1 Overview: What TALIS insights about teacher allocation imply for policy

This report uses 2018 Teaching and Learning International Survey (TALIS) data to examine how teachers are distributed across different schools. By doing so, it provides important insights on the extent to which different students have access to effective teachers and good learning environments. This chapter briefly describes the analytical approach employed in the report, and then provides an overview of the report's main findings. The chapter ends with some recommendations for education policy that could lead to a more equitable allocation of teachers, and potentially, to a decrease in socio-economic inequalities in student outcomes.

Introduction

Equity in teaching and learning has been a central goal of education systems worldwide. One of the 17 Sustainable Development Goals (SDGs) adopted by United Nations member states as part of the 2030 Agenda for Sustainable Development is: ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all (United Nations, 2015[1]). Enabling all students to have access to the best education opportunities is a way of using resources effectively, and improving education and social outcomes in general (OECD, 2019, p. 42[2]). The COVID-19 pandemic and subsequent disruption in schooling has drawn further attention to the issue of inequities in education. Learning losses during school closures have been most severe among marginalised students (OECD, 2021[3]).

Succeeding in today's fast-changing world requires a wide range of skills and the capacity to continuously learn new ones. Poor or inadequate skills limit access to better-paying and more rewarding jobs and, more generally, to better living and health conditions, and greater social and political participation (Hanushek et al., 2015[4]; OECD, 2016[5]). Yet, in most education systems, students' individual circumstances over which they have no control, such as their parents' occupations, the language they speak at home or their place of birth, tend to be strong predictors of achievement in school (OECD, 2019, p. 42[2]). Analyses based on Programme for International Student Assessment (PISA) data show consistently that while many socio-economically disadvantaged students succeed at school, students from socio-economically advantaged family backgrounds tend to outperform their disadvantaged peers in all subjects (OECD, 2019[2]). Equity does not mean that all students must obtain equal outcomes; rather, it means that all students should be provided with the same opportunities so that differences in outcomes are not driven by factors that are outside of students' control (OECD, 2018[6]). To ensure such equality of opportunities it is often necessary to explicitly devote more resources to students who start at a disadvantage in order to level the playing field.

Previous TALIS reports have investigated to what extent disadvantaged children have equal opportunities in terms of access to effective teachers, effective curricula and effective teaching practices, and how schools can make up for students' disadvantaged backgrounds. The TALIS 2013 report explored how equitably experienced and trained teachers were distributed across different types of schools (OECD, 2014[7]). The first volume of the report on TALIS 2018 showed that teachers tend to work in more challenging schools (i.e. schools with a higher concentration of students from socio-economically disadvantaged homes and students with an immigrant background) when they are in the early years of their career (OECD, 2019[8]). It also showed that classroom time spent on actual teaching and learning is significantly lower in schools with less experienced teachers and with high concentrations of students from socio-economically disadvantaged homes, students with special education needs and immigrant students. The second volume of the report on TALIS 2018 indicated that teachers working in schools with a high concentration of socio-economically disadvantaged students are more likely to report a desire to change schools than those working in schools with lower concentrations of these students (OECD, 2020[9]). While past TALIS reports provided insights into the distribution of resources across schools, they covered a limited subset of teacher characteristics and practices.

Past analyses of PISA 2015 data also looked at equity by examining how teacher resources vary across different school profiles. These analyses showed that in 2015 a majority of countries and territories that participated in PISA compensated disadvantaged schools by providing them with more teacher resources – through smaller classes and/or lower student-teacher ratios. However, in more than a third of countries and territories, teachers in the most disadvantaged schools were less qualified or less experienced than those in the most advantaged schools (OECD, 2018[10]). Thus, in disadvantaged schools, teacher quality tends to be compensated for with quantity in terms of teaching resources.

This is important. Among all the things that schools can do to raise students' cognitive and social-emotional skills, teacher quality is by far the most effective (Hattie, 2009[11]; Rice, 2003[12]; Seidel and Shavelson, 2007[13]). A large body of research literature shows that teachers have a large impact on students'

outcomes (Aaronson, Barrow and Sander, 2007[14]; Jackson, Rockoff and Staiger, 2014[15]; Rivkin, Hanushek and Kain, 2005[16]). Moreover, the impact of teachers is long-lasting (Chetty et al., 2011[17]). Teacher impact is not limited to academic achievement or other cognitive outcomes either as there is now robust evidence that teachers can also raise students' social and emotional skills (Blazar and Kraft, 2017[18]; Jackson, 2018[19]).

Identifying what precisely makes teachers effective is much harder and still an active strand of investigation. Recent literature has stressed the importance of teachers-students match in terms of teacher characteristics and teaching practices, and students' characteristics and learning profiles (Dee, 2005[20]; Fairlie, Hoffmann and Oreopoulos, 2014[21]; Gershenson et al., 2018[22]; Gershenson, Holt and Papageorge, 2016[23]; Lim and Meer, 2017[24]). In other words, some teachers are more effective with some students than others, and some teaching practices work better with some students than with others.

That said, there are certain teacher characteristics and teaching practices more than others that, on average, are consistently associated with better student outcomes. These include teachers' experience; self-efficacy; ability to maximise instruction time; clarity of instruction; use of cognitive activation; and the content of their initial teaching education. Other factors that are important for students' outcomes do not depend on teachers but on principals and their ability to create effective learning communities. In environments where school leaders facilitate and complement teachers' work, the overall results are often greater than what the sum of the individual components would deliver elsewhere. Concrete actions that principals can take to create effective learning environments include managing the curriculum; attending to teachers' professional development needs; and creating a culture of collaboration. TALIS measures principals' capacity to be instructional leaders and the presence of teachers' mentoring systems in the school.

This report provides further insights into the allocation of effective teachers and students' unequal access to effective teaching practices and learning environments. The identification of effective teachers and teaching practices relies on proxy measures collected in TALIS and described in the previous paragraph. In doing so, it focuses on teacher and school resources in terms of quality rather than quantity. It also expands the range of teacher and school characteristics and practices analysed from an equity point of view compared to previous OECD reports. The report uses the terms allocation, distribution and sorting interchangeably. This is important to note as these terms can have slightly different meanings and evoke slightly different concepts. Teacher allocation, for instance, can be interpreted as the result of top-down choices over which teachers have little say; sorting, on the other hand, is often associated with the results of individual choices; distribution, finally, is probably the most neutral and descriptive term. As TALIS data do not allow disentanglement of the different mechanisms that lead to the observed distribution of teachers across schools in different countries, these terms are used interchangeably in this report and should be interpreted as having a neutral connotation.

Building on the literature that identifies characteristics and practices of teaching that boost students' achievement, this report shows how effective teachers and teaching practices tend to concentrate in certain kinds of schools. A special focus is devoted to teachers' ability to integrate information and communication technology (ICT) in their teaching and the actual use of ICT for teaching. The use of digital technology for teaching and learning can help students acquire digital skills, social-emotional skills and more standard cognitive skills such as numeracy and literacy. While teachers' reliance on ICT has increased considerably in the wake of the COVID-19 pandemic, available evidence also shows that learning losses have been the most severe among marginalised students since the health crises (OECD, 2021[3]). Looking at students' access to good quality digital infrastructure, equipment and teachers who were at ease with ICT in their teaching previous to the pandemic may fill in some blanks about these learning losses we see now. The report also investigates the extent to which students attending different types of schools – by concentration of students from socio-economically disadvantaged homes (i.e. disadvantaged versus advantaged schools),[1] school location (i.e. city schools versus rural schools)

and school governance (i.e. privately managed versus publicly managed schools)[2] – have different access to good teachers and teaching practices as well as effective learning environments.

By investigating how certain teachers and teaching practices are allocated across schools, and the extent to which all students have fair access to good teachers, teaching practices and learning environments, this report complements a recent PISA report that showed how students sorted by ability and socio-economic background across schools (OECD, 2019[25]). Concentration of good students in a restricted number of schools can increase inequalities to the extent that students benefit from being exposed to more able peers. In the same vein, the concentration of effective teachers in a limited number of schools can increase inequalities as only a minority of students will have access to effective teachers. Inequalities can also increase if effective teachers are more likely to teach in schools where students that are already advantaged are concentrated.

The same PISA report also explored whether school-choice policies can have consequences on the sorting of students, and whether they are associated with the effectiveness and equity of education systems (OECD, 2019[25]). The present report points out different aspects of education systems that can influence how teachers are allocated across schools. These include the degree of autonomy schools have in hiring, firing, and rewarding teachers, and the degree of competition they face in recruiting students. It also discusses the consequences that inequitable teacher allocation can have on average student achievement and socio-economic inequalities in student performance.

In sum, this report aims to address the following questions:

- Chapter 2: Do students have equitable access to effective teachers?
- Chapter 3: Do students have equitable access to digital learning in school?
- Chapter 4: How is the sorting of effective teachers and teaching practices related to inequalities in student outcomes? Are there system-level policies, such as school competition and school autonomy in hiring and dismissing teachers, and determining teachers' salaries that are associated with more even and equitable sorting of teachers across schools?

Equality or equity?

This report analyses students' access to effective teachers and teaching practices from two different angles:

- **Equality:** By investigating the extent to which teachers with certain traits are equally allocated across schools, the chapter addresses issues related to equality. This analysis focuses only on the characteristics of teachers. It disregards student characteristics as well as the fact that students themselves sort across schools based on their personal characteristics (OECD, 2019[25]). An equal distribution of good teachers results in students being evenly exposed to effective teaching. A more diverse teachers' body also helps teachers learn from their peers and improve their own practices when there is sufficient collaboration among teachers working in the same schools. This enriches peer learning through the exchange of ideas and interactions (Goddard, Goddard and Tschannen-Moran, 2007[26]; Reeves, Pun and Chung, 2017[27]). The analysis related to equality is based on the dissimilarity index (see Box 2.1 for more detail). This captures the extent to which the distribution of teachers departs from what would be observed if teachers were allocated across schools in a perfectly random way. A random allocation of teachers would ensure that, on average, all students irrespective of their personal or socio-economic profile, are taught by teachers who, altogether in a school, reflect the characteristics of the overall teacher population of the education system rather than a subset of that population.
- **Equity (or fairness):** Providing equal resources to all students irrespective of their characteristics, by randomly assigning teachers to schools might not, however, help in addressing concerns related to equity. This report also examines the types of schools in which teacher and school resources

tend to concentrate, thereby addressing *equity* issues. In this context, the notion of *equity* (which could, in this context, be considered as a synonym of *fairness)* refers to providing the opportunity for all students to realise their potential by removing obstacles they may face because of factors individual students have no control over. These include students' socio-economic background, ethnic origin, special education needs, gender and giftedness (Cerna et al., 2021[28]; OECD, 2017[29]). Equitable school systems are able to weaken the link between students' individual circumstances and their education outcomes (OECD, 2019, p. 42[2]).

These two angles, *equality* and *equity*, are complementary. Although the analysis on equality in students' access to effective teachers and teaching practices disregards the characteristics of the students, it can still identify teacher characteristics and practices along which teachers tend to sort across schools. The dissimilarity index highlights overall imbalances in teacher allocation. On the other hand, analysis focusing on equity draws a more detailed picture of teacher allocation. Notably, it examines how teachers with certain characteristics and practices are distributed across different types of schools. The distinction between these two concepts is relevant only when there is a segregation of students, when similar students cluster in the same schools. If students were randomly distributed across schools, an equal allocation of teachers across schools would also be equitable. Throughout this report, the distribution of students will be taken as a given; an in-depth analysis of students' segregation is contained in (OECD, 2019[25]).

To what extent can TALIS identify "effective" teachers?

Research shows that children taught by different teachers often experience very different educational outcomes. Teacher quality is the most important school-related predictor of student achievement (Hattie, 2009[11]; Rice, 2003[12]; Seidel and Shavelson, 2007[13]). Nevertheless, evidence is less conclusive about the specific characteristics and actions of teachers that boost student achievement, and consequently about what exactly makes an "effective" (or "strong", "good, "quality") teacher. This is partly due to the fact that teaching is a complex and multidimensional activity that is also influenced by contextual factors such as the "match" between the teacher and the school (Jackson, 2013[30]) and the "match" between teachers' and students' socio-demographic characteristics (Dee, 2005[20]; Fairlie, Hoffmann and Oreopoulos, 2014[21]; Gershenson et al., 2018[22]; Gershenson, Holt and Papageorge, 2016[23]; Lim and Meer, 2017[24]). Different teaching styles and practices can be especially beneficial for some students but less so for others. It is, therefore, difficult to pinpoint teaching practices that are "superior" to others. For instance, there is evidence that cognitive activation strategies may be more beneficial for socio-economically advantaged students (Caro, Lenkeit and Kyriakides, 2016[31]; Le Donné, Fraser and Bousquet, 2016[32]) and teacher-centred instruction for disadvantaged, at-risk students (Butler, 2020[33]).

A consensus is slowly growing on what constitutes effective teaching and what makes an "effective" teacher (OECD, 2020[34]). Good teaching requires a well-managed classroom in which disruptions are minimised and learning time is maximised. Effective teachers must be able to communicate in a clear and comprehensive way; they should help students gain a deep understanding of the subject by requiring them to evaluate, integrate and apply knowledge to solve problems; they should be able to provide effective support to students, listening to their needs, respecting their ideas, and encouraging them (Brussino, 2021[35]); they should provide constructive feedback through both formative and summative assessments. Effective teachers should also, of course, be competent professionals: they should possess and continue to develop appropriate content and pedagogical knowledge as well as affective and motivational competencies, and this knowledge should inform their teaching practices (Guerriero, 2017[36]).

TALIS cannot measure teacher effectiveness directly as it is not an assessment of teachers but a tool to help teachers' and school leaders' voices to be heard. TALIS enables teachers and principals to provide input into educational policy analysis and development in key areas. TALIS results are based exclusively on self-reports from teachers and school leaders. They, therefore, represent their opinions, perceptions, beliefs and accounts of their activities. Yet, a large and growing body of literature focusing on identifying

teacher attributes and teaching practices that improve students' cognitive and socio-emotional development inform TALIS' conceptual framework (Ainley and Carstens, 2018[37]) and the questionnaires administered as part of the survey. This report draws on data from TALIS 2018 and examines how teachers' characteristics and practices that research has shown to be robustly correlated with students' achievement are distributed across schools.

Given that this report aims at informing policies about the allocation of teachers in order to achieve more equitable outcomes for students, the distinction between teacher characteristics and teaching practices is particularly relevant. Teacher characteristics such as years of teaching experience and content of formal education are considered to be portable assets that teachers possess irrespective of the schools they work at. In contrast, teaching practices are assumed to be an explicit choice made by teachers depending on the context in which the instruction takes place. Hence, teachers may adopt different practices in a different school, or even with different students in the same school.

This report looks at equity from the viewpoint of students. The analyses gauge the extent to which students have fair access to effective teachers and digital learning at school. However, TALIS contains little information about the characteristics of each student that surveyed teachers teach. Students' characteristics are available only at the school level as reported by school principals who are asked to consider the overall situation of the school. Principals report, for instance, on the socio-economic composition of the student body, a variable that is heavily used in the report. Other variables such as school location (i.e. schools located in cities versus rural schools) and school governance (i.e. privately managed schools versus publicly managed schools) can also be indirectly informative about the characteristics of students attending them. However, the sorting of different students in rural or urban schools, or in public and private schools, is likely to vary across countries. In many countries, for example, the type of school management (i.e. private versus public) can be an important factor in explaining the segregation of students according to their socio-economic background (OECD, 2019[25]).

The implicit assumption underlying the analyses in this report is that all students in a given school are equally "exposed" to all the teachers in the school (or, equivalently, that students are randomly sorted into classes). The validity of this assumption varies across countries depending on the particular institutional arrangements governing class formation, the assignment of teachers to classes, and whether such arrangements change from grade to grade.

Can TALIS 2018 data, which was collected before the COVID-19 pandemic, provide relevant insights into today's digital divides?

This report draws on data that were collected in 2018;[3] that is, before the outbreak of the COVID-19 pandemic. Teachers' ability today to integrate ICT into teaching and learning is clearly different from what it was before school closures. This is true as well for schools' digital infrastructure. Prior to the pandemic, digital technology was one of many tools teachers could rely on. However, with schools closures, ICT became the only tool at teachers' disposal for teaching their students. As teachers and students have adapted to remote learning during the pandemic, teachers are using ICT much more and their technical skills have increased significantly (OECD, 2021[3]; OECD, 2021[38]). Many education systems have also enhanced teacher training on using digital tools and invested in ICT equipment and digital learning platforms (OECD, 2021[3]).

While digital technology has become key in teaching and learning, school closures have also highlighted the continued presence of digital divides. Although many countries implemented remedial measures targeting disadvantaged students, such as mentoring and homework support, there is evidence that learning losses during school closures were the most severe among marginalised students (OECD, 2021[3]). Studies from England (United Kingdom), France and the Netherlands show that disadvantaged students have suffered greater learning losses than their peers because of school closures (OECD,

2021[3]). With the pandemic putting the spotlight on inequalities in digital learning, TALIS 2018 data provide important insights into the extent and nature of these digital divides.

Overview of the main findings

Do students have equitable access to effective teachers?

While probably all students and parents know (or would claim to know) how effective their teachers are, it is difficult for researchers to identify effective teachers on the basis of observable, easy-to-access characteristics: teaching is a complex activity and hard to capture through surveys. Based on the best available research evidence, the TALIS questionnaire elicits information on a range of teacher characteristics and teaching practices that are robustly associated with effective teaching and better student performance (Ainley and Carstens, 2018[37]). The characteristics examined in this report are teachers' years of experience, the content of their initial education, and self-efficacy. Teaching practices that are analysed include cognitive activation, clarity of instruction, and classroom management skills, in particular the ability to maximise time devoted to actual teaching.

In all countries and territories participating in TALIS, there is evidence of clustering across schools of teachers with similar characteristics and practices related to effective teaching such as experience and time spent on actual teaching (see Tables 2.3 and 2.12). More often than not, teachers who are experienced and teachers who maximise instruction time work in schools with a high share of students from a socio-economically advantaged background. Less clear-cut are the patterns of sorting between public and private schools, and between urban and rural schools. The sorting of teachers along other characteristics and practices of effective teaching such as the content of their initial education, self-efficacy, cognitive activation and clarity of instruction is less prevalent (see Tables 2.5, 2.6, 2.8 and 2.10).

Students' access to experienced teachers

Experienced teachers are on average more effective in raising the performance of their students (Papay and Kraft, 2015[39]). The literature on this issue is abundant, in part because experience is very easy to observe and therefore an important and easy-to-use proxy for informing policies. In many of the countries participating in TALIS, experienced teachers (those with more than ten years of teaching experience) are more likely than their less experienced colleagues (those who have ten years or less of teaching experience) to work in advantaged schools that have a low concentration of students coming from socio-economically disadvantaged homes (10% or less of the student body) (Table 1.1). There are, however, exceptions to this general pattern: in Colombia, Shanghai (China) and Israel, experienced teachers are actually more likely to work in disadvantaged schools that have a high concentration of socio-economically disadvantaged students (more than 30% of the student body). And, in the majority of countries, differences between advantaged and disadvantaged schools are very small or not statistically significant.

Table 1.1. Snapshot of students' access to effective teachers, by school characteristics

Countries and territories with a significant difference, results based on responses of lower secondary teachers and principals

	By concentration of students from socio-economically disadvantaged homes[1]		By school type		By school location	
	Disadvantaged schools have **higher** share of…	Disadvantaged schools have **lower** share of…	Public schools have **higher** share of…	Public schools have **lower** share of…	Rural schools have **higher** share of…	Rural schools have **lower** share of…
Experienced teachers	PRT, CSH, COL, BRA, ISR, ARE	EST, HUN, VNM, ROU, FRA, SWE, BFL, BEL, USA, AUS, ENG, CAB, SAU, TUR	COL, ARE, VNM, PRT, ITA, GEO, SWE, MLT, CZE, BRA, SVK, MEX, CSH, TUR, NOR	BEL, BFL, KOR, AUS, NZL, SGP	ARE, AUT, NOR, USA	CHL, ESP, MEX, SAU, ROU, TUR
Time spent on actual teaching	CSH	CAB, NZL, DNK, AUS, USA, FRA, BFL, BGR, AUT, SWE, JPN, ENG, ESP, BEL, SAU, PRT, LTU, TUR, HUN	ITA, JPN	ARE, BFL, BFR, FRA, ESP, AUT, BEL, PRT, BRA, FIN, NZL, DNK, AUS, KAZ, SGP,	COL, ESP, FIN, SVN, TUR, DNK, MEX, NOR, AUT	LTU, HUN, KAZ, AUS
Comprehensively trained teachers	FRA, CSH, ENG, AUT, ISR, ITA, CABA	BFL, BEL, ESP	VNM, JPN, KAZ, SWE, ITA, CABA, FRA, NZL	ARE, DNK, BEL, BFL	BRA, ROU, HRV, HUN, KAZ	-
Teachers with high self-efficacy	ZAF	ESP, BEL	ABA, NOR, KAZ, CHL	FRA, MEX, ARE, BEL, ESP, FIN, SGP	CHL	FRA, ITA, FIN, LTU, EST, AUS, SWE
Cognitive activation practices	-	AUT, ISR, LTU, PRT	CHL, KAZ	PRT, ARE, CSH, CZE, SGP, FIN	TUR	ARE, LTU, NOR, EST, AUS
Clarity of instruction practices	CHL, AUS	-	ITA, AUS, USA, CHL, CABA, JPN, SVK, NZL, KOR, HUN, AUT, BEL	FIN, SGP	ZAF, ROU, HUN	LTU, SWE, SVN, EST, FIN, USA, CAB

Note: Countries are referred to by their three-letter country codes, based on the International Organization for Standardization (ISO) 3166 standard (see https://www.iban.com/country-codes). The letter codes used for territories are: CABA: Ciudad Autónoma de Buenos Aires (Argentina); CAB: Alberta (Canada); BFL: Flemish Community of Belgium; BFR: French Community of Belgium; ENG: England (United Kingdom); CSH: Shanghai (China).

1. High concentration of disadvantaged students refers to schools with more than 30% of students from socio-economically disadvantaged homes. Low concentration of disadvantaged students refers to schools with less than or equal 10% of students from socio-economically disadvantaged homes.

Source: OECD, TALIS 2018 Database, Tables 2.3, 2.5, 2.6, 2.8, 2.10 and 2.12.

Similar results emerge when comparing public and private schools (Table 1.1). Experienced teachers are generally more likely to work in public schools, and in some countries the differences are very large: in Colombia, for instance, the share of teachers with more than ten years of experience teaching in public schools exceed the share in private schools by almost 30 percentage points (see Table 2.3).

Differences according to school location are less common (Table 1.1) but in the few countries where they exist, they tend to be large. In Turkey, for instance, the share of experienced teachers in urban schools is 34 percentage points higher than in rural schools (see Table 2.3). The United Arab Emirates are an example in the opposite direction, with experienced teachers more likely to work in rural schools.

Students' access to teachers who maximise instruction time

More instruction time during class translates into higher student achievement (Carroll, 1963[40]; Muijs et al., 2014[41]; Schmidt, Zoido and Cogan, 2014[42]). This result has been shown to hold across different settings, using different data and different empirical strategies. TALIS allows measuring the instruction time to which students are exposed by asking teachers how their working time is allocated between different tasks such as administrative tasks, keeping order and actual teaching. Data from the TALIS-PISA linking study show that students of teachers who spend a larger share of class time on actual teaching perform better in the PISA assessment (OECD, 2021[43]). The literature on teaching quality has stressed the ability of teachers to maximise instruction time as one important component of classroom management (Ainley and Carstens, 2018[37]; Kane et al., 2010[44]; Stronge et al., 2007[45]). Yet, the amount of time that can be devoted to instruction does not depend exclusively on the choices teachers make about how they allocate their time or teachers' ability to keep order in the class. It also depends on classroom environment and students' behaviour. For most teachers the share of class time spent on instruction varies in different schools and even with different students in the same school.

Teachers who are in the top quarter of the national distribution in terms of the share of class time they spend on actual teaching are far from being equally represented across schools (Table 1.1). Differences in the share of class time spent on actual teaching are affected by classroom environment, which can be more challenging in certain schools than others.

Divides between advantaged and disadvantaged schools are particularly large (above 20 percentage points) in Alberta (Canada), Denmark, and New Zealand (see Table 2.12). Shanghai (China) is the only territory in which disadvantaged schools are more likely to employ teachers in the top quarter of the distribution in terms of share of working time spent teaching. Differences between private and public schools are largest in Singapore (32 percentage points), Kazakhstan (17 percentage points), Australia (16 percentage points), Denmark (15 percentage points) and New Zealand (15 percentage points). The only countries in which public schools are more likely than private schools to employ teachers who spend a large share of their time actually teaching are Italy and Japan. Differences according to school locations are less common. In nine countries, rural schools are more likely to employ teachers who spend a large share of their time in actual teaching, with differences particularly large (20 percentage points or above) in Colombia and Spain. Differences are in favour of urban schools in Australia, Hungary, Kazakhstan and Lithuania (Table 1.1).

Students' access to comprehensively trained teachers

The type and quality of teacher education are important determinants of teacher knowledge. These, in turn, have been found to be significantly related to student achievement (Baumert et al., 2010[46]). TALIS does not contain information on teacher knowledge or on the quality of initial teacher education but it does ask teachers many questions about the content of their initial training. The complexity of teaching and rapid changes in society (Cerna et al., 2021[28]) require teachers to be trained in a wide range of issues: important dimensions captured by TALIS include content; pedagogy; classroom practices; cross-curricular skills; teaching in a mixed-ability setting; and classroom management. Not all teachers received a comprehensive initial education, including all the aforementioned dimensions, though, and many had to learn their skills on the job: on average across OECD participating countries, only about 40% of teachers received a comprehensive initial education (see Table 2.5).

These teachers do not appear to be more or less likely to teach in certain types of schools: differences between advantaged and disadvantaged schools, between private and public schools, or between urban and rural schools are only apparent in a handful of countries, and they are often small in magnitude (Table 1.1). More often than not, comprehensively trained teachers are more likely to teach in disadvantaged schools: this is notably the case in Ciudad Autónoma de Buenos Aires (hereafter CABA [Argentina]), Israel and Italy.

Students' access to teachers with high self-efficacy

Self-efficacy refers to individuals' perceptions of their capabilities of performing a task. Such perceptions can influence actual behaviours and, thus, performance. A vast literature in education has showed robust positive association between self-efficacy and performance for both students and teachers. TALIS elicits teachers' self-efficacy beliefs by asking them to assess their perceptions of their ability to perform well in a range of tasks related to classroom management, instruction, and students' engagement.

In the majority of countries participating in TALIS 2018, there are essentially no differences between different types of schools in employing teachers with high self-efficacy (defined as those in the top quarter of the national distribution of the self-efficacy scale) (Table 1.1). The differences that emerge in a few countries are mostly related to the type of schools (with private schools being more likely to employ teachers with high self-efficacy) and school locations (whereby teachers with high self-efficacy are more likely to work in urban schools).

Students' access to cognitive activation

Cognitive activation consists of instructional activities that require students to evaluate, integrate and apply knowledge within the context of problem solving (Lipowsky et al., 2009[47]). The use of cognitive activation has been shown to be related to higher student achievement (Bellens et al., 2019[48]; Le Donné, Fraser and Bousquet, 2016[32]).

In most countries, differences between advantaged and disadvantaged schools in the share of teachers that heavily rely on cognitive activation are not statistically significant: only in four countries (Austria, Israel, Lithuania and Portugal) is the share of teachers who frequently rely on cognitive activation higher in socio-economically advantaged than disadvantaged schools (Table 1.1). Cognitive activation practices are more common in private schools in six TALIS participating countries and territories, with large differences in Finland (21 percentage points), Singapore (14 percentage points) and the Czech Republic (11 percentage points) (see Table 2.8). In only six countries are some differences between urban and rural schools observed. In Australia, Estonia, Lithuania, Norway and the United Arab Emirates, cognitive activation practices are more likely to be used in urban schools, while in Turkey the reverse pattern is observed.

Students' access to clarity of instruction

Clarity of instruction is conceptualised in TALIS as the ability to set clear and comprehensive instruction and learning goals; to connect new and old topics; and to provide students with a summary of the lesson at the end (Ainley and Carstens, 2018[37]). Various studies have shown how this practice is related to positive student outcomes, including learning motivation, achievement and satisfaction (Hines, Cruickshank and Kennedy, 1985[49]; Seidel, Rimmele and Prenzel, 2005[50]).

In 12 countries and territories, teachers who rely most on clarity of instructions tend to be concentrated in public schools (Table 1.1). The difference with respect to private schools is largest in Italy (15 percentage points), Australia (13 percentage points) and the United States (13 percentage points) (see Table 2.10). Finland and Singapore are the only countries where clarity of instruction is more frequently adopted in private schools. Fewer differences emerge according to school location. Teachers tend to more frequently adopt clarity of instruction in urban schools in seven countries, while in three countries such practices are more common in rural schools. Differences according to the socio-economic composition of the student body are present in only two countries (Australia and Chile); in both cases, they are to the benefit of disadvantaged schools whose teachers are more likely to heavily rely on practices pertaining to clarity of instruction.

Do students have equitable access to digital learning in school?

Students' access to effective digital learning at school depends on various factors. Having adequate ICT infrastructure at school such as software, computers, laptops, smart boards and sufficient Internet access is essential for effective digital learning in school. However, it is equally important that students have access to teachers who are trained in and feel capable of using ICT. Past studies have shown that having access to technology will not improve student learning in itself; effective integration of technology into teaching and learning requires teachers who are well trained and able to use digital tools for instruction (Fraillon et al., 2019[51]; OECD, 2021[52]; OECD, 2019[53]; OECD, 2015[54]). Although past research based on PISA data show that ICT use at school does not automatically lead to better student outcomes – use of ICT that is either too limited or excessive can be associated with lower student achievement (Borgonovi and Pokropek, 2021[55]; OECD, 2019[53]; OECD, 2015[54]) – teachers' and students' ability to make the most of ICT is reinforced by regular and judicious use of digital technology in the classroom.

Students' access to ICT equipment

One of the reasons for education systems to invest in schools' ICT infrastructure is to compensate for the limited access to ICT tools and at-home Internet many disadvantaged students have (Bulman and Fairlie, 2016[56]; OECD, 2015[54]). Yet, in line with findings based on PISA 2018 data (OECD, 2020[57]), TALIS results show that students' access to adequate ICT infrastructure varies according to the type of school they attend (Table 1.2). Namely, students who attend public schools and schools with a high share of disadvantaged students tend to have more limited access to adequate ICT infrastructure. On average across OECD countries, the share of principals who reported that the school's capacity to provide quality instruction was hindered by a shortage in or inadequacy of digital technology for instruction is higher in socio-economically disadvantaged schools than in advantaged schools (by 9 percentage points), and also in public schools than in private schools (by 12 percentage points) (see Table 3.3). The share of schools where providing quality instruction is hindered by insufficient Internet access is 9 percentage points higher in socio-economically disadvantaged schools than in advantaged schools, and 14 percentage points higher in public schools than in private schools on average across OECD countries (see Table 3.4). These results indicate that socio-economically advantaged schools and private schools tend to have more resources to maintain and improve the schools' ICT infrastructure.

School location is found to matter more for the quality of schools' Internet access than for ICT equipment. In most TALIS participants, there are no differences in the availability and quality of digital equipment between schools located in cities and those situated in rural areas (Table 1.2). In contrast, the share of principals who reported that the school's capacity to provide quality instruction was hindered "quite a bit" or "a lot" by insufficient Internet access is 7 percentage points higher in rural schools than in schools located in cities on average across OECD countries and territories (see Table 3.4). These results may reflect the general gaps in connectivity and Internet access that persist between urban and rural areas in virtually all countries (International Telecommunication Union, 2020[58]). Moreover, the funding of rural schools often does not reflect the higher costs of delivering education programmes and services in remote areas (OECD, 2017[59]). It can also be highly dependent on the local tax base, which tends to be lower in rural areas (Echazarra and Radinger, 2019[60]).

Table 1.2. Snapshot of students' access to digital learning at school, by school characteristics

Countries and territories with a significant difference, results based on responses of lower secondary teachers and principals

	By concentration of students from socio-economically disadvantaged homes[1]		By school type		By school location	
	Disadvantaged schools have **higher** share of…	Disadvantaged schools have **lower** share of…	Public schools have **higher** share of…	Public schools have **lower** share of…	Rural schools have **higher** share of…	Rural schools have **lower** share of…
Adequate ICT equipment	JPN, SWE, CSH	AUT, ROU, PRT, USA, ITA, AUS, COL, ZAF, MEX, CABA	-	MEX, CABA, VNM, COL, PRT, BRA, JPN, ARE, KAZ, USA, AUS, BEL, ESP, DNK	AUT	COL, ARE, KAZ, RUS, BGR
Sufficient Internet access	CSH	PRT, AUS, AUT, ZAF, MEX, COL, CABA	-	CABA, MEX, COL, ITA, VNM, ARE, KAZ, ZAF, BRA, PRT, JPN, AUS, HUN, GEO, BEL, DNK, ESP, SGP	AUT	CAB, COL, MEX, ITA, ARE, KAZ, RUS, TUR, SAU, GEO
Teachers who had formal training in the use of ICT for teaching	VNM, ARE, ENG, AUS, SWE, FRA	COL, TUR	JPN, KAZ, FRA, SGP, TUR, ENG, VNM	PRT, ZAF, COL	ROU, HRV, SVN, ENG, TUR, KAZ, SWE	LVA
Teachers who participated in professional development in ICT skills	KAZ, VNM, FRA	EST, ENG, BGR, ZAF, SWE, TUR	FRA, NOR, KAZ	MEX, AUS, BFL, BEL, BRA, ZAF	ESP, HRV	BEL, AUS, NZL
Teachers with high self-efficacy in the use of ICT for teaching	CAB	BEL, MEX, COL, AUT, ZAF, BRA, CABA	NOR, VNM, CZE, CHL, BFR	ARE, SVK, AUS, COL, ESP, FIN, ZAF, BEL, GEO, BRA, MEX, SGP	AUT, SVK, CHL, HUN, CZE, PRT	TUR, AUS, USA
Teachers who use ICT for teaching on a regular basis	BFL, CAB	VNM, ENG, AUS, ARE	BFL, CHL, TUR	MEX, FRA, MLT, CSH, FIN, SVK, BRA, ARE, ESP, AUS, SGP	CHL, AUT, ITA	GEO, TUR, USA, VNM

Note: Countries are referred to by their three-letter country codes, based on the International Organization for Standardization (ISO) 3166 standard (see https://www.iban.com/country-codes). The three-letter codes used for territories are: CABA: Ciudad Autónoma de Buenos Aires (Argentina); CAB: Alberta (Canada); BFL: Flemish Community of Belgium; BFR: French Community of Belgium; ENG: England (United Kingdom); CSH: Shanghai (China).

1. High concentration of disadvantaged students refers to schools with more than 30% of students from socio-economically disadvantaged homes. Low concentration of disadvantaged students refers to schools with less than or equal 10% of students from socio-economically disadvantaged homes. Source: OECD, TALIS 2018 Database, Tables 3.3, 3.4, 3.5, 3.7, 3.12 and 3.15.

Students' access to teachers with high self-efficacy in the use of ICT

In all TALIS participants, there is evidence for clustering of teachers who are trained in and feel capable of using ICT (see Tables 3.5, 3.6, 3.7, 3.8 and 3.12). On average across the OECD, around one-third of teachers who were trained in and feel capable of using ICT would need to move to another school so that the distribution of teachers across schools mirrors the overall teacher population. However, the uneven allocation of teachers with certain characteristics does not necessarily mean that a school system is inequitable. Education systems may deliberately allocate more resources to disadvantaged schools to

remove obstacles for students that they can do nothing about. This includes the problem of limited access to digital learning resources at home.

Looking more closely at the types of schools in which teachers who are trained in and feel capable of using digital technology tend to concentrate shows a mixed pattern. There are not many countries and territories where the share of teachers who were trained in ICT skills either in service or as part of their initial education varies across different types of schools. Teachers with high self-efficacy in ICT use tend to work in private schools (Table 1.2). The share of teachers who feel they can support student learning through the use of digital technology "quite a bit" or "a lot" tends to be higher in private schools than in public schools in almost one-fourth of the countries and territories participating in TALIS. Teachers in private schools may report higher self-efficacy in ICT use because private schools tend to have better ICT infrastructure. In any case, the share of teachers with high self-efficacy in the use of digital technology tends to be higher in schools where the quality of instruction is not hindered by inadequate digital technology (see Table 3.1).

The share of teachers who feel they can support student learning through the use of ICT "quite a bit" or "a lot" is also higher in socio-economically advantaged schools than in disadvantaged schools in seven education systems (Table 1.2). In Austria, Belgium, Brazil, CABA (Argentina), Colombia, Mexico and South Africa, the share of teachers with high self-efficacy in ICT use is higher in socio-economically advantaged schools than in disadvantaged schools. In these countries and territories, students from socio-economically disadvantaged backgrounds, who tend to be less exposed to digital learning at home, are also less likely to have access to teachers with high self-efficacy in ICT use for instruction at school.

Students' access to teachers who use ICT for teaching on a regular basis

Similar to the distribution of teachers who were trained in and feel capable of using ICT, there is also evidence in all TALIS participants of clustering of teachers who "frequently" or "always" let students use ICT for projects or class work (see Table 3.15). On average across the OECD, around one-third of teachers who regularly use ICT in the class would need to move to another school in order to distribute this type of teachers evenly across schools.

Differences across schools in the use of ICT for teaching tend to be the most pronounced between private and public schools (Table 1.2). In almost one-fourth of the countries and territories participating in TALIS, the share of teachers who reported using ICT for projects or class work on a regular basis is higher in private than public schools. Thus, in several education systems, students attending private schools are more likely to be exposed to digital learning at school on a regular basis than their peers who attend public schools. Teachers in private schools may use ICT for instruction more regularly since private schools tend to have better ICT infrastructure. In addition, students attending private schools may have better access to digital learning resources at home, which, in turn, can help teachers implement digital learning at school more smoothly and effectively. In addition, in a few education systems such as Australia, England (United Kingdom), the United Arab Emirates and Viet Nam, there is evidence that the share of teachers who regularly use ICT in their teaching is higher in socio-economically advantaged schools than in disadvantaged schools.

The differences between schools in the frequency with which teachers use ICT once teacher and school characteristics are taken into account suggests that reallocating teachers and improving schools' ICT infrastructure may not be sufficient in addressing inequities in students' access to digital learning in school. Across all TALIS participants except for Malta, differences between schools in the frequency of ICT use remain significant even after accounting for teacher characteristics such as years of teaching experience, self-efficacy, initial education and continuous professional development in the use of ICT as well as schools' digital infrastructure (see Table 3.16). However, when teachers collaborate with each other,[4] it is more likely they will regularly let students use ICT for projects or class work (see Table 3.17). This holds true in around half of the countries and territories participating in TALIS and on average across the OECD

after accounting for teacher characteristics;[5] teachers' training in the use of ICT; and classroom composition. This means that while digital technology fosters teacher collaboration by providing better tools for collaborative work, collaboration among teachers itself can help increase the use of ICT in school.

Teacher allocation and learning divides

Despite significant efforts to narrow disparities in students' outcomes in the recent past, students' socio-economic background remains strongly correlated with their academic performance (OECD, 2019[2]; OECD, 2018[6]) It is also clear that teachers with various characteristics and practices are not distributed randomly across schools and can be concentrated in certain schools depending on school characteristics such as socio-economic profile and location (see Chapters 2 and 3). To see how the sorting of effective teachers is related to socio-economic inequalities in student outcomes, one can correlate TALIS measures of teacher allocation with PISA-based measures of inequalities in learning outcomes at the system level. This can provide valuable insights for policy directions aimed at reducing socio-economic inequalities in student outcomes. In addition, it is also worth investigating whether certain system-level policies are associated with more even and equitable sorting of teachers across schools. This means exploring whether factors like school competition and school autonomy in hiring and dismissing teachers, and determining teachers' salaries can be effective policy levers in addressing inequities in teacher sorting (see Chapter 4).

How access to effective teachers is related to socio-economic inequality in student performance

At the system level across TALIS countries and territories, the mean reading score in PISA[6] tends to be negatively associated with the dissimilarity index for experienced teachers (i.e. teachers with more than ten years of teaching experience) (linear correlation coefficient (r) = -0.44) (see Table 4.1). That is, the uneven (non-random) distribution of experienced teachers is associated with lower average reading scores at the system level. This suggests that experienced teachers are not directed to the schools that need them most and that reallocating experienced teachers could help increase the average reading scores of students. As highlighted in Chapter 2, experienced teachers are more likely to work in schools where there are few socio-economically disadvantaged students (10% or less of the student body) than in schools where disadvantaged students constitute more than 30% of the student population in many of the countries participating in TALIS. The system-level correlation also shows that an uneven distribution of experienced teachers is negatively associated (linear correlation coefficient (r) = -0.42) with the PISA reading score of the most disadvantaged students in the country, here defined as the bottom quarter of socio-economic status in that country. Disadvantaged students tend to have lower reading scores when experienced teachers are not evenly distributed but, rather, clustered in schools that are predominantly socio-economically advantaged.

Meanwhile, in school systems where teachers who spend more class time on actual teaching are concentrated in certain schools, the mean reading score of students tend to be lower, especially for the most disadvantaged students (see Table 4.1). The dissimilarity index for teachers who are in the top quarter based on class time spent on actual teaching and learning is negatively correlated with the mean reading score of students in the bottom quarter of socio-economic status (linear correlation coefficient (r) = -0.36). Thus, in education systems where teachers who spend more class time on actual teaching are more unevenly distributed and clustered in schools that are predominantly socio-economically advantaged, students, especially those from disadvantaged backgrounds, tend to perform worse in reading. Based on findings in Chapter 2, large and systematic differences are observed between different types of schools in the share of teachers who spend a large share of class time on instruction. Notably, teachers that spend more class time on actual teaching are more likely to work in advantaged schools as well as private schools. However, the system-level relationship does not necessarily mean that when disadvantaged students are taught by teachers who maximise actual teaching time it will improve their performance.

There might be other factors that play a part; for example, advantaged schools might have fewer disciplinary problems in the classroom overall, which allows teachers to spend more time on actual teaching instead of classroom management. In general, the share of class time teachers can spend on actual teaching also depends on the school's student composition.

According to the system-level correlational analysis, disadvantaged students tend to have just as much or more opportunity to learn digital literacy skills (such as detecting if the information read is subjective or biased) at school in those education systems where there is a more even distribution of teachers with high self-efficacy in ICT use (linear correlation coefficient (r) = 0.49) and who "frequently" or "always" use ICT for instruction (linear correlation coefficient (r) = 0.45) (see Table 4.2). As highlighted in Chapter 3, the share of teachers with high self-efficacy in ICT use and who use ICT for instruction on a regular basis is larger in private than public schools in almost a quarter of countries and territories participating in TALIS. Thus, the dissimilarity index may partly reflect an inequitable distribution of teachers who feel self-efficacious in ICT and use it regularly for teaching. Although causality cannot be determined, the findings of the system-level correlational analyses suggest that a more even distribution of teachers who have high self-efficacy in ICT use and engage in the use of digital technology on a regular basis can give disadvantaged students the same opportunity to learn digital literacy skills as their peers from socio-economically advantaged families.

How access to effective teachers is related to school autonomy and competition

Overall, the association between system-level policies such as school competition and school autonomy in hiring, dismissing and determining teachers' salaries, and TALIS measures of teacher allocation is weak. However, there is an exception to this pattern when it comes to the sorting of experienced teachers across schools. Across TALIS participants, the larger the share of principals within a country who report that their school has autonomy in appointing or hiring teachers, the more evenly experienced teachers tend to be distributed across schools (linear correlation coefficient (r) = -0.51) (see Table 4.3). Differences in the share of principals within a country who report that their school has autonomy in appointing or hiring teachers account for 26% of the differences in the dissimilarity index for experienced teachers. Similarly, the higher the share of principals within a country who report that their school has autonomy in dismissing or suspending teachers from employment, the more evenly experienced teachers tend to be distributed across schools (linear correlation coefficient (r) = -0.47). These findings suggest that higher school autonomy in staffing practices can result in a more equal distribution of teachers across schools. Past research has found that higher levels of school autonomy in managing teachers tend to produce a more equitable sorting of teachers across schools (OECD, 2018[10]). Yet, there are two caveats to this: disadvantaged schools may need monetary or other support to be able to attract and retain the teachers they want (OECD, 2018[10]). And school autonomy in staffing practices might only translate into greater equity in student performance if it is accompanied by higher levels of accountability, past findings suggest (OECD, 2018[10]; OECD, 2016[61]; Torres, 2021[62]). And, last of all, in looking at individual countries, there appear to be outliers among countries that report lower school autonomy. This indicates that policy makers should consider a range of policy tools.

Finally, system-level analysis shows that differences between disadvantaged and advantaged schools in terms of the share of teachers with high self-efficacy in ICT use is negatively correlated with the share of principals who reported that two or more schools in their district were in competition for students (linear correlation coefficient (r) = -0.40) (see Table 4.4). When there is more competition for students among schools, teachers with high self-efficacy in the use of digital technologies tend to sort into advantaged schools. Empirical evidence on the effect of school competition on teacher quality is mixed. There are studies showing that "more competition tends to increase teacher quality, particularly for schools serving predominantly lower-income students" (Hanushek and Rivkin, 2003, p. 45[63]). This may be the case if competition enhances the productivity of disadvantaged schools more than it benefits advantaged schools. Competition can provide incentives for considerable improvements in disadvantaged schools'

hiring, retention, monitoring and other teacher management practices. However, increased competition across schools can also result in more disparities in teacher quality in favour of socio-economically advantaged schools. In general, these schools are assumed to be more effective in attracting and retaining good teachers. Yet, as with all other findings presented in this report, one should be cautious in interpreting the results, which are only correlational and not causal. The observed system-level correlation between school competition and the differences in the share of teachers with high self-efficacy in ICT use between disadvantaged and advantaged schools may be a result of mediating factors. For example, in education systems where school competition is common, the gap in the quality of ICT infrastructure between advantaged schools and disadvantaged schools may be larger, which, in turn, is related to the differences in teachers' self-efficacy in ICT use between disadvantaged and advantaged schools.

What these findings imply for policy

The results of this report suggest that effective teachers do not necessarily work in the schools that need them most. The analyses also show that inequities in teacher allocation can be related to socio-economic inequality in student performance. This section highlights some directions for education policies that could lead to more equitable teacher allocation, and, potentially, to a decrease in socio-economic inequalities in student outcomes. It focuses on policies aiming at a better match between teachers and schools. The policies highlighted touch upon issues around school autonomy in teacher management; teacher preferences and incentives; criteria and processes guiding the recruitment of teachers; support for teachers working in challenging environments; and funding allocation for schools. These policy directions draw mainly on policy options put forward in the OECD Review of Policies to Improve the Effectiveness of Resource Use in Schools (School Resources Review), in particular in the report titled: *Working and Learning Together: Rethinking Human Resource Policies for Schools* (OECD, 2019[64]).

As one would expect, there is no one-size-fits-all approach to designing policies. The right policy mix depends on the specific context of each country's education system. Therefore, the policy directions highlighted in this section should be considered in each national context according to country-specific challenges and constraints.

Ensure that all schools have the capacity to recruit and retain effective teachers

The degree of school autonomy in recruitment varies by countries. There are education systems where schools have very limited influence on hiring decisions (OECD, 2019[64]). However, school-level hiring can improve the matching of teachers to the needs and profiles of particular schools and their students (OECD, 2019, p. 27[64]). As school-based recruitment allows teachers themselves to choose their workplace; have personal contact before the decision is taken; and build a sense of commitment to their school, it can also result in higher job satisfaction and lower teacher turnover and attrition (OECD, 2019[64]).

Yet, school autonomy in staffing decisions may lead to more inequitable allocation of qualified and experienced teachers as advantaged schools may have more resources and be more efficient in their recruitment processes. Indeed, not all schools have the capacity and expertise to effectively manage the selection and recruitment of their teachers (OECD, 2019[64]). And yet, the findings of this report, which are in line with previous OECD study (2018[10]), suggest that schools' increased autonomy for managing teachers is associated with a more even allocation of experienced teachers (see Table 4.3). School-based teacher recruitment can lead to more effective and equitable teacher allocation especially when all schools, including disadvantaged ones, have sufficient resources and the capacity to properly screen and select applicants. Thus, schools that are most in need may require additional funding to improve their leadership, and managerial and administrative capacity, and compete against other schools in attracting effective teachers. In the United Kingdom, for instance, disadvantaged schools have access to financial support to help them recruit and retain effective teachers (see Box 4.1). Alternatively, schools can also collaborate

with the education administration and create a hybrid recruitment system. For example, schools could participate in interviews managed by the administration. They could make the final selection among candidates who have already been interviewed and ranked in a central process, and who have expressed interest in working at their school. Schools can also directly select a part of their teaching staff while the administration remains in charge of recruiting and assigning the remaining part (OECD, 2019, p. 251[64]). But for more equitable teacher allocation to translate into more equitable student outcomes, greater school autonomy needs to be combined with adequate accountability mechanisms (OECD, 2018[10]; OECD, 2016[61]; Torres, 2021[62]).

Nevertheless, equitable teacher allocation can also be observed in education systems with little school autonomy (OECD, 2018[10]). In Japan, more experienced teachers tend to be evenly distributed across schools even though only 12% of school principals reported autonomy in appointing or hiring teachers (see Figure 4.6). In Japan, the use of a mandatory mobility scheme whereby teachers are regularly assigned to new schools based on their age and gender may play a role in achieving an even allocation of experienced teachers (see Box 4.4). Still, teacher preferences on where to work and the way recruitment criteria is designed are generally important in achieving an effective and equitable distribution of teachers.

Provide incentives for teachers to work in high-need areas

Teacher preferences play an important role in how teachers are distributed across schools, and can be shaped by financial and other incentives. Although teachers often prefer to work in socio-economically advantaged schools as they tend to provide more favourable working conditions, financial incentives to work in areas of need – either in socio-economically disadvantaged schools or in rural areas – can help in directing effective teachers where they are most in need (OECD, 2019[64]). Education systems could offer higher salaries, differential pay for particular expertise, or scholarships and subsidies for teachers working in disadvantaged schools or schools located in rural areas (OECD, 2019, p. 253[64]). In Brazil, for instance, teachers who are willing to work in disadvantaged schools are offered salary premiums (see Box 4.4). In England (United Kingdom), mathematics teachers working in challenging schools can get retention payments (see Box 4.1). In Chile, there are monetary incentives in the form of special allowances to attract teachers and school leaders to remote areas. They are also used to encourage teachers to take on management roles in rural schools (OECD, 2018, p. 162[65]). Yet, the efficacy of financial incentives are highly dependent on the general context of teacher recruitment and career progression, and they are relatively rarely applied among OECD countries (OECD, 2019[64]). Therefore, the introduction of financial incentives requires adequate evaluation and monitoring as a way to facilitate implementation and potential adjustments.

Although financial compensation matters, there are other important factors that shape teachers' choice. Teachers tend to be highly motivated by the intrinsic benefits and social utility of teaching. Around 90% of teachers in the OECD become teachers because they want to influence children's development and contribute to society (OECD, 2019[8]). In addition, working conditions such as workload, preparation time and facilities as well as professional factors such as autonomy, opportunities for career progression, professional learning and a collegial and collaborative school climate can influence teachers' school choice. These are important non-financial incentives (OECD, 2019[64]). For example, in China, career-related incentives in the form of offering tenure track positions are used to attract teachers to remote areas (see Box 4.4).

Results related to inequities in students' access to digital learning at school point to various policy options that rely on non-monetary incentives such as professional development activities focusing on ICT use for school staff and fostering a collaborative culture among teachers, which can boost ICT use (see Chapter 3). These, along with improvement of schools' ICT infrastructure, can attract teachers to schools in need and address digital divides. In light of lessons learned in the early stages of the COVID-19 pandemic, Germany and Spain allocated funds to provide digital devices and connectivity to education

institutions with priority given to disadvantaged schools (OECD, 2021[66]). In Chile, there have been programmes since 2000 that provide rural schools with ICT infrastructure, including Internet access. Chile has also taken action to improve teachers' working conditions and opportunities for collaboration in rural and remote areas (OECD, 2018, p. 164[65]).

Review criteria for recruitment and transfers of teachers

There are education systems in which teachers with permanent contracts and higher levels of seniority and qualifications have first say on the schools they would like to work at. Teacher seniority, qualifications and contractual status are important criteria in the recruitment and allocation of teachers. Combined with teachers' preferences to work in advantaged schools, this tends to lead to inequitable teacher allocation (OECD, 2019[64]). As also shown by this report, more experienced teachers tend to work in socio-economically advantaged schools while their less experienced colleagues start their careers in more challenging schools (see Table 2.3). Such a mismatch between schools' (and students') needs and teachers' skills may also result in novice teachers leaving the profession (OECD, 2019[64]). Education systems in which seniority, qualifications and contractual status have a large bearing on teacher recruitment and allocation could consider reducing the weight of these criteria. Alternatively, experience in difficult or remote schools can be given larger consideration in teachers' career progression (OECD, 2019, pp. 252-253[64]).

Provide support to teachers working in more challenging schools

Nudging effective teachers to work in challenging schools is one way to achieve a more equitable teacher allocation. Yet, education systems, in particular those with more centralised teacher allocation and compensation mechanisms, should also provide additional support for teachers who work in challenging schools. The support could focus on in-service training as well as mentoring and induction activities for those who are either new to the profession or just moved to a new school (OECD, 2018[10]; OECD, 2020[9]).

Education systems can facilitate teachers' participation in professional development by relying on incentives (e.g. covering costs or teaching duties) or adapting accountability measures such as teacher appraisal or school evaluation (OECD, 2021[66]). In the United Kingdom, there are policies in place that focus on improving the availability of professional development for teachers who work in disadvantaged areas (see Box 4.1). Regarding the form of professional development, school-embedded forms such as peer-learning opportunities (e.g. teacher coaching) tend to be more efficient in improving teaching practices and can significantly reduce the cost of training than more traditional activities (e.g. courses or seminars) (Kraft, Blazar and Hogan, 2018[67]; Opfer, 2016[68]). In terms of the content of in-service training, Estonia, which has a comprehensive national strategy for ICT use in schools, showcases the benefits of enhancing teachers' professional development in the use of ICT (see Box 4.3). Collaborative professional development is another cost-effective policy lever for providing in-service training while also initiating and extending a culture of collaboration within schools (Darling-Hammond, 2017[69]). In addition, as shown by the findings of this report, collaboration among teachers can also help in increasing the use of ICT in school (see Table 3.17).

Induction to teaching and mentoring are mechanisms to support teachers who are new to the school or the profession and, as a result, may face more challenges than their colleagues (OECD, 2019[70]). Chile provides examples for mentoring programmes (e.g. *Tutores para Chile*) where professional mentors observe trainee teachers during tutoring sessions with students and provide feedback on their professional practice (OECD, 2020, p. 64[71]).

Ensure equitable and transparent funding allocation for schools

Many of the policy directions mentioned above require that education systems have adequate funding to support schools and their teachers that are in need. However, disadvantaged schools or those located in rural areas often have limited resources. For example, the funds allocated to rural schools that are primarily based on student enrolment usually do not reflect the higher costs of delivering education programmes and services in remote areas (OECD, 2017[59]). Moreover, in some education systems, school funding by local authorities is highly dependent on the local tax base, which tends to be lower in rural areas (Echazarra and Radinger, 2019[60]).

To achieve an equitable teacher allocation it is necessary to also have an equitable funding allocation in place (OECD, 2019[64]). Namely, an equitable funding system should balance between regular and targeted funding. Funding formulas tend to account for schools' different resource needs by applying weights for the socio-economic characteristics, immigrant background and special educational needs of the student body and also for school location (OECD, 2017[59]). While a well-designed funding formula can be an efficient, equitable and transparent way to manage current expenditures such as teacher salaries, it is important to thoroughly monitor the additional funding directed towards schools, teachers and students at risk of underperformance (OECD, 2019, p. 252[64]). Although targeted funding can ensure responsiveness, the multiplication of targeted funding programmes can also lead to overlap, lack of co-ordination between different programmes, excessive bureaucracy and a lack of long-term sustainability for schools (OECD, 2017[59]). Policy responses to the COVID-19 crisis provide examples for targeted funding for schools that are most in need. In the 2020/21 academic year, schools in need in England (United Kingdom)[7] and the Netherlands received one-off financial support to ensure that all students make up for lost teaching time (OECD, 2020[71]).

In decentralised systems, in which sub-national authorities that depend on local taxes do not have adequate revenues or the capacity to meet the funding needs of their schools, well-designed fiscal equalisation mechanisms can be implemented (OECD, 2019[64]). In these systems, it is also important to align the revenue-raising and spending powers of sub-national authorities (OECD, 2017[59]). For example, in Nordic countries, local governments tend to have substantial control over personal income tax rates. However, it is important to note that setting such fiscal rules goes beyond the scope of the education system and should be considered in the broader context of fiscal transfers across the different levels of government (OECD, 2017, p. 89[59]).

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Notes

[1] Schools where more than 30% of students come from socio-economically disadvantaged homes are classified as "disadvantaged schools", and schools where less than 10% of the students are socio-economically disadvantaged are classified as "advantaged schools".

[2] A privately managed school is a school whose principal reported that it is managed by a non-governmental organisation (e.g. a church, trade union, business or other private institution). In some countries, the privately managed schools category includes schools that receive significant funding from the government (government-dependent private schools). A publicly managed school is a school whose principal reported that it is managed by a public education authority, government agency, municipality, or governing board appointed by the government or elected by public franchise. In the principal questionnaire,

this question does not make any reference to the source of the school's funding, which is reported in the preceding question.

[3] Southern Hemisphere countries were surveyed in 2017.

[4] The index of professional collaboration measures teachers' engagement in deeper forms of collaboration that involve more interdependence between teachers, including teaching jointly as a team in the same class, providing feedback based on classroom observations, engaging in joint activities across different classes and age groups and participating in collaborative professional learning.

[5] Teacher characteristics include teachers' self-efficacy in ICT use, years of teaching experience, gender and employment status.

[6] Reading was the focus domain in the 2018 round of PISA, which means it was tested in more detail than the other two domains, mathematics and science.

[7] England's (United Kingdom) Catch-up Premium is a one-off, universal payment of GBP 80 per student in mainstream schools and GBP 240 for those in special education settings (OECD, 2020, p. 64[71]).