Making the most of teachers' time

Teachers' time is a critical resource for education systems and a key input for student learning. Like any type of resource, teachers' time can be allocated more or less effectively to promote positive outcomes for students. How school systems regulate teachers' working time reflects diverse conceptions of the role of teachers and different strategies for making the most of their time. The COVID-19 pandemic and the rise of remote and hybrid teaching environments in 2020 have further increased the complexity and diversity of tasks that compete for teachers' time. The pandemic context has also tested the capacity of school systems to adapt provisions for teachers' use of time quickly in response to changing conditions. Building on the findings from the OECD School Resources Review series and data from the Teaching and Learning International Survey (TALIS), this Policy Brief presents policies and practices that can promote an effective use of teachers' time by exploring the following questions:

- What do we know about teachers' effective use of time?
- How to balance regulations and flexibility to encourage an effective use of time?
- How to define core tasks and support teachers in prioritising them?
- Can technology help teachers use their time more effectively?

What do we know about teachers' effective use of time?

The quality of teachers is one of the most important determinants of students' educational and non-educational outcomes (Jackson, 2018[1]; Chetty, Friedman and Rockoff, 2014[2]; Rivkin, Hanushek and Kain, 2005[3]). Making the most of their precious time is a complex process that involves balancing activities inside the classroom that directly affect student learning and activities outside the classroom, such as lesson planning and professional learning, that affect students more indirectly by enhancing teachers' ability to offer high-quality instruction.

Just like teachers need to balance various tasks competing for their attention, policy makers at the system level must consider difficult trade-offs when regulating teachers' time. As teachers' salaries account for a large share of educational expenditure, whether teachers are given an additional hour in the classroom, an hour to prepare their lessons or an hour to engage in professional learning can have significant implications for both the cost and the quality of education.

Making choices about time allocation to support student learning is not straightforward and the research evidence on the benefits of additional instruction time is mixed (Andersen, Humlum and Nandrup, 2016[4]; Meyer and Van Klaveren, 2013[5]). In many circumstances, the quality of instruction and the time that students spend *engaged* with relevant tasks appear to matter more than the overall instruction time. However, there is evidence that disadvantaged students tend to benefit more from extended learning time than advantaged students (Patall, Cooper and Batts Allen, 2010[6]).

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Many different tasks compete for teachers' attention. Self-reported data on teachers' time use in the 2018 TALIS survey shows significant cross-country differences in the proportion of time that teachers devote to tasks such as classroom instruction, lesson planning, marking, collaboration and professional learning (Figure 1). What constitutes an effective distribution of teachers' time across these tasks to best support their students is likely to be context-specific. It will depend on each teacher's abilities and dispositions, their students' background and learning objectives as well as the context in which they teach.

Figure 1. Teachers' working hours and task composition (ISCED 2), 2018

Average hours teachers report having worked in the last complete week and estimated shares of individual tasks.
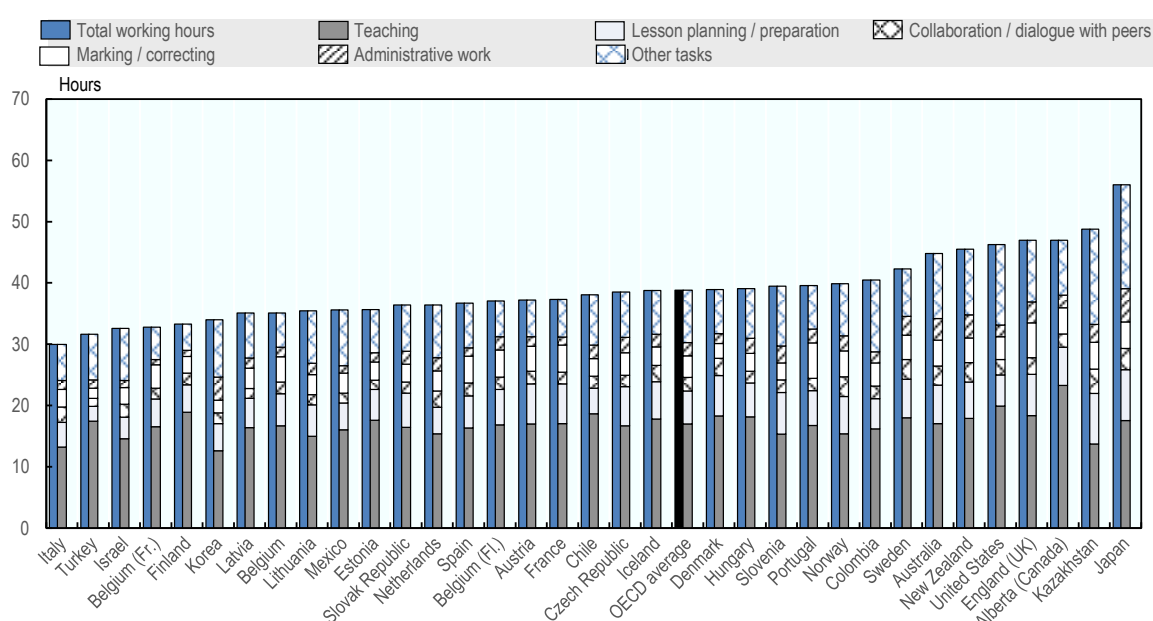
Notes: The reported times are national averages of all surveyed teachers, including part-time teachers; Time spent on individual tasks was proportionally adjusted to match total reported working hours; "Other tasks" include student counselling, participation in school management, professional development, engagement with parents and extracurricular activities; A "complete" calendar week is one that was not shortened by breaks, public holidays, sick leave, etc. Also includes tasks that took place during weekends, evenings or other off-classroom hours.
Source: OECD (2019[7]) *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, https://doi.org/10.1787/1d0bc92a-en, Table I.2.27; Figure adapted from OECD (2019[8]) Working and Learning Together, https://doi.org/10.1787/b7aaf050-en.

> There is no one-size-fits-all model for the effective use of teachers' time. It depends on their abilities and dispositions, their students and learning objectives as well as the context in which they teach.

Teachers' time use not only influences their students' educational experience, it is also closely related to teachers' own well-being, which in turn may influence the quality of their teaching. Many teachers report high workload to be a challenge and some countries have made it a priority to address the problems arising from long working hours. In the 2018 TALIS survey, more than 10% of the teachers in nearly every OECD country reported to have worked 50 hours or more in the preceding week and in 17 of 31 countries, this share exceeded 25%. There are many reasons why teachers may work very long hours, regularly or during busy times of the year.

In most countries, teaching hours are relatively consistent across the population of full-time teachers and the high workload reported by some teachers is mostly explained by their non-teaching tasks. However, there are systematic differences in the non-teaching tasks that drive long working hours in different countries. Figure 2 shows, for example, that teachers with the highest workload in the Flemish Community of Belgium spend particularly long hours on planning and preparation as well as marking and correcting students' work. By contrast, teachers with the longest overall working hours in Japan spend a lot of time on administrative work as well as extracurricular tasks (Boeskens and Nusche, 2021[9]). This suggests that strategies to address excessive working hours should be based on a careful analysis of each system's (and even sub-system's/school's) context.

Figure 2. Task composition by overall workload in the Flemish Community of Belgium, 2018

Results based on responses of full-time lower secondary teachers.
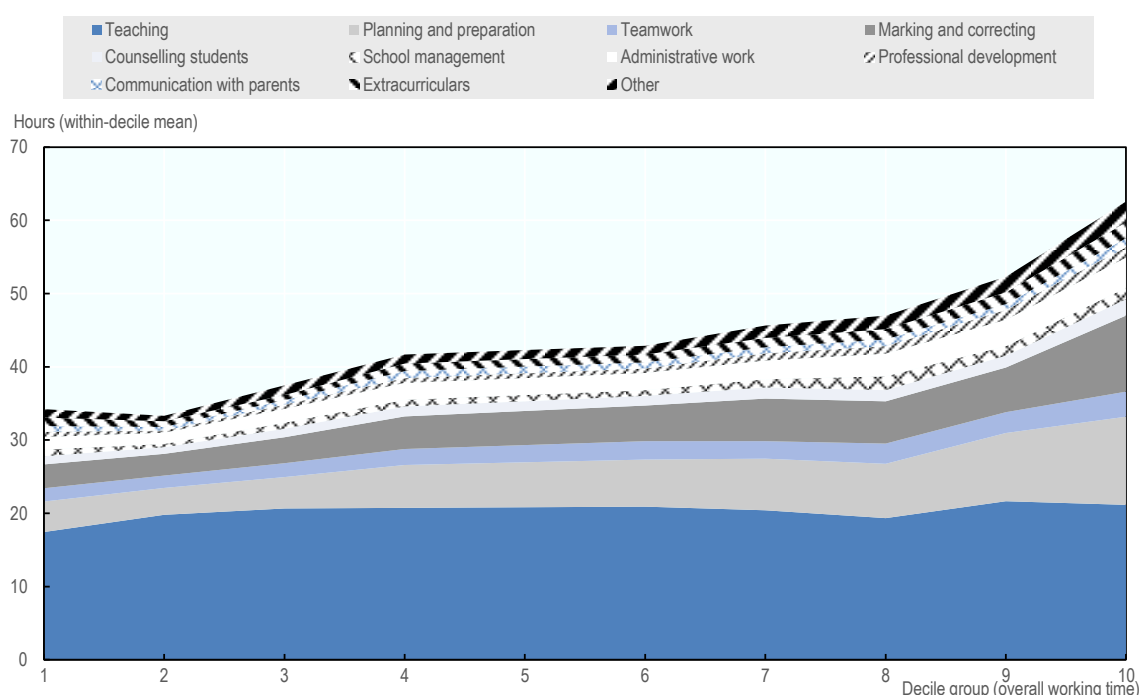
Note: Data is based on the average reported time for individual tasks among teachers within a given decile of the distribution of overall reported overall working hours.
Source: OECD (2019), *TALIS 2018 Results* (database), https://www.oecd.org/education/talis/talis-2018-data.htm (accessed on 12 January 2021).

A range of individual and school-level factors can influence effective time use. For example, teachers who are assigned new courses or a greater number of unique courses may require more preparation time relative to their teaching time (Bastian and Janda, 2018[10]). Teachers of specific subjects, such as physical education or mathematics, might require less marking time to correct students' work than others, such as language of instruction teachers. Novice teachers might be expected to require more time to prepare their classes, while the time of more senior peers might be effectively used for teacher-leadership activities or mentorship. Students' needs and the teacher's classroom composition can also play a role with students in more diverse classes likely to require more individualised counselling or after-class support (Fine-Davis and Faas, 2014[11]). Yet, TALIS data indicates that teachers' reported use of time is relatively unresponsive to school- and individual-level characteristics (e.g. student backgrounds) in many OECD countries, which is surprising in light of these theoretical considerations.

One factor that is quite commonly taken into consideration in policy frameworks is seniority. Across OECD countries, novice teachers with five years of experience or less reported teaching slightly more hours than their mid-career peers with 6-15 years of experience (Boeskens and Nusche, 2021[9]). This seems counterintuitive as novice teachers are likely to need more time to prepare their lessons and benefit from induction. Some countries take a different approach more in line with novice teachers' needs. As seen in Figure 3, novice teachers in Singapore have a significantly reduced teaching load, which provides them with more time to adapt to their new working environment, learn from their peers, prepare their lessons or engage in induction programmes while they develop their teaching skills and improve their effectiveness (Jensen et al., 2012[12]; Paniagua and Sánchez-Martí, 2018[13]; Kraft and Papay, 2014[14]).

Other countries reduce the teaching load for senior teachers. In Portugal, for example, secondary school teachers receive a reduction of two hours at the age of 50 (and 15 years of service), another two at the age of 55 (and 20 years of service), and another four hours at the age of 60 (and 25 years of service) while their overall working hours remain unchanged (Liebowitz et al., 2018[15]), which is visible in Figure 3. In some cases, lower teaching hours among senior teachers reflect the legacy of collective bargaining agreements favouring incumbents. However, a reduced teaching load for experienced teachers can also be a means to encourage teachers to stay in the teaching profession by diversifying their duties as they approach retirement, for example by spending more time mentoring their less experienced peers.

Figure 3. Teaching hours by experience in Portugal and Singapore, 2018

Based on self-reports of full-time lower secondary teachers.
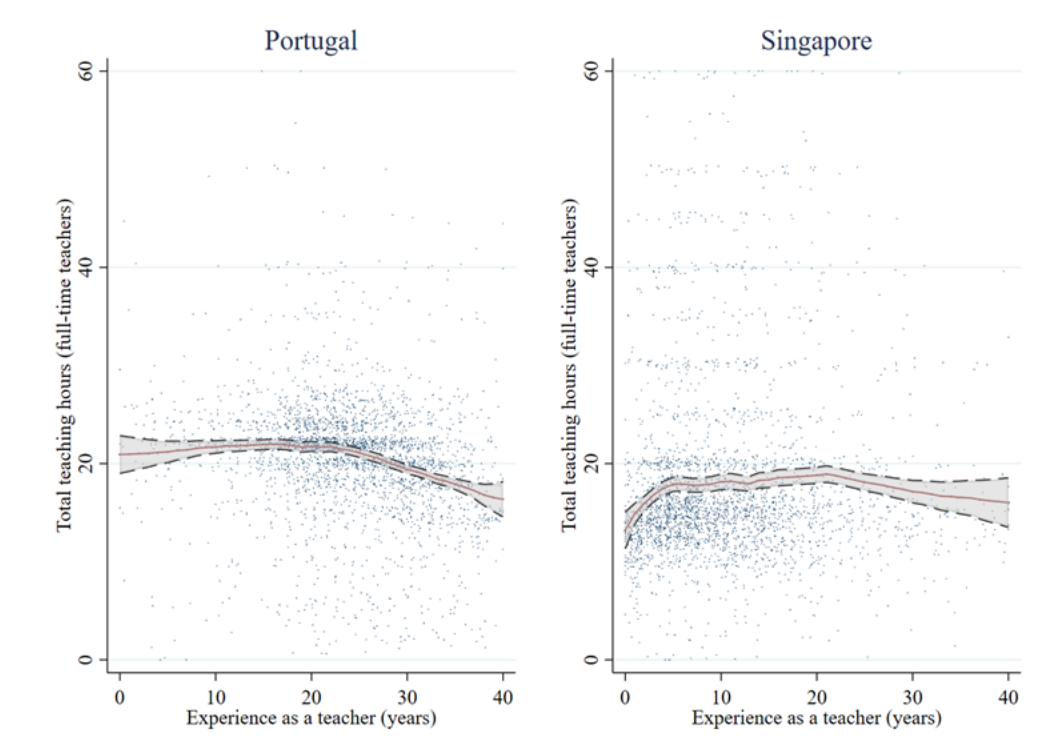
Note: Analysis restricted to teachers with 40 or fewer years of experience and 60 or fewer teaching hours. Running line and pointwise confidence interval for smoothed values of teaching hours.
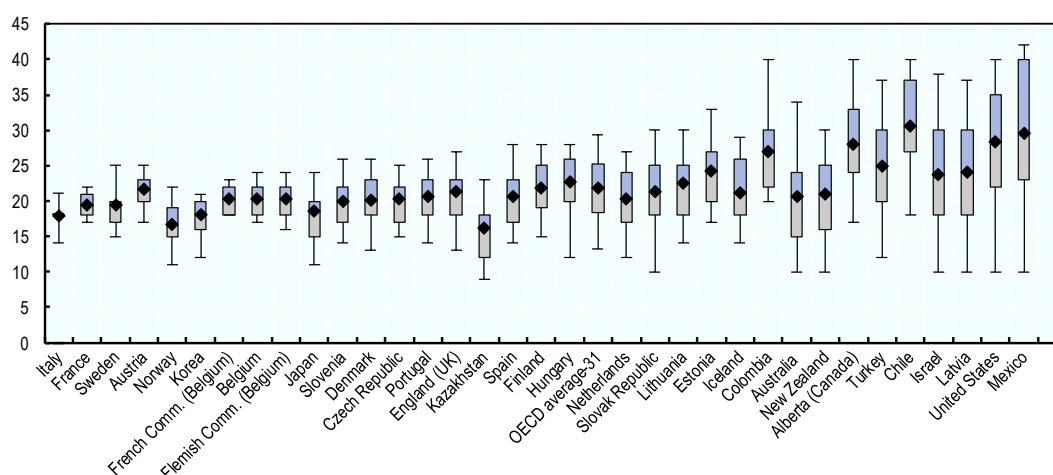*Source*: OECD (2019), *TALIS 2018 Results* (database), https://www.oecd.org/education/talis/talis-2018-data.htm (accessed on 12 January 2021). Reproduced from Boeskens and Nusche (2021), "Not enough hours in the day: Policies that shape teachers' use of time", *OECD Education Working Papers*, No. 245, https://doi.org/10.1787/15990b42-en.

How to balance regulations and flexibility to encourage an effective use of time?

Next to teachers' salaries and the size of their classes, the amount of time each teacher spends in the classroom is one of the most financially consequential policy decisions in OECD school systems. As mentioned above, within-country differences in the time full-time teachers spend in the classroom are relatively small in many school systems. Yet, as can be seen in Figure 4, some OECD countries exhibit significant differences in the hours that full-time teachers' report spending in the classroom. These differences reflect various approaches to the regulation of teaching hours and teaching load reductions.

Figure 4. Variability in teaching hours, 2018

Teaching hours or full-time lower secondary teachers

Note: The boundaries of boxes and whiskers represent values at the 10th, 25th, 75th and 90th percentiles; Countries are sorted in ascending order of their interquartile range.
Source: OECD (2019), *TALIS 2018 Results* (database), https://www.oecd.org/education/talis/talis-2018-data.htm (accessed on 12 January 2021). Reproduced from Boeskens and Nusche (2021), "Not enough hours in the day: Policies that shape teachers' use of time", *OECD Education Working Papers*, No. 245, https://doi.org/10.1787/15990b42-en.

As discussed above, there are many reasons why school systems might want to adjust the proportion of time teachers spend in the classroom based on specific school-level and individual-level factors in order to ensure that teachers can make the most effective use of their time. Some OECD countries use sophisticated systems to adjust teaching loads based on a variety of these factors that are assumed to determine how much time teachers need for preparation and other non-instruction tasks. Box 1 presents an example of a well-developed mechanism of this kind in Iceland.

Box 1. Balancing teaching and non-teaching time in Iceland

A collective labour agreement for compulsory school teachers signed in May 2014 sets full-time teachers' working hours to 1 800 per annum, or 40 hours per week. Within this envelope, teachers' time is divided into three variable components: Part A covers teachers' core tasks of teaching, preparation and follow-up. Part B covers all other non-teaching activities, including professional development, meetings with parents, record keeping, collaboration with peers and breaks. Part C covers special assignments.

In the baseline model, full-time teachers spend about 641 hours per year on teaching and 395 on preparation (Part A), 150 hours on professional development and 614 on other tasks (Part B). Special assignments (Part C) are proposed by the head teacher in agreement with the teacher. This can include, for example, the management of school projects or special initiatives. Any time spent on Part C is supposed to be compensated by a reduction in the time spent on teaching and other tasks (Part A and B).

In practice, the teaching hours and precise distribution of time between Part A and Part B are determined at the school level based on a holistic assessment of each teacher's work. This causes de-facto teaching hours to range from about 13 hours to 19 hours per week. The assessment takes into account a range of factors, including: the teacher's subject, the number of subjects, class size and composition, required preparation and marking time, student assessments, the maintenance of equipment and facilities, the amount of teacher co-operation required, the use of new teaching methods and development of study materials, communication with parents, and exceptional record keeping duties. In addition, teachers receive a reduction of time spent on Part A (and complementary increase in Part B) from the ages of 55 and 60, and additional holiday allowances from the ages of 30 and 38.

Source: Icelandic Ministry of Education, S. (2014), *OECD Review of Policies to Improve the Effectiveness of Resource Use in Schools: Country Background Report for Iceland*, Iceland Ministry of Education, Science and Culture, http://www.oecd.org/education/schoolresourcesreview.htm.

System-level policy frameworks regulating teachers' use of time are an important means to ensure decent working conditions that allow teachers to provide their students with high-quality instruction, regardless of where they teach. At the same time, giving schools an appropriate level of discretion in the management of individual teachers' task range is likely to promote a more efficient use of their time. For example, there can be advantages in regulating teaching hours on a monthly or annual basis rather than a weekly basis, or in providing teachers with greater scope to reduce teaching hours in exchange for other tasks, such as mentoring, extracurricular activities or school management.

Given the intimate knowledge of their schools, school leadership teams, in collaboration with their staff, should be in a good position to evaluate where adjustments to teachers' time use might benefit school development and student learning (Barrios and Bovini, 2017[16]). Avoiding an overly prescriptive approach to teachers' time and retaining sufficient room for local discretion can empower school leaders and, under the right conditions, promote innovation. Several school systems participating in the School Resources Review have sought to reform the governance of teachers' time to increase flexibility and responsiveness to different contexts' needs or to rebalance responsibilities across different levels of the system. Unless otherwise noted, country examples throughout this brief are drawn from Boeskens and Nusche (2021[9]) and the SRR country reviews available on the project website:

- In **Portugal**, teaching loads are adjusted automatically based on teachers' level of education and their seniority or age. In addition, a system of credit hours is used to give local actors a greater role in managing adjustments of teaching hours. Each school in Portugal receives a given number of credit hours based on a formula that takes into account a range of factors, including the school's size and its socio-economic profile. School leaders can freely allocate these credit hours to reduce the teaching load of selected teachers and provide them with more time to engage in other activities, particularly those aimed at promoting the success of all learners. For example, school leaders might recognise a teacher's organisational talent by providing them with release time to design and supervise innovative pedagogical projects. During the COVID-19 crisis of 2020, all schools were provided with additional credit hours to provide them with greater flexibility in adapting their teachers' time since many schools reorganised their schedules to accommodate social distancing measures.

- In 2013, **Denmark** decentralised the governance of teachers' time by providing school leaders with greater scope and flexibility in determining the use of teachers' working hours and their

presence at school. Following the reform, the majority of municipalities issued guidelines concerning teachers' use of time, which were generally followed by school leaders – some of whom lacked examples of effective ways to allocate the working and teaching hours. Many municipalities introduced requirements for teachers to be present at school for some time each day in order to facilitate teachers' collaboration and increase accountability around their non-teaching time.

- In 2013, **Estonia** reformed teachers' employment, shifting from a system in which staff contracts only specified teaching hours to a workload-based system that specifies the total number of working hours and defines the full range of tasks that teachers are expected to perform both inside and outside the classroom. The reform also gave school leaders greater responsibility to decide on the distribution of teachers' time between teaching and non-teaching tasks, based on a holistic conception of their work. In some cases, school leaders' decisions on the use of teachers' time are subject to political agreements at the municipal level or with a school's teacher council.

The governance of teachers' time should be responsive to the needs and priorities of actors at different levels

Policy frameworks for teachers' time use reflect system-level educational priorities and can be a way to provide local authorities, school leaders and teachers with helpful guidance to promote evidence-informed practices around the allocation of teachers' time. At the same time, making sure that school leaders have adequate discretion in managing teachers' time could promote innovation and a more efficient use of time, provided that school leaders have sufficient capacity to recognise teachers' needs and potential and work collaboratively with teachers to address students' needs. It is equally important to adequately recognise teachers' autonomy, including over their use of time. Excessive micro-management of teachers' time not only risks impairing their ability to act upon their professional judgement, but also places an inefficient burden on school leaders. Of course, autonomy should not be confused with an absence of support. Opportunities for professional exchange, regular feedback and mentoring are key to help teachers make a well-reflected use of their time.

How to define core tasks and support teachers in prioritising them?

A common understanding of teachers' "core tasks" is key to operationalising a school system's vision for the teaching profession. While the definitions of teachers' responsibilities vary across countries, for education policies to be consistent, such high-level definitions (or standards) should reflect the student outcomes the system is aiming to achieve. In addition, as teachers work in diverse contexts, any system-level definition of teachers' core tasks needs to be refined based on an assessment of the particular needs of the students that they teach.

Countries differ as to where they draw the line between the work of teachers and that of other school staff. What may be considered a burden best delegated to other staff in some countries, may be seen as a central element of teachers' work in others. Some countries have very holistic conceptions of teachers' roles and consider it the teachers' responsibility to cultivate students' well-rounded development and well-being, whereas others aim for more task specialisation among the different staff in schools. Regardless of these different conceptions of teachers' roles, the decision of what teachers should focus on inevitably involves trade-offs.

Of all the tasks that teachers are expected to engage in outside the classroom, the preparation of lessons is not only the most time-consuming on average – it is also undoubtedly an important condition for quality

instruction. As shown in Figure 5, countries differ significantly in the average time their lower secondary teachers report spending on planning and preparation per teaching hour. Both cross-country and within-country associations point to a clear trade-off between the hours that teachers are expected to teach and the time they have for preparing each lesson. In systems with a high teaching load (such as the United States, Alberta [Canada] and Chile), teachers spend less time preparing each lesson, whereas the opposite is the case in countries with fewer teaching hours (e.g. Kazakhstan and Norway). Of course, these differences are also shaped by the types of preparation countries expect teachers to engage in and by their working methods (e.g. the extent to which they share materials and prepare lessons with colleagues).

Figure 5. Teaching hours and planning time per teaching hour

Results based on responses of all lower secondary teachers (including part-time teachers).
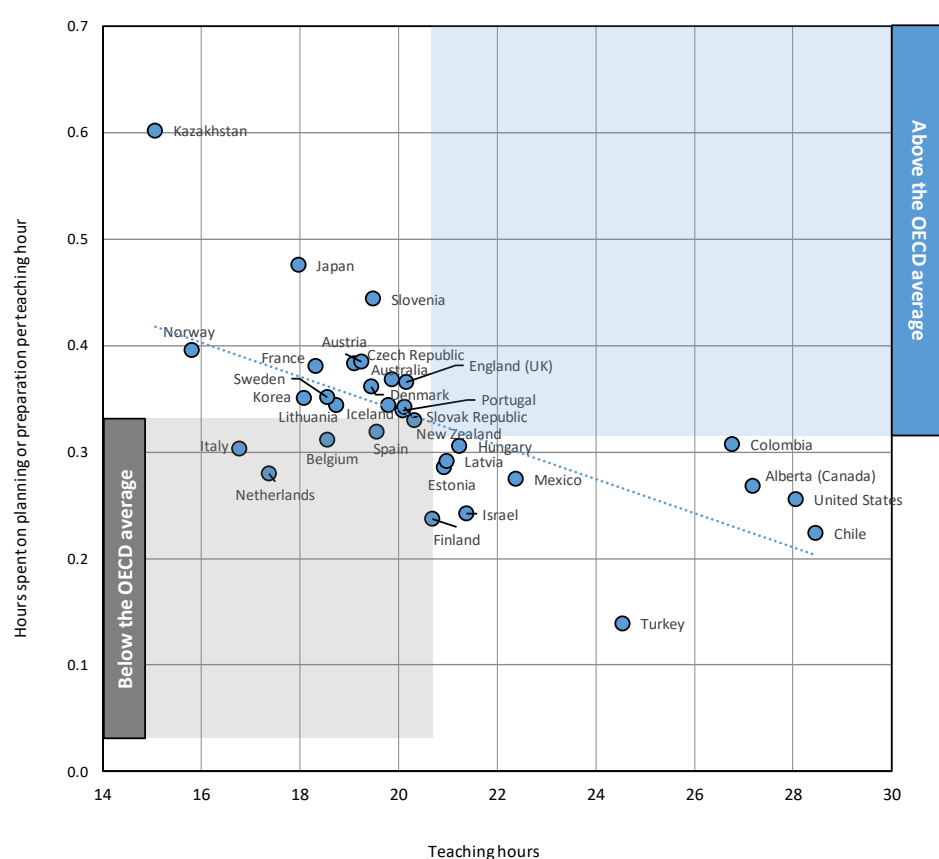
Note: Teachers' time spent planning per teaching hour is calculated as the country-level average of individual-level ratios.
Source: OECD, TALIS 2018 Database, Table I.2.27 and authors' analysis of TALIS 2018 data; Reproduced from Boeskens and Nusche (2021), "Not enough hours in the day: Policies that shape teachers' use of time", *OECD Education Working Papers*, No. 245, https://doi.org/10.1787/15990b42-en.

While finding the right balance between teaching and non-teaching time is not trivial, there are strategies that may provide teachers with additional time for core tasks outside the classroom without compromising their ability to offer instruction, e.g. by reducing non-core tasks or by increasing class sizes. One strategy that is frequently invoked to help teachers focus on their core work is to reduce their administrative workload, either by increasing the administrative support in schools or by using existing support staff more effectively. However, the marginal impact of hiring more staff to support teachers in their administrative

duties is contested (OECD, 2019, p. 173 f.[8]) and international comparison suggests that the hiring of support staff might be neither sufficient nor necessary to ease teachers' administrative burden.

To give an example, starting in 2003, England (United Kingdom), engaged in a large workforce remodelling reform, which raised the number of teaching assistants and their administrative responsibilities. The aim of the reform was to ease teachers' workload and permit them to spend more time on pedagogical tasks like lesson planning, preparation and assessment, rather than administrative duties. Despite the reform's high cost of implementation, evaluations of its effectiveness have shown mixed results (see Box 4.2. in Boeskens and Nusche (2021[9])). As this experience demonstrates, increasing the effectiveness of teachers' working time (and that of their colleagues) requires a careful reflection on the roles of different staff in schools and the division of tasks between them.

To reduce teachers' time burden of low-priority tasks, it is also important to reflect on how working methods and other practices at the school level can be organised more efficiently to free up some of teachers' time. This might include streamlining regular meetings (Jensen et al., 2014[17]) and developing effective data management protocols (Allen and Teacher Workload Advisory Group, 2018[18])). Similarly, at the system level, there is typically ample room to review and reduce the administrative work generated by accountability and bureaucratic procedures (Heissel and Ladd, 2018[19])).

In practice, the boundaries of teachers' roles are subject to change and may need to be renegotiated in response to events, new policy priorities or student needs. The COVID-19 crisis is a good example of such an unexpected development and Box 2 describes how Japan has responded to it by adjusting the staff mix in schools in order to alleviate teachers' workload.

Box 2. Adjusting the staff mix in Japanese schools during the COVID-19 crisis

To respond to the increased demands on teachers' time during the COVID-19 crisis, Japan has taken significant steps to adjust the staff mix in schools and hire additional support staff to alleviate teachers' workload. In the context of a system that is characterised by a very holistic approach to the teacher's role, the crisis has prompted a rethinking around the distribution of responsibilities between teachers and other staff. In the course of the COVID-19 crisis, most schools in Japan were closed for two to three months in early 2020 and although most had reopened by late June, many were still forced to use shortened or staggered timetables. In the 2018 TALIS survey, teachers in Japan reported the longest average working hours across OECD countries and the shift to distance education and blended learning during the crisis has – as in many countries – required them to take up new and additional tasks.

To avoid a further intensification of teachers' working time, a supplementary budget was secured in June 2020 to hire 84,900 additional staff in elementary and junior high schools (3 per school, on average) through March 2021. It is envisaged that the process will lead to the hiring of 3,100 new teachers (to offer smaller class-size for the last year of primary and middle schools), 61,200 learning instructors, and 20,600 school support staff. Prefectural and municipal governments are responsible for the hiring and employment process. The ministry covers the full cost of learning instructors and school support staff, while local governments are expected to supply two thirds of the cost of newly hired teachers. Support staff and learning instructors are expected to take up some of the new tasks related to distance education and infection prevention measures in order to allow teachers to concentrate on their instruction and other school duties. Specifically, learning instructors are expected to prepare home learning assignments, to mark students' submitted work and to assist classroom teachers with their lesson preparation. In addition, school support staff perform disinfection work, ensure the ventilation of school buildings, print learning materials and liaise with parents to assist classroom teachers during the reopening phase.

Source: MEXT (2020), *Reiwa 2 nendo Monbukagakusho dai2ji hoseiyosan (an) jigyobetsu shiryoshu* (MEXT proposal for 2nd supplementary budget: Project documents), https://www.mext.go.jp/a_menu/yosan/r01/1420672.htm.

Starting with a broad view of teachers' roles, systems should build a common understanding of priorities and make time for them

As the disruption of schooling caused by the 2020 COVID-19 pandemic has highlighted, teachers' responsibilities extend well beyond the transmission of knowledge and skills. The interpersonal aspects of teachers' work, including socio-emotional support, communication with parents and the coordination of counselling, social support services and pastoral care are likely to further rise in significance. A common understanding of teachers' core tasks and a careful reflection on their role and that of their colleagues is vital to operationalise a school system's vision for the teaching profession. Teachers and their professional organisations should take a lead role in developing and taking responsibility for the definition of teachers' core tasks. Such teacher standards should be conceived as "living documents" that are regularly reviewed and used by relevant actors as a reference point in evaluating, developing and improving teachers' work. Effective leadership at the school and system level can play a key role in ensuring that the desired outcomes set for students at the system, school and classroom levels become the main rationale for making choices concerning teachers' use of time and working methods. Such leadership requires strong focus on setting relevant objectives in terms of desired student outcomes and monitoring progress towards school (and system) goals. It also requires ensuring that sufficient time is reserved in teachers' schedules to promote their professional learning to and continuous improvement.

Can technology help teachers use their time more effectively?

Technology can play a powerful role in helping teachers save time by allowing them to perform their tasks differently or more efficiently, or by automating routine tasks. While the digital transformation can make some occupations less needed and create new ones, it also changes occupations by transforming the way in which tasks are carried out. Workers in more digital work environments tend to perform more frequently a variety of tasks (e.g. management and communication, advanced numeracy) and to make a more intensive use of general cognitive skills (OECD, 2019[20]). As digital technologies increasingly permeate schools and classrooms, they also have transformed and will continue to transform how teachers perform their teaching and non-teaching tasks.

Digitalisation enables new forms of knowledge transmission. Whether through educational software, platforms that combine formative assessment with personalisation features adapting to students' needs, technology-enabled collaboration or virtual laboratories - digital technologies have provided novel opportunities for teachers to unfold instruction activities differently, with increased potential to enhance student outcomes. Emerging technologies that rely on Artificial Intelligence, blockchain or robots, some of whch are increasingly used at scale (OECD, 2020[21]), further expand the universe of possibilities for reshaping how teachers deliver knowledge, support and interact with students, and organise their classrooms.

At the same time, before the COVID-19 crisis, teachers' use of technology for knowledge transmission tasks remained relatively limited on average across OECD countries. Around 53% of lower-secondary teachers reported that they frequently or always let their students use ICT for projects or class work in OECD countries with available data in TALIS (OECD, 2019[7]). While almost all teachers in Denmark used ICT as part of their teaching practices and 90% of them did so with high frequency, fewer than 20% of teachers in Japan reported using ICT for class work with high frequency. Evidence from the TALIS Video Study based on classroom observation displays a similar picture (OECD, 2020[22]). In the eight participating

countries and economies in the Study, technology was generally absent from lessons and when present, was mainly used for communication purposes rather than for conceptual understanding tasks.

While increasing the level of technology use should not be an objective per se, digital technologies can help enhance student learning and engagement when they amplify teaching and are integrated in innovative instructional practices. The COVID-19 disruption has accelerated teachers' use of technology for instruction purposes, whether in online or blended formats. Although most country responses to the disruption relied on traditional technologies (e.g. online learning platforms, virtual classes, text messaging apps), smart technologies (e.g. intelligent tutoring systems with personalisation features) continue to make fast progress (OECD, 2020[21]) and will increasingly transform how teachers carry out their teaching activities.

In addition, by supporting teachers and school staff in the performance of some tasks and automating other tasks, digital technologies have great potential for saving teachers' time and transforming how they engage in administrative work, lesson preparation, assessment, professional learning and collaboration. Recent evidence based on a survey of more than 2000 teachers in Canada, Singapore, the United Kingdom, and the United States suggests that between 20% and 40% of teacher time is dedicated to activities that could be automated (McKinsey, 2020[23]).

There is significant potential in some school systems for ICT to help save teachers and school staff's time by streamlining or automating repetitive administrative tasks, such as recording pupil data (Ilkka, 2018[24]; Selwood and Pilkington, 2005[25]). Technology-based behavioural interventions, such as message reminders, emails with information on students' attendance and grades and automated school-parent information programmes can enhance the effectiveness of school-parent communication at relatively low costs (Abdul Latif Jameel Poverty Action Lab, 2019[26]).

Technology can also provide opportunities for teachers to save time in lesson preparation by making teaching resources and curriculum materials more easily accessible to teachers. Many teachers already rely on online communities to share ideas, exchange on their teaching practices and filter information (Lantz-Andersson, Lundin and Selwyn, 2018[27]). New assessment technologies that rely on simulations, sensors, games and artificial intelligence have shown promise for delivering real-time, adaptive feedback, embedded within learning processes, which can give teachers more time to focus on other types of tasks (Vincent-Lancrin and van der Vlies, 2020[28]).

At the same time, such smart technologies are often designed as socio-technical or hybrid systems where technologies complement individuals or teachers rather than substituting for them in the performance of their tasks (OECD, 2020[21]). According to estimates based on expert interviews and assessments of current technologies, teacher tasks that hold the greatest potential for automation revolve around preparation, administration, evaluation, and feedback (McKinsey, 2020[23]). However, not all tasks susceptible to automation will necessarily be automated and even in advanced uses of digital technologies that involve task automation (e.g. personalised learning systems), teachers continue to maintain a control on technology (OECD, 2020[21]), with digital technologies transforming how teachers unfold their activities rather than replacing them.

In this context, while many smart or frontier technologies in education systems are still in development, digital technologies have nevertheless been increasingly used to help teachers save time when performing activities related to instruction, lesson preparation, administrative work or assessment. The following country examples illustrate such approaches:

- In the last decade, **Denmark** has relied on a range of digital tests to support teachers and school leaders in formative assessment (Balanskat and Engelhardt, 2020[29]). National digital tests, introduced in 2010, cover different subjects (Danish, Mathematics, English and Science), rely on online adaptive programmes and can be automatically checked. Schools and teachers can rely on the test results to monitor students' progress and target additional support to students in need, compare the performance of students in different classes of the same grade

and obtain summaries of students' performance relative to the objectives of the national curriculum.

- At the beginning of the COVID-19 disruption of schooling in 2020, **France** expanded access to its 17 banks of digital resources for school education (*Banques de Ressources Numériques pour l'Ecole, BRNE*) to support teachers in adapting to online teaching and saving time on preparing digital lessons or materials (Thillay, Jean and Vidal, 2020[30]). The BRNEs bring together a range of learning and teaching resources aligned with the French curriculum, including content, tools for creation and services that enable interaction between teachers and students. They comprise thousands of educational and structured resources that can be used or modified by teachers who can also create new resources or personalise the existing ones for the needs of their own students (éduscol- Ministère de l'Éducation nationale, 2020[31]). The resources can be adapted for online or offline use on a variety of digital supports. The BRNE resources were created several years before the COVID-19 crisis by publishers together with EdTech companies. During the COVID-19 crisis, the BRNE were extended to all teachers interested in using them, beyond the initial target of the platform (primary-lower secondary, French public school teachers) (Thillay, Jean and Vidal, 2020[30]). Teachers could thus rely on all digital tools provided by the BRNE in order to design and share learning activities with their students. Teachers also gained access to resources at different education levels than the ones they were teaching. In addition, access to the platform was simplified and an open model was chosen to enable easier access also from other French-speaking countries.

- In **Korea**, the COVID-19 crisis led to a complete switch to online classes in April 2020 with teachers providing two types of classes: real-time interactive classes and/or one-way clases, whether content-oriented (in which students watched recorded videos, were monitored by teachers or provided comments/answers) or task-oriented (students engaged in self-directed learning tasks provided by teachers) (Ministry of Education, 2020[32]). In this context, digital technologies also supported the adaption of methods for checking student attendance and progress in a digital environment. While interactive classes allowed teachers to check attendance in real time, learning management systems were relied upon to track attendance in one-way classes (e.g. through log-history) by gathering information on students' starting access date, progress, online access record and learning time. Social network services, text messaging and the submission of documents on line were used as alternative ways of monitoring attendance and progress of students who could not attend classes (Ministry of Education, 2020[32]).

- To save time on administrative tasks and communication with parents, the Ministry of Education and the Government Technology Agency of **Singapore** have developed the Parents Gateway app. The app enables teachers to create, send and follow their announcements to parents, as well as collect any forms that parents may need to sign, receive parental consent for children's activities or export parental responses in Excel files (Ministry of Education, 2018[33]). The app covers all children aged 7-18, with the objective of both enhancing parental engagement in children's education and saving teacher time by eliminating a number of manual administrative processes that were usually undertaken using hardcopy. Teachers can also create customised groups on the platforms (e.g. targeting only a group of students for some curricular activities or school trips). Estimates from one of the pilot schools in which the app was initially introduced showed that the app enabled teachers to spend only 15 minutes rather than four hours on gathering parental consent forms during the school year (Ministry of Education, 2019[34]). In the context of the COVID-19 crisis, the app also facilitated the diffusion by the Ministry of Education of information and directions regarding the pandemic to parents as well as contact-tracing and travel history tracking by schools (Observatory of Public Sector Innovation, 2020[35]).

Professional learning is crucial for an effective use of digital resources to help teachers save time

While technology has the potential to help teachers save time, its effective use requires professional learning, not only for teachers but for actors at all levels of the school system. If teachers, school leaders and education administrators and lack the knowledge and skills (digital and non-digital) to use new technologies in their work, they are likely to lose time by trying to work with digital tools that they are not familiar with or that are too technical. Well-designed professional learning opportunities can help encourage and sustain innovation across school systems so as to make the most of digital technologies within and outside classrooms. A number of strategies can support this, including the use of competency frameworks that reflect skills related to the effective use and management of digital resources and the design and provision of effective professional development, tools and guidance for teachers, school leaders and system leaders. Other policy challenges associated with the rise of smart technologies also need to be addressed, such as the need to increase awareness of and trust in such technologies, manage privacy, data security and ethical considerations, and enhance data collection and availability to support the effectiveness of such technologies (Vincent-Lancrin and van der Vlies, 2020[28]; Ilkka, 2018[24]).

School Resources

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For more information

Contact: Deborah Nusche, project leader, Deborah.Nusche@oecd.org

See: OECD School Resources Review

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