .01, *** p < .001. Regression coefficients represent the estimated association between a given student outcome and a one-unit increase in the measure of teaching practice, adjusted for students' pre-unit scores, demographic characteristics and classroom averages of these characteristics. Standard errors are in parentheses below regression coefficients.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Notes

[1] All regression models use “zero imputation” methods to account for missing values of independent variables and use school clustered standard errors to account for the nesting of students within schools. Readers interested in full model specification should reference the Technical Report or Data User Guide for additional information.

[2] Data for Madrid (Spain) needs to be interpreted with caution. Fielding issues did not allow for a reliable comparison of pre- and post-measures at an individual or classroom level.

[3] Germany* refers to a convenience sample of volunteer schools.

[4] The term “growth model” is not to be confused with a longitudinal growth curve model, and rather, is used only to refer to the fact that students’ pre-unit scores are used as a control variable when estimating the relationship between teaching practices and post-unit scores. Readers interested in full model specification should reference the Technical Report or Data User Guide for additional information.

8 Insights and interpretations

Anna Pons and Lawrence Houldsworth

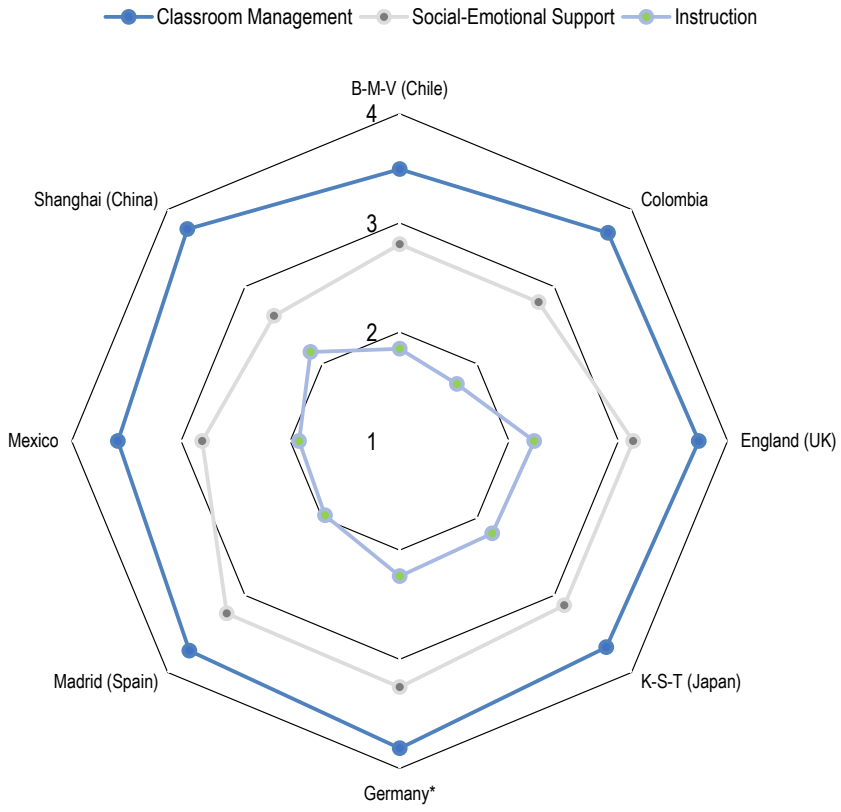
The Study offers a unique window into the classroom at an international scale. It provides a rare description of the intricate and complex nature of teaching. This chapter outlines the broad trends in classroom teaching that the Study finds from examining different contexts and school systems, and highlights directions that can be pursued to take teaching forward.

Improving teaching to raise student outcomes

Improving the quality of teaching is the key to ensuring that all students develop the knowledge and skills that help them reach their full potential. Observing the variation in teaching practices both within and across countries, and linking this to the outcomes achieved is the key to understanding quality in teaching. This is what the present Study is about. It offers a rare window into the classrooms of the world, through observing the intricate and complex nature of teaching, and documenting the observations within an internationally agreed framework. Its findings capture the broad trends of classroom teaching in different contexts and school systems and can provide insights on areas of strength in teachers' practice, as well as highlighting potential opportunities for improvement and growth.

Figure 8.1 shows the mean score for each participating country/economy in the three domains of teaching based on classroom observation scores. Overall, teachers excelled at managing the classroom, gave students some social-emotional support and provided them with reasonable instructional quality.

Figure 8.1. The quality of teaching practices varies, by domains of practice



Notes: The figure shows domain scores based on components. Components were rated holistically on a four-point scale, ranging from low quality (score 1) to high quality (score 4) and then averaged over raters, lessons, classrooms and components to the domain level.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Managing classrooms

Today, the long-standing image of a teacher at the front of a classroom providing instruction and maintaining order is still largely true. Whole class instruction (frontal teaching) was observed in over 88% of lesson segments across all countries/economies. In England (UK), Kumagaya, Shizuoka and Toda (Japan) (hereafter "K-S-T [Japan]"), and Shanghai (China), frontal teaching occurred in combination with individual seatwork activities in the majority of the observed lesson segments.

Other types of classroom structures less infrequent. For instance, student collaboration – whether in pairs or in small groups of three or more students – appeared in less than 22% of lesson segments across participating countries/economies.

Teachers' classroom management practices seem to work well in long-standing structures. The average classroom observed had very well organised and efficient routines in place. Teachers sometimes or frequently engaged in monitoring student behaviours and when disruptions occurred virtually all teachers handled them quickly and effectively such that, while students' focus on mathematics was momentarily interrupted, the learning time lost was very limited. When surveyed, both teachers and students agreed that classrooms were very well managed.

Creating social-emotionally supportive environments

Ensuring a safe environment in which students are treated with respect and dignity and where they reciprocate this to their peers is an important condition for creating a classroom conducive to learning. High levels of respect were observed in interactions between teachers and students and in interactions between students in virtually all classrooms. Negative interactions, such as threats or degrading comments, were neither observed nor reported by teachers and students, suggesting that respectful environments are being nurtured in many classrooms.

Nine out of ten classrooms were neither very cold and distant nor very warm and encouraging environments. The important relationship between social-emotional support and student cognitive and non-cognitive outcomes discussed in Chapter 4 suggests that teachers could consider further ways to foster greater shared warmth (e.g. smiling, laughter) and to make encouragement more constructive, focused and meaningful (e.g. reassurance, constructive praise), to help students build the motivation, self-belief and interest that will allow them to become confident and resilient lifelong learners.

The Study captured different ways to go about delivering opportunities for social-emotional support in the classroom. For example, when students encountered errors, teachers responded in different ways. Most teachers in Germany*[1] (92%), Mexico (84%) and Biobío, Metropolitana and Valparaíso (Chile) (hereafter "B-M-V [Chile]") (76%) provided some support and encouragement to help students to persist in their efforts to try to overcome these errors. In other participating countries/economies, however, the majority of teachers' immediate reaction to students' errors was either to address them in a limited way or not address them at all.

Teaching for deeper learning

The overall quality of instruction observed in classrooms was lower than that of classroom management and social-emotional support in all countries/economies. Instruction is a rich, multifaceted domain of teaching which is directly related to how much students learn. In the present Study, it was broken down into practices related to subject matter, the depth of students' cognitive engagement, teachers' assessments of and responses to students' understanding, and students' participation in the classroom's discourse.

Students had some opportunities to explore the rich, interconnected nature of mathematics and develop a robust and deep understanding. They learnt different representations of quadratics and different methods

for solving them. In the majority of classrooms, at least one loose connection was made between different aspects of quadratics or other aspects of mathematics, but connections to real world contexts were infrequent. Also, teachers tended to tell students what activities they would work on but it was rarer that teachers specified what students were expected to learn, which might further focus students' efforts.

The level of cognitive challenge can be increased in most classrooms. Students had many opportunities to practise a particular skill or procedure repeatedly to help them to develop fluency. They were sometimes asked to take on cognitively demanding tasks in 53% of classrooms in K-S-T (Japan) and in a minority of classrooms in Germany* (12%), Mexico (9%) and England (UK) (8%). Students were seldom required to use more than one mathematical approach to complete a task or to compare and contrast different approaches, which Chapter 5 identified as important, and the majority of students were occasionally or never asked to engage in understanding the rationale behind using different procedures and processes.

Students' thinking was superficially assessed and responded to. Teachers frequently elicited moderate levels of student thinking and, sometimes used that thinking instructionally to respond to students' needs and levels of understanding. They regularly provided students with feedback, although a minority did so in a frequent and complete way. For example, few teachers in Germany* (18%), Madrid (Spain) (16%), England (UK) (8%), K-S-T (Japan) (8%), Mexico (7%) and Shanghai (China) (5%) provided feedback about why the mathematical procedures and processes were correct or incorrect.

Students more often engaged in classroom discussions to repeat previously learnt ideas or steps rather than to share their thoughts on different concepts, justifications or analysis. Classrooms contained few questions that encouraged analysis, synthesis and other more complex mathematical actions, again aspects that Chapter 5 identified as important. Students were engaged in lengthy explanations of deeper mathematics in about 55% of classrooms in Shanghai (China) and K-S-T (Japan), and in some classrooms in England (UK) (24%), Madrid (Spain) (19%), Germany* (18%), B-M-V (Chile) (13%), Colombia (8%) and Mexico (7%).

There was little use of research-based practices in the lessons observed. Few instances were observed of idea-based discussions where the teacher guides the conversation towards a learning goal; of metacognitive prompting to encourage students to think about their thinking; or of self-assessment to help them reflect on their understanding of the content or their learning. This raises the important question of how to help research findings reach the classroom, and vice versa.

Blending physical and digital learning environments

Most teachers frequently used technology for communication purposes. For example, they used technology such as power point slides, overhead projectors or document visualisers, to convey information to the class. As for students, they did not use any technology in four out of five classrooms in all countries/economies but Germany* (56%).

Nevertheless, technology can also be used to teach differently, and the Covid-19 pandemic has highlighted the importance of using technology innovatively to better support self-directed learning and deeper conceptual understanding. The digital learning space can be used to enhance and extend the learning environment in powerful ways. Only a small proportion of classrooms in the Study used technology to support students' conceptual understanding: England (UK) (21%), Mexico (19%), Colombia (14%), K-S-T (Japan) (12%), Madrid (Spain) (11%), Germany* (10%), Shanghai (China) (8%), B-M-V Chile (5%). In these classrooms, teachers used technology to aid analysis, evaluation and creation of work or to focus on the underlying logic of procedures and processes.

Drawing on high quality teaching materials

Much like the findings from the observation of lessons, there were large differences between and within countries/economies in terms of the quality of the teaching materials evaluated by the Study. Teaching materials included lesson plans, visual aids, handouts, textbook pages and student assignments.

Some practices were widely documented across countries/economies. Teaching materials contained evidence of opportunities to practise and develop fluency with specific skills or procedures in all eight countries/economies. In seven countries/economies, half of the teachers typically provided more than five opportunities to practise. Similarly, in all countries/economies, with the exception of Shanghai (China), teachers tended to use teaching materials that made explicit connections among multiple representations.

Other practices varied considerably either between or within countries/economies. Only in Germany*, K-S-T (Japan), Mexico and Shanghai (China) was there evidence that the majority of teachers used teaching materials that asked students to explain their thinking in at least one lesson. Similarly, in England (UK), Germany*, K-S-T (Japan), Mexico and Shanghai (China), the majority of teachers used teaching materials that asked students to identify patterns or articulate generalisations in at least one lesson, but this was more uncommon in other participating countries/economies. Except for in Shanghai (China), teachers in all countries/economies also did not consistently specify learning goals in teaching materials.

The Study also found that some practices were primarily absent from teaching materials. It was rare that teaching materials contained evidence of connections to real world contexts in more than one lesson and there were few opportunities in teaching materials for students to engage in self-assessment. The use of technology as a tool to develop understanding of mathematical concepts and relationships was also largely limited in teaching materials.

Identifying what works in the classroom

The Study also sheds light on how practices are related to student cognitive and non-cognitive outcomes. It shows that the quality of instructional practices has a significant effect on student learning before accounting for students' backgrounds.

However, higher levels of instructional quality were generally found among classes with higher levels of prior achievement. By the time that students encounter quadratic equations, teaching effects are confounded with those of students' predispositions and backgrounds as well as their prior knowledge; when taking measures of the latter into consideration the impact of teaching on student cognitive growth weakens considerably.

With regard to non-cognitive outcomes, the findings of the Study suggest that what teachers do in the classroom is potentially a significant lever for affecting students' beliefs and dispositions. Students were more likely to be interested in mathematics when they were in classrooms with higher levels of classroom management and social-emotional support in half of the countries/economies, even when controlling for background characteristics and prior interest. Moreover, higher exposure to these practices can lead to greater growth in student self-efficacy, with the Study finding a similar effect for instructional practices in some countries too.

Understanding teachers' professional learning and development needs

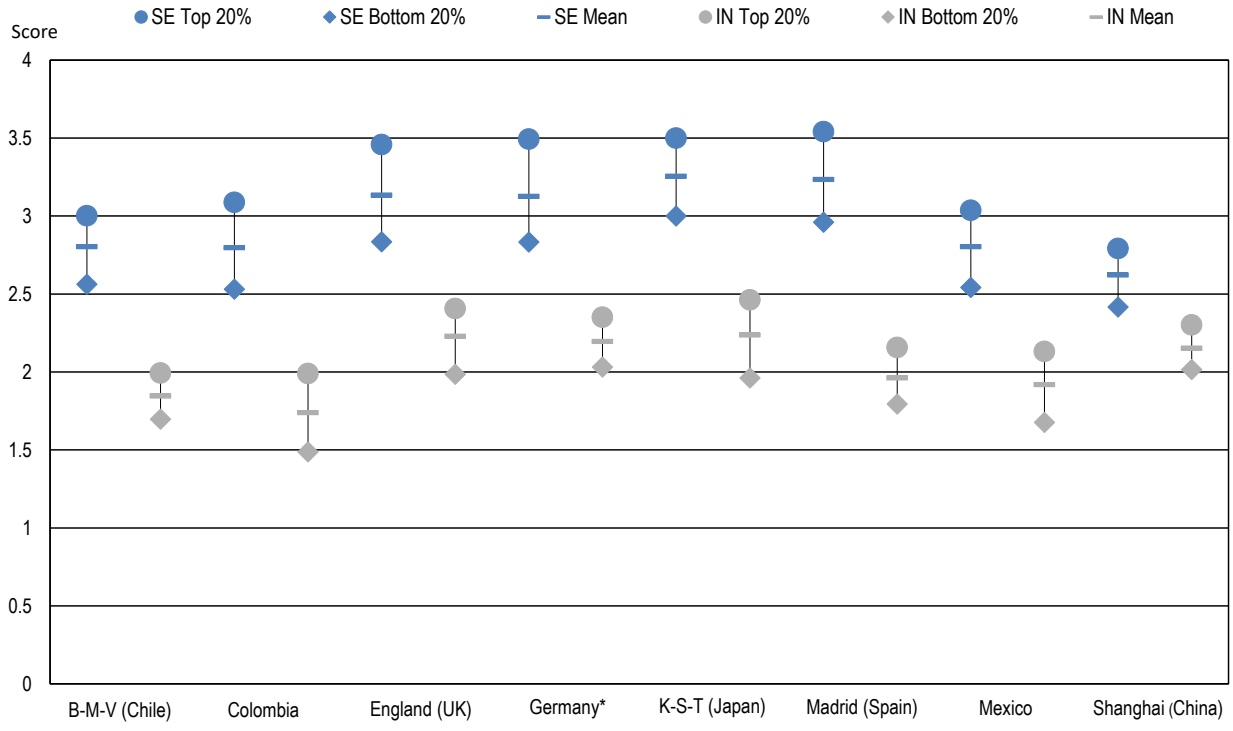
Even the best prepared teacher will always have to keep on learning. Professional development opportunities are key to keeping teachers' skills and knowledge up-to-date and continually refining and enhancing their practices. By looking into the quality of practices, the Study offers insights on where

teachers' greatest development needs may lie and what proportion of teachers could benefit the most from further refining their skills in those areas of teaching.

All teachers can continue to grow

All teachers can further develop in almost every practice. Figure 8.2 show on a four-point scale the observed quality of practice in classrooms at three different levels: at the average, at the top 20% and at the bottom 20% of the distribution. Every teacher in all countries/economies – even those with the highest level of practice – has considerable scope to further refine their skills, particularly on social-emotional and instructional practices. Mastering practice requires teachers to continually hone their craft as technology, professional skills and knowledge advance (Lampert, 2003[1]; Ingersoll and Collins, 2018[2]) as well as when their classrooms present them with new challenges.

Figure 8.2. Differences in the quality of social-emotional and instructional practices at the classroom level



Notes: SE (blue) and IN (grey) refer to the domain score for social-emotional support and instruction, respectively.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Focusing on specific areas of teaching

Teaching is complex and the Study suggests that teachers generally struggle with some practices more than others (Figure 8.1). For example, virtually all teachers have already mastered classroom management practices in long standing classrooms structures. Additional training on classroom management is likely to be of little relevance for the vast majority of teachers, unless it is focused on the specific needs of teachers who face particularly challenging classroom contexts or those who are interested in adopting non-traditional classroom structures.

In contrast, the present Study suggests that there is scope for improving instructional and social-emotional practices in many classrooms. In particular, further development opportunities specifically focused on how mathematical content is taught as well as how teachers cognitively engaging students may be of relevance. Teacher development programmes, therefore, should not focus equally on all aspects of teaching.

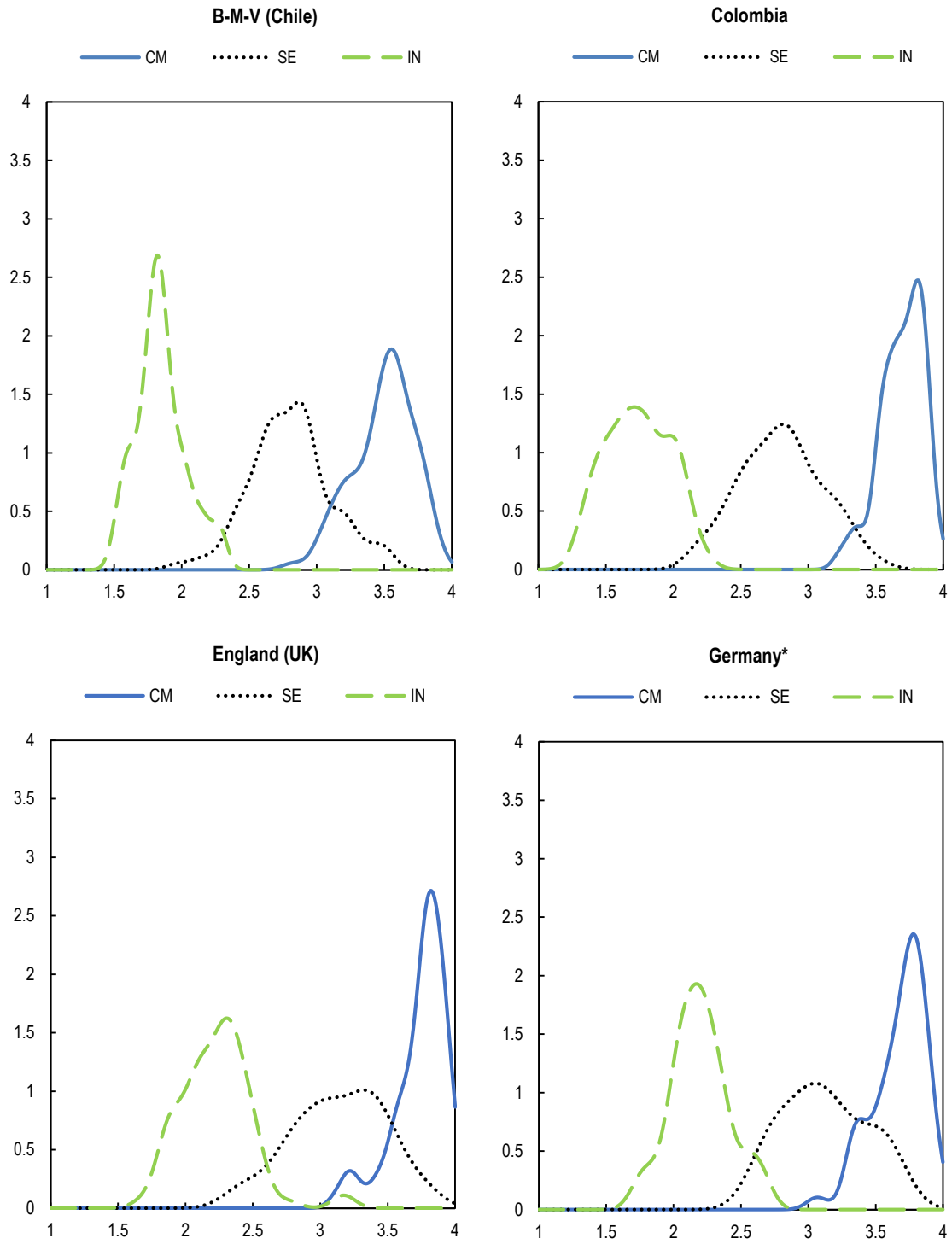
Targeting professional development opportunities

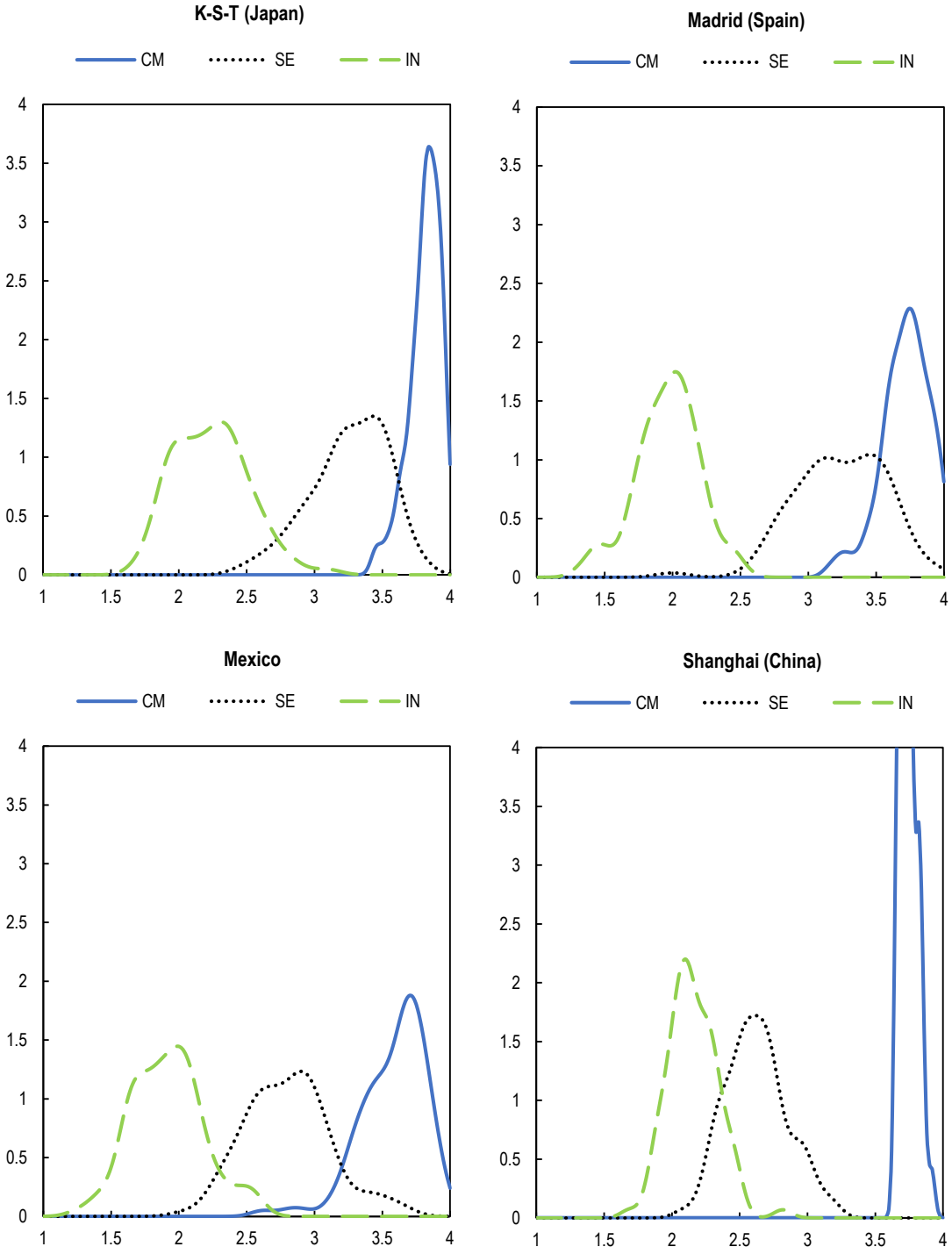
The Study suggests that every teacher has unique professional development needs. Figure 8.3 shows the distribution of the quality of teaching practice within countries/economies. A flat curve means that the quality of practice observed is very different across individual teachers and thus the support needed to refine them is likely to differ too. In contrast, a curve with a peak means that most teachers tend to have the same quality of practice and thus support can be less targeted.

Supporting teachers with the particular practices they are struggling to master would increase the likelihood that this support improves teaching and raises student outcomes.

Figure 8.3. The quality of instruction, classroom management and social-emotional support practices largely varies

Distribution of teachers by the mean scores in each domain of teaching





Notes: CM, SE and IN refer to the domain score for classroom management, social-emotional support and instruction, respectively.
This figure includes smoothed histograms of classroom scores using an interval size of 0.02 score points. The y-axis is density.
The more peaked the curve is, the more classrooms have mean scores concentrated around a few score points (i.e. the more densely populated is that range under the curve).
The density curves are meant to convey the general shape of the distributions.
The classroom management curve for Shanghai (China) is truncated at y=4.0; it peaks at a density of 5.94 for the classroom mean score of 3.74.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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Preparing new teachers for the challenge of the classroom

The complexity of teaching and the time and sustained effort it takes to master make the initial years of teaching a particularly hard and testing period. However, the observed quality of classroom management, social-emotional practices and instructional practices for teachers with less than three years of experience was only slightly lower than that of more experienced teachers in all countries/economies. These differences were significant only in B-M-V (Chile) and Mexico for classroom management and in B-M-V (Chile) for social-emotional practices.

Teachers learn and develop many of the skills and practices that they will use throughout their careers in this initial period (OECD, 2019[3]). Providing novice teachers with a solid knowledge base, which is grounded in classroom pedagogy and practical skills linked to theoretical knowledge, is important for the quality of teaching that they will eventually deliver in the classroom (OECD, 2019[3]; Guerriero, 2017[4]).

Taking multiple measures to understand the quality of teaching

The challenge for education systems is to move towards a more fine-grained approach to identify teachers' development needs. To this end, the Study shows the importance of considering different sources of information to build a more accurate and detailed account of the quality of teaching. The Study measured the quality of instruction from four different perspectives: observations of lessons, analyses of lesson materials (including lesson plans, visual aids, handouts and student assignments), teacher questionnaires and student questionnaires.

The Study finds that teachers tend to report positive views about every aspect of their teaching. Notably, these are often more positive than those reported by their students, suggesting that tools which make teachers aware of their own practice, such as through lesson study, mutual classroom observation or collaborative professional development, are important. The Study also suggests that the views of an independent observer can be beneficial alongside those of the teacher or their students. For example, while teachers' and students' perceptions of classroom disruptions appeared to align with the views of the independent observer, independent observers perceived the quality of instruction or the level of warmth and encouragement often quite differently.

Empowering the profession to grow and develop

Among teachers participating in the Study, well-established forms of professional development (e.g. courses, conferences) were prevalent in all countries/economies. Yet, the variation in the quality of practices within countries/economies points to considerable opportunities for teachers themselves to share classroom expertise and know-how.

Building on each other's strengths

The study data suggests that teachers often varied in their performance across the three different domains of practice that the Study measures, as shows in Table 8.1. Teachers who excelled in one domain did not necessarily perform well in other domains.

Table 8.1. The interrelations between teaching domains

	Classroom management and social-emotional support	Classroom management and instruction	Social-emotional support and instruction
B-M-V (Chile)	0.45	0.47	0.35
Colombia	0.42	0.30	0.50
England (UK)	0.68	0.43	0.43
Germany*	0.15	0.17	0.22
K-S-T (Japan)	0.45	0.40	0.52
Madrid (Spain)	0.40	0.22	0.32
Mexico	0.35	0.36	0.51
Shanghai (China)	0.09	0.19	0.59

Notes: The limited differences in classroom management scores among teachers in Shanghai (China), or low variability in those scores, results in the small (near 0) correlations between classroom management scores and scores in the other two domains.
*Germany refers to a convenience sample of volunteer schools.
Source: OECD, Global Teaching InSights Database.

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A teacher might be very strong at explaining how to solve a quadratic equation by completing the square but struggle to provide students with the encouragement they need to persist through challenges and difficulties. These weak to moderate interrelations across domains of practice suggest that teachers have different strengths which they could collectively draw upon. Professional learning opportunities can help teachers come together to collaborate, co-design and dialogue around classroom practice for collective professional growth.

Learning to notice and reflect about practice through observation

The potential of classroom observation to improve teaching practice seems largely untapped. When asked how often their instruction had been videotaped during their career as a teacher, the vast majority of teachers who participated in the Study reported three or fewer times: Madrid (Spain) (97%), Germany* (96%), Colombia (95%), Mexico (95%), B-M-V (Chile) (84%), England (UK) (83%), K-S-T (Japan) (73%) and Shanghai (China) (57%). Observing their own teaching can help teachers identify the specific areas of practice that need improvement grounded in concrete examples and evidence from their own classroom.

Meanwhile, observing other teachers can also hold a mirror up to a teacher's own individual practice, helping them reflect and reason on what they do in the classroom and how it impacts their students. Yet, when asked how often their classes had been observed by others in a typical school year, less than one third of teachers who participated in the Study reported having been observed frequently: England (UK) (29%), K-S-T (Japan) (18%), Germany* (14%), B-M-V (Chile) (14%), Mexico (10%), Madrid (Spain) (7%) and Colombia (4%). The only exception was Shanghai (China) where 39% reported their classroom being observed by others frequently.

In particular, observation has the potential to bring the complex and creative nature of the job to life. Directly looking at practice can make the many small yet powerful things that teachers do, for example to capture students' imagination, foster engagement or spur thinking, far more tangible. There were many examples from teachers who participated in the Study. A Colombian teacher immersed students in real world applications of quadratic equations by asking students to role-play a problem on economic yields in agriculture. A Spanish teacher brought in the rich history of mathematics to answer a demanding question. A Mexican teacher sang a hit song and adjusted the lyrics as a memory aide for students who had been

struggling to remember the procedures of the quadratic formula. A Japanese teacher explained quadratics by exploring the cross-sectional area of a bundle of noodles to engage students and to reiterate the important role of mathematics in their daily lives. A Chinese teacher introduced how to apply quadratics to geometrical problems by discussing the hard work of the women's volleyball team to become Olympic champions.

Designing quality teaching materials

Despite examining only one particular topic of mathematics, the Study findings show considerable variation in the quality of teaching materials both within and between countries. One potential way to improve the quality of teaching materials could be for teachers to collaborate in exchanging and designing them.

Across the eight participating countries/economies of the Study, about two-thirds of teachers in England (UK) (73%), Shanghai (China) (71%), Madrid (Spain) (66%) and B-M-V (Chile) (64%) report that they frequently ("at least once a month ") engage in this form of collaboration. In Germany*, just over half of teachers (54%) reported engaging in this type of collaboration at least once a month. However, in K-S-T (Japan) (39%), Mexico (33%) and Colombia (16%) a smaller proportion of teachers exchange teaching materials with colleagues at least once a month. Greater levels of collaboration and dialogue around teaching materials could be rich opportunities for exchange and learning.

Strengthening teachers' confidence, satisfaction and well-being

How teachers feel is the foundation for a strong profession and building a world-class education system. Teachers who reported being more confident and motivated about their work tended to enact higher quality teaching practices in the Study. Similarly, teachers who reported higher levels of self-efficacy were significantly correlated with a higher level of social emotional support in Shanghai (China) (0.22), B-M-V (Chile) (0.24) and Germany* (0.36).

Teachers' occupational well-being is also likely to influence the effectiveness of their classroom teaching. Teaching is an extremely demanding job that requires a great deal of emotional and physical energy. A teacher's affective experiences, both positive and negative, shape the social and emotional climate of their classroom. Classes taught by teachers who reported higher level of anger scored significantly lower in social-emotional support in England (UK) (-0.31), Madrid (Spain) (-0.28), Shanghai (China) (-0.27) and B-M-V (Chile) (-0.20). In addition, classes taught by teacher who reported higher level of anxiety in Shanghai (-0.28) significantly lower scored in social-emotional support.. Thus, failing to adequately and properly cater to teachers' occupational well-being may have impacts on classroom practice and students.

Valuing teachers' work

Despite their important work, teachers do not feel recognised and appreciated. The overwhelming majority of teachers in the Study reported that they do not feel valued by society: B-M-V (Chile) (87%), Colombia (75%), England (UK) (65%), K-S-T (Japan) (75%), Madrid (Spain) (90%) and Mexico (68%). These figures are similar to the findings in the OECD Teaching and Learning International Survey (TALIS) and underline the importance of exploring ways to recognise teachers' work in order to help keep them motivated and support efforts to retain and nurture teachers to become accomplished professionals.

Ensuring high quality learning opportunities for all students

The quality of the teaching and learning opportunities students experience is instrumental in ensuring that students have the knowledge and the skills that will allow them, their communities and society to all thrive in the future.

Defining what students need to learn

Despite the fact that quadratic equations is just one topic of the mathematics curriculum, there were large differences in how countries and teachers approached its content. The mapping of the intended curricula across the eight participating countries/economies showed wide variation in how much time teachers were expected to invest in teaching the quadratic equations, ranging from sixteen lessons in Colombia to six lessons in Madrid (Spain). In most cases, the actual time spent on teaching quadratic equations was lower than that expected in the curriculum of each country/economy.

Teachers themselves also approached the topic in different ways. For example, teachers in Germany*, K-S-T (Japan) and Shanghai (China) placed a considerable emphasis on completing the square, the most difficult solving method in quadratic equations, whilst in other countries/economies this method was rare. A further example is the variation that the Study found in the sequencing of subtopics. Teachers in K-S-T (Japan) typically transitioned from first introducing quadratic equations to moving to solving them with the quadratic formula and then to working with applications. In Mexico, on the other hand, both the quadratic formula and applications were typically introduced earlier in the topic.

The content that students have the opportunity to learn shapes the bodies of knowledge that they develop and their ways of thinking. Variation in these opportunities to learn can reflect differences in terms of the expected depth and understanding of a topic in different educations systems as well as differences in pedagogical approaches. Further investigating these differences is important for better understanding and designing the learning experiences students encounter in the classroom.

Building a shared understanding about quality teaching

The amount of variation observed in the quality of teaching within each country suggests that considerable differences in teaching quality exist between classrooms, even within countries. An exception is Shanghai (China) where the variation in the quality of teaching practices is the lowest among participating countries/economies (Figure 8.1). Because there are few differences in teaching quality, students in Shanghai (China) are more likely to receive the same learning opportunities no matter what classroom they are in.

The case of Shanghai (China) shows that supporting all teachers to perform at similarly high levels, in any of the domains of teaching practice, is possible. By developing a shared vision for what a teacher should know and be able to do in the classroom, teaching standards can help align the efforts of all stakeholders in an education system around quality teaching for all, from how systems attract and retain teachers to how they train and develop them.

Providing more equitable learning opportunities

Much like in large-scale studies, the quality of classroom teaching and learning opportunities that students receive varies by socio-economic background in the Study. Students from an advantaged background are significantly more likely to be exposed to higher quality instructional practices in B-M-V (Chile) and Madrid (Spain) and to better social-emotional practices in Shanghai (China).

The findings also show that traditional measures of teaching quality – such as qualifications and experience – might not be strong grounds from which to devise recruitment or allocation mechanisms to the most disadvantaged schools. With the exception of those teachers in their very first years of practice, teachers who had five, fifteen or thirty years of experience showed no significant difference in the quality of the practices observed in all participating countries/economies. A similar picture emerges when considering teacher qualifications. If high quality learning opportunities are to be equitably available, the education community needs more refined and detailed measures of quality teaching and a more

comprehensive understanding of what can best support students from diverse backgrounds in the classroom.

Looking beyond country borders to further our understanding of teaching and learning

The findings of the Study show how much there is still to understand about teaching and learning, but the global outlook of the Study also points to promising avenues that may lead to a more robust and detailed understanding of the nuanced and intricate relationship between the two.

Every country has something to learn

Teaching is complex and multidimensional and the Study finds that no country/economy excels at everything. Figure 8.1 shows that there was variation between countries, with some countries demonstrating higher average quality than others in certain teaching practices and simultaneously lower average quality in other practices. Looking outwards at different countries, systems and settings can provide valuable insights on what may work in different classrooms and present opportunities to reflect on practice.

There is a world of difference in teaching to be explored

The Study shows that there are many important differences across countries in how teachers approach a single curriculum topic. This finding is in alignment with previous international studies, whether they draw upon socio-cultural analysis, video sources or large datasets.

However, the education community has only scratched the surface of these differences. Practitioners and policy makers alike do not yet have a detailed understanding of the full scope of these differences, how they arise and their implications. Engaging in international learning between systems can allow for differences like these to be identified and better understood. Furthermore, it also has the potential to spur new ways of teaching, to question well-entrenched national pedagogies and to provide the inspiration that is needed to reimagine education for a future yet to come.

Fostering classroom-based research and collaboration across borders

These large differences across countries are also a challenge for the global education community. A major achievement of the Study is that a large group of observers from different countries were able to observe teaching through the same lenses. When looking at the same evidence of teaching, they agreed on 89% of what was easy to observe and 53% of more complex teaching aspects. While teaching will always be contextual and culturally sensitive, the fact that a common framework can be developed to consistently analyse teaching is promising for greater cross-national dialogue.

In the digital age, teachers also have an unprecedented opportunity to collaborate, form communities of practice and share resources with peers from all over the world. The *OECD Global Teaching InSights* platform will provide classroom video examples, drawn from the Study, to illustrate teaching practices in a tangible and authentic way. It will provide a powerful resource for teachers and educators to discuss and collaborate at a global scale.

Focus on instruction to advance our understanding of teaching

In recent decades, there has been a lot of research targeted towards building a strong evidence-base on "what works" in teaching. Teaching quality has been measured in several ways, such as through

opportunities to learn (e.g. content coverage and time), the reported presence of "high leverage" practices (e.g. teacher and student questionnaires) and direct observation measures of teaching (e.g. lesson observations, video observations, teaching materials). Despite many advances, there is still a lot to understand, especially regarding how teaching impacts desired student outcomes.

In particular, understanding the more complex and nuanced aspects of instructional practices remains challenging. Even in the case of observational studies, most of the rubrics today still fail to sufficiently target important instructional aspects (Schoenfeld et al., 2018[5]). The Study has sought to break new methodological ground by observing teaching practices in greater depth and breadth, such as by measuring classroom discourse and analysing teaching materials for the first time at an international scale.

The data and lessons learnt from the Study can be of interest to researchers, policy makers and practitioners who are committed to furthering society's understanding of teaching and learning. An example of potential further research is provided by the city of Toda in Japan. Researchers are combining data from students who participated in both the Study and a regional longitudinal assessment of students' cognitive and non-cognitive skills. The preliminary findings show that when teachers showed more cognitive engagement practices, students reported being able to craft richer questions and to think more deeply about the topic at the end of the lesson than they could at the beginning (Toda City Educational Policy Think Tank, forthcoming[6]). In addition, students' cognitive and non-cognitive skills were higher.

However difficult, furthering our understanding of teaching and learning needs to be a priority going forward as it will be the key to improving quality and equity in learning outcomes. In particular, it is in the domain of instructional practice that the Study observed the greatest scope for improvement. Continuing to enter the classroom and bring stakeholders and practitioners together around observation can support efforts to further the quality of instructional practices. Although challenging, the Study has shown that it is possible to observe and measure teaching in the classroom space and to unpack the innate complexity of teaching, even across borders.

Such evidence can help teachers and policy-makers to not just look forward but also outwards. This is not about copying and pasting solutions from other countries; it is about looking seriously and dispassionately at good practice in our own countries and elsewhere to become knowledgeable of what works in which contexts and applying it consciously. In a fast-changing world, this may become a key distinction between the countries that will make progress in education and those that will not. The distinction may be between those educators and education systems that feel threatened by alternative ways of thinking and those that are open to the world and ready to learn from and with the world's education leaders.

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Notes

[1] Germany* refers to a convenience sample of volunteer schools.

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Global Teaching InSights

A VIDEO STUDY OF TEACHING

What does teaching look like? What practices are most impactful? By directly observing teaching in the classroom, this study trialled new research methods to shed light on these key questions for raising student outcomes around the world. This report provides a detailed account of classroom management, social and emotional support, and instructional practices in the classrooms of eight countries and economies, drawing upon the observation of lesson videos and instructional materials, the analysis of teacher and student questionnaires, and the measurement of students' cognitive and non-cognitive outcomes.



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