Education Policy Outlook 2024

RESHAPING TEACHING INTO A THRIVING PROFESSION FROM ABCS TO AI

OECD

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Foreword

The *Education Policy Outlook,* the OECD's analytical observatory of education policy, is a collaborative effort between OECD countries and economies, the OECD Secretariat, and invited organisations, as well as all actors working within participating education systems, to help students achieve their potential.

This report was prepared by the Education Policy Outlook Team (Diana Toledo Figueroa [Project Leader], Christa Rawkins, Emily Qing, and Hugo Marques de Sousa). It was prepared under the responsibility of Paulo Santiago, Head of the Policy Advice and Implementation Division, and Andreas Schleicher, Director for Education and Skills and Special Advisor on Education Policy to the OECD Secretary-General. The team also benefitted from exchanges and feedback from colleagues at different stages of the report: Etienne Albiser, Luka Boeskens, Eric Charbonnier, Esther Ferreira dos Santos, Lawrence Houldsworth, Jonathan James, Stéphanie Jamet, Leila Loupis, Jan Maarse, Tali Malkin, Katharina Meyer, Jason McGrath, Anna Pons, Nóra Revai, Simon Roy, Claire Shewbridge, Karine Tremblay, and Samo Varsik. Ameline Besin provided editorial and administrative support, with communications input from Sasha Ramirez-Hughes, Duncan Crawford, Eda Cabbar, Rachel Linden, Kevin Gillespie, Anna Wahlgren, Kristen Hinkle and Della Shin.

The preparation of this report was possible thanks to the work undertaken by the Education Policy Outlook in its three strands of work – comparative and thematic analysis, country-based work (mainly through the preparation of country policy profiles) and policy dialogue. These act as building blocks to develop, strengthen, and mobilise international knowledge of education policy. The OECD Secretariat is thankful to its EPO National Coordinators and key actors' representative bodies at the OECD – including the Trade Union Advisory Committee (TUAC) and Business at OECD (BIAC) – for their valuable input during the project's activities, which have informed the preparation of this publication.

Grounded on extensive research and data analysis, the Education Policy Outlook comparative reports provide evidence-based insights into international education policy. From 2023, the Education Policy Outlook also supports countries to follow up on the goals established by the ***2022 Declaration on Building Equitable Societies Through Education***. As part of this support, this report continues the Education Policy Outlook's work on responsiveness and resilience since 2020 and provides insights relevant to education actors in 2024 based on priority areas of the Framework of Responsiveness and Resilience in Education Policy. The report presents insights from international comparative analysis of relevant and promising policy efforts adopted by participating countries in recent years, predominantly since 2020, to support a quality teaching profession.

The report also builds on education system's responses to the *Education Policy Outlook National Survey for Comparative Policy Analysis 2024: Reshaping Teaching Into a Thriving Profession (from ABCS to AI)*, collected mainly between April and May 2024. The 33 education systems participating in this survey are: Austria; the Flemish, French, and German-speaking Communities of Belgium; Brazil; Chile; Colombia; Croatia; Czechia; England (United Kingdom); Finland; France; Germany; Greece; Hungary; Iceland; Ireland; Japan; Kazakhstan; Korea; Latvia; Lithuania; Luxembourg; Mexico; Norway; Peru; Poland; Portugal; Romania; Slovenia; Spain; the Netherlands; and Türkiye. Information for other education systems was collected through other Education Policy Outlook activities.

This report was launched at the *Education Policy Reform Dialogues 2024: Reshaping Teaching into a Thriving Profession* from ABCS to AI, co-hosted with the Ministry of Science, Education and Youth of Croatia in Zagreb on 25-26 November 2024. The Education Policy Reform Dialogues, organised annually since 2018, are the leading OECD forum on education policy. Outcomes of the discussions inform the future work of the OECD on education and skills, including the Education Policy Outlook.

Editorial

Expectations around student learning are evolving, carrying important implications for the teaching profession. Education systems are increasingly goal oriented, articulating ambitious aspirations for what learners should achieve at different stages of their learning processes. Teachers remain central for achieving these goals, with ever higher expectations placed upon them.

We expect teachers to have a deep and broad understanding of what they teach, whom they teach and how students learn, because what teachers know and care about makes such a difference to student learning. But we expect much more than what we put into the job descriptions of teachers. We expect teachers to be passionate, compassionate and thoughtful; to make learning central and encourage students' engagement and responsibility; to respond effectively to students of different needs, backgrounds and languages, and to promote tolerance and social cohesion; to provide continual assessments of students and feedback; and to ensure that students feel valued and included and that learning is collaborative. We expect teachers themselves to collaborate and work in teams, and with other schools and parents, to set common goals, and plan and monitor the attainment of goals.

Not least, students are unlikely to become lifelong learners if they do not see their teachers as active lifelong learners, willing to extend their horizon and question the established wisdom of their times. And there is more, most successful people had at least one teacher who made a real difference in their life – because the teacher acted as a role model, or took a genuine interest in the student's welfare and future, or provided emotional support when the student needed it.

In 2022, the Ministerial Declaration on Building Equitable Societies Through Education highlighted high-quality teaching as a critical factor in improving learning outcomes, particularly for disadvantaged students. The Declaration also called for recognising the evolving roles of education professionals and advocated for policies that empower them to meet these demands. However, declining student performance, persistent inequities in learning, and growing teacher shortages show us that we need to find new policy responses.

Teachers need to meet expectations while navigating old and new challenges. Demographic changes, for example, will continue to greatly impact the teaching profession in the coming years, according to 33 governments surveyed by the OECD for this report. Populations are ageing, including teachers, and we are having fewer children, resulting in a fluctuating profile of student populations across many education systems. We are also becoming more urban, and our classrooms more diverse, with implications for class size or inclusiveness. But while most education systems recognise demographic shift as a priority, fewer report that policies concerning the teaching profession adequately address these changes.

At the same time, the Programme for International Student Assessment (PISA) results for 2022 show that digital investments in education are not yet translating into improved learning outcomes. This underscores the need for a more evidence-informed approach to digital technology in classrooms. Governments are aware of this necessity, yet a gap is emerging between vision, policy, and classroom realities. In particular, efforts to integrate Artificial Intelligence (AI) risk repeating the pattern of high resource investment with little educational return.

Supporting teachers in experimenting with practices, collaborating with researchers and EdTech developers, and drawing on peer expertise can help close this gap. As can efforts to level up teachers' own professional learning through digital means. EdTech, researchers, and policy makers can pay much more attention to the opportunities advanced technologies offer teacher development.

Both quick fixes and strategic approaches are essential to balance teacher supply and demand in ways that support education quality over time. Creating conditions that help teachers thrive in evolving contexts will require examining the opportunities, structures, and processes that can empower them as trusted professionals. This, in turn, calls for political will and strategic skill to define priorities that transform rules into guidelines for good practice, and ultimately, good practice into culture.

In our changing world, advancing into 2025 and beyond, fostering opportunities for teachers' professional learning, collaboration, well-being, and leadership is key. Equally important is enhancing teachers' capacity to integrate digital technologies within a broader pedagogical toolkit.

Addressing teacher shortages, therefore, goes beyond merely getting teachers where they are lacking. It is about ensuring that all teachers have the essential skills – from foundational pedagogies (ABCs) to digital fluency, including AI – to deliver quality education in diverse and evolving settings. As pointed out in this report, this requires not only having the right number of teachers but also placing them in the right schools at the right time, and in ways that optimise student learning.

Depending on the context of the education system, long-term measures for this may include reforming funding models or systematically supporting flexible, specialised, and mobile career pathways within and beyond teaching. In classrooms, the traditional 'one teacher, one classroom' model may no longer suffice. Emerging practices across OECD countries suggest that education systems can explore alternative structures that promote flexibility and make better use of the workforce's collective skills.

We must commit to thoughtful, transformative action that lays the foundation for a thriving teaching profession, from foundational skills to advanced digital tools, to support student learning well into the future.

Andreas Schleicher

Director for Education and Skills,

OECD Special Advisor on Education

Policy to the Secretary-General

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Abbreviations and acronyms

AI	Artificial Intelligence
AUD	Australian Dollar
Comm.	Community
COVID-19	Coronavirus Disease 2019
EACEA	European Education and Culture Executive Agency
ECD	Early Childhood Education Development
ECEC	Early Childhood Education and Care
EdTech	Education Technology
EENEE	European Expert Network on Economics of Education
EPO	Education Policy Outlook
ESCS	Economic, Social, and Cultural Status index
GBP	Great Britain Pound
GYO	Grow Your Own (United States)
HRM	Human Resources Management
IBM	International Business Machines Corporation
ILO	International Labour Organisation
INTEF	*Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado* (National Institute of Educational Technologies and Teacher Professional Development, Spain)
ISCED	International Standard Classification of Education
IT	Information Technology
LLM	Large Language Models
MINEDUC	*Ministerio de Educación* (Ministry of Education, Chile)
MOE	Ministry of Education
NHS	National Health Service (United Kingdom)
NOLAI	*Nationaal Onderwijslab AI* (National Education Lab AI, The Netherlands)
PhD	Doctor of Philosophy
PISA	Programme for International Student Assessment
PLC	Professional Learning Community
RPIP	Research-Practice-Industry Partnership
TALIS	Teaching and Learning International Survey
TNTP	The New Teacher Project (United States)
USD	United States Dollar
VAGO	Victorian Auditor-General's Office (Australia)
VET	Vocational Education and Training

Executive summary

The teaching profession today: Understanding the challenge

Many education systems are struggling to balance teacher supply and demand, while facing declining student performance and persistent inequities. In 2022, nearly half (47%) of school principals across OECD countries reported that teacher shortages were hindering instruction at the lower secondary level – up from 29% in 2015. Global demographic shifts, such as ageing populations and low birth rates, mean disruptions in teacher supply and demand are set to intensify. At the same time, rapid technological advancements, particularly in AI, are reshaping how people live and work.

The *2022 Ministerial Declaration on Building Equitable Societies Through Education*, marked a commitment by OECD education ministers to develop policies that promote quality and equity in student learning. Achieving this vision requires bold action to reimagine education systems and support educators. Policymakers, teachers, and institutional leaders must work together to enhance, adapt, or even disrupt current practices to strengthen teaching quality.

Chapter 1 of this report provides a comparative overview of the challenges education systems face in attracting, retaining, and developing quality teachers in this evolving context. It introduces a policy roadmap for education systems, which is further examined in Chapters 2, 3, and 4 through selected international experiences.

This analysis draws on data from over 33 education systems, gathered through the *Education Policy Outlook National Survey for Comparative Policy Analysis 2024* (EPO Survey 2024) and additional OECD data. While the central focus is on school-level education, the report also considers other education levels.

Addressing teacher shortages

Responses to the EPO Survey 2024 showed that, when it comes to the urgent policy challenge of addressing teacher shortages experienced in some education systems, a larger share of education ministries are focused on attracting teachers, compared to retaining them. Regarding attraction, two-thirds of respondents prioritised raising the status of the profession, enhancing institutional leadership, and diversifying pathways into teaching to improve teacher attraction.

The roadmap identifies key factors influencing teacher demand such as the size of the school-age population, compulsory education duration and coverage, teaching loads, and graduation requirements. Teacher supply, on the other hand, is affected by professional prestige, salaries and incentives, working conditions, and job availability, as well as by training, certification, and career structures.

Policy responses explored in this report to address teacher shortages aim to:

- **Get more teachers into the workforce**, by reducing barriers to entering the profession, supporting re-entry, addressing targeted shortages, or proposing alternative pathways into the profession.

- **Better allocate teachers to areas of need**, by rethinking teams' skill mixes (e.g. enhancing teaching roles in collaborative structures, and restructuring teachers' time into teams), increasing mobility within and outside of the profession, or ensuring an equitable distribution of teachers.
- **Make teaching a more attractive profession,** by enhancing career structures that support progression, reviewing relative salaries and incentives; or developing campaigns to improve the status of the teaching profession.

Supporting teaching quality in changing contexts

In rapidly changing contexts, addressing teacher quality is also an urgent need. Responses to the EPO Survey 2024 suggest that harnessing the potential of digital technologies to improve teachers' professional learning is only an emerging priority across education ministries compared to its use to support student outcomes. Similarly, fewer ministries prioritise policies that encourage teachers to use evidence-informed practices.

To support teacher quality in these contexts, the roadmap identifies policy factors to help them manage their workload while enhancing skills that can enhance their practice (e.g. digital skills, integration of evidence-informed approaches). At school level, the roadmap sees teachers' professional judgement as informed and strengthened by strong relationships with colleagues and other partners, including from beyond the school walls. Similarly, supporting school leadership and enhancing physical and digital infrastructure or resources matter too. Furthermore, relevant areas of action at system level in times of rapid change include ongoing professional development and formative teacher appraisal.

Policy responses explored focus on:

- **Teachers:** Helping manage teacher workloads including through the support of AI, enhancing teaching with technology and AI, or engaging with research to experiment with practice.
- **Schools:** Working with champion teachers and institutions; or fostering collaborations between educators, researchers, and EdTech to co-design digital tools that meet teachers' needs.
- **System:** Embedding mentoring systems to support both novice and experienced teachers, or diagnosing teachers' development needs

Strengthening capacity in evaluation and monitoring

Education systems require strategic yet flexible approaches to address teacher shortages, grounded in a coherent vision. For this, effective planning must balance immediate needs with long-term objectives, supported by robust evaluation and monitoring to understand what is working, for whom, and in which contexts. However, the EPO Survey 2024 reveals that only two-thirds of education systems have projections of potential teacher shortages for 2025-2030 at primary and secondary levels, and fewer than half have done so for other education levels. The survey also finds that barriers to implementation or evaluation vary across the area of teacher policy surveyed.

Key efforts identified to enhance evaluation and monitoring capacity include:

- **Developing data infrastructure to inform decision-making:** Developing comprehensive data infrastructure involves mapping current data efforts, integrating disparate data sources, and closing gaps with qualitative and quantitative data. Such infrastructure can allow for real-time adjustments and long-term impact assessments of policies on teacher quality and retention.
- **Empowering teachers and leaders as evidence contributors:** Encouraging teacher participation in evaluation, supported by recognition and professional development, can enhance feedback quality and engagement. Digital tools and structured methods can further enable

teachers to systematically document evidence, fostering a culture of evaluative thinking and continuous improvement within the teaching profession.

- **Leveraging rapid and adaptive evaluation models:** Rapid, adaptive models can enable incremental assessment and timely adjustments to policies as they are being implemented. These methods use scenario-based evaluations, stress testing, and small-scale pilots to provide actionable insights in real time. While they may involve rigour trade-offs, these models can deliver timely information, allowing for flexible monitoring that addresses challenges before they become entrenched. Technology adoption – including AI-enabled data analytics, reflective tools, or platforms – can further streamline this process, creating feedback loops that support decision-making.

1 The teaching profession today: understanding the challenge

This chapter analyses the rising teacher shortages across some OECD countries and economies, exploring diverse factors contributing to these gaps. Using data collected by the Education Policy Outlook (EPO) and other OECD datasets, it provides insights into how these shortages are increasingly impacting student performance and limiting educational quality. The chapter examines critical challenges to balance teacher supply and demand and underscores the need for teachers with relevant pedagogical and digital skills in modern classrooms. It also discusses the influence of global megatrends, particularly demographic shifts, and digitalisation, on teacher supply and demand, highlighting their implications for policy. This analysis sets the stage for a comprehensive roadmap to address these shortages and strengthen the teaching workforce in dynamic global contexts.

In Brief

The teaching profession today: understanding the challenge

Teacher shortages across some OECD countries and economies have reached critical levels in recent years. Data from PISA 2022 show that nearly half of students now attend schools where principals report that teacher shortages hinder the schools' capacity to provide instruction, a sharp rise from 29% in 2015. There is an urgent need for effective, long-term policy solutions to balance teacher supply with educational quality.

While not a universal challenge, many education systems are facing a mismatch between teacher supply and demand. OECD data show that across 21 education systems during the 2022/23 academic year, 9 education systems reported teacher shortages across all subjects in terms of unfilled vacancies, while another 9 faced shortages in specific fields. Moreover, some education systems are facing high turnover rates – driven by resignations and early retirements – leading to shortages across many regions. According to data from 15 education systems, close to 1 in 10 fully qualified teachers leave each year due to resignations or retirement (OECD, 2024[1]).

Beyond high attrition, the ageing teacher workforce further complicates these issues, as retirement rates are expected to rise sharply, particularly in secondary education. For education systems in particular, on average, 41% of teachers in OECD countries and economies were aged 50 or older in 2022 at upper secondary level (OECD, 2024[1]).

Looking ahead, three global megatrends – demographic shifts, digitalisation, and rising inequalities – are expected to significantly impact teacher supply and demand. Demographic changes, including ageing populations and declining birth rates, will necessitate strategic planning also to balance resource allocation between urban and rural areas. At the same time, technological developments such as Artificial Intelligence (AI), offer potential benefits for personalised learning, while requiring teachers skilled in both pedagogy and technology in order to be able to effectively impact student learning.

In response, a strategic policy roadmap is needed that goes beyond simply seeking to help education systems increase teacher numbers. Immediate recruitment measures must be balanced with policies that enhance teacher quality and retention. The roadmap introduced in this chapter encourages policymakers to consider both short-term recruitment and long-term workforce sustainability, addressing systemic factors such as the status of the teaching profession, salary competitiveness, and job quality.

By adopting a balanced and forward-looking approach, education systems can address teacher shortages while ensuring that teaching quality remains high, ultimately improving outcomes for students and society at large.

Introduction

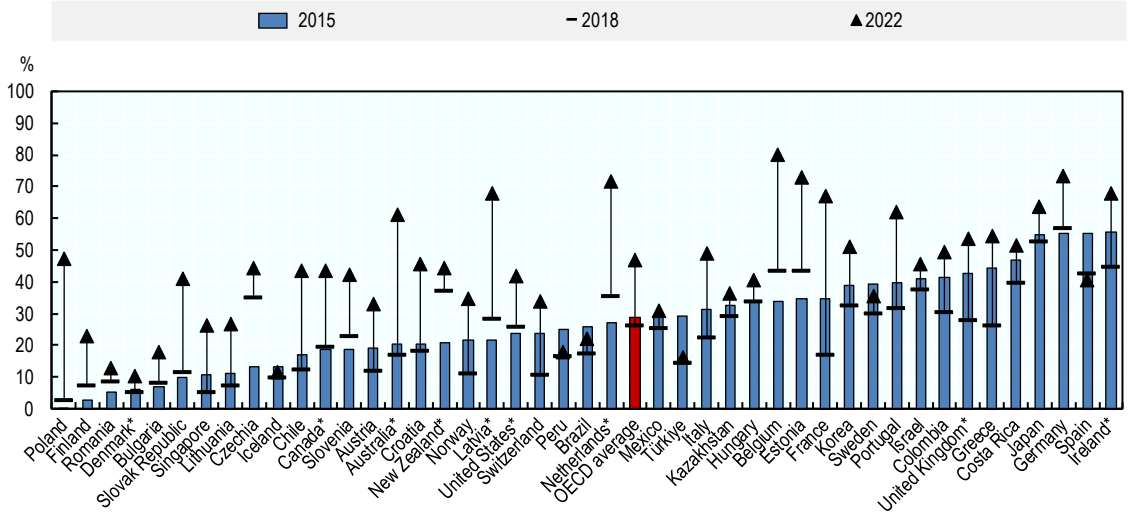
Teacher shortages have exacerbated in recent years across some OECD countries and economies, making it an urgent priority for these education systems. They are influenced by multiple factors shaping supply and demand, including working conditions and salary disparities, as explored further in this chapter. These factors, along with the pressure to meet rising educational demands, exacerbate recruitment and retention issues.

In the Programme for International Student Assessment (PISA) 2022, around half of students on average across the OECD where in schools where school principals reported that teacher shortages hinder the school's capacity to provide instruction. This was a notable increase compared to previous cycles (OECD, 2023[2]). The sharp rise in reported shortages hindering instruction since 2015 underscores the need for robust policy interventions to address the widening gap between teacher supply and demand.

Between 2015 and 2022, the share of students whose principals reported them grew from 29% to 47% on average across the OECD, despite a brief improvement in 2018 (26%). In some countries and economies, the increase has been especially stark. For example, in Poland, virtually no school principals reported a lack of teachers in 2015, but by 2022 this figure had surged to nearly 50%, indicating a rapid deterioration in staffing levels. However, a few countries, such as Iceland and Türkiye, showed stability or improvement from 2015 to 2022 (Figure 1.1).

Figure 1.1. Rise in reported teacher shortages hindering instruction according to PISA (2015-2022)

Percentage of students in schools whose principals reported that teacher shortages hindered instruction in schools



* Caution is required when interpreting estimates because one or more PISA sampling standards were not met.
Note: Results refer to the percentage of students in schools whose principal reported that the school's capacity to provide instruction is hindered to some extent or a lot by a lack of teaching staff.
Source: Analysis based on OECD (2023[2]), *PISA 2022 Results (Volume II): Learning During – and From – Disruption*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/a97db61c-en.

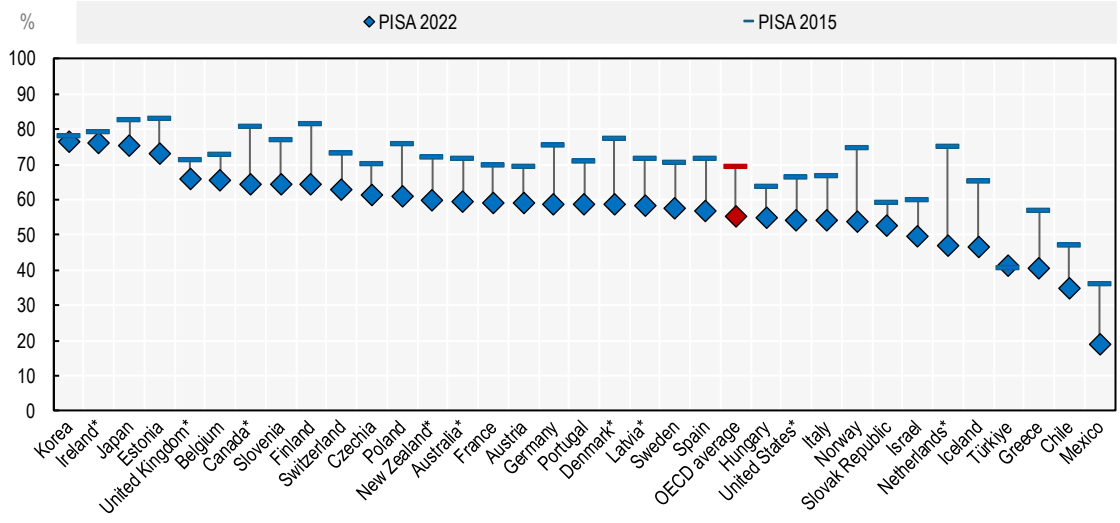
These shortages appear to have implications for student outcomes. PISA 2022 data reveals that, on average, students in schools where principals reported that teaching staff shortages hindered instruction scored 12 points lower in mathematics. At the same time, the broader PISA 2022 results underscore the need for education systems to transform teaching and learning more profoundly, both to ensure having enough teachers, but also that they are supported to deliver quality education in changing contexts.

Despite significant advances in our understanding of effective teaching practices and continued policy efforts, student performance is declining. In PISA 2022, only 55% of 15-year-olds across OECD countries and economies reached minimum proficiency in reading, mathematics and science – down sharply from 69% in 2015. This concerning trend is widespread, with proficiency rates in mathematics falling in nearly all OECD countries and economies, except in Türkiye (Figure 1.2). Other assessments also reflect this downturn, showing that young learners' reading performance has declined in many countries and economies (Mullis et al., 2023[3]). These long-term negative trends point to systemic weaknesses in education systems to help teachers and students conduct effective learning processes, making them increasingly vulnerable to shifting global contexts.

If these trends are not addressed and teachers supported for this, societies risk losing out on the economic opportunities presented by the green and digital transitions. Foundational skills such as reading, writing, and mathematics are among the most critical competencies for green jobs, both in established and emerging sectors (OECD, 2024[4]). Furthermore, literacy and numeracy are essential for the basic use of digital technologies, which are increasingly required for participation in the digital economy (International Labour Organisation (ILO), 2021[5]). Teachers and students are at the heart of processes that must be strengthened to help societies seize opportunities and address the challenges presented by new contexts.

Figure 1.2. Students' foundational skills show a decline across the OECD in PISA (2012-2022)

Share of participating15-year-olds achieving minimum proficiency in reading, mathematics and science



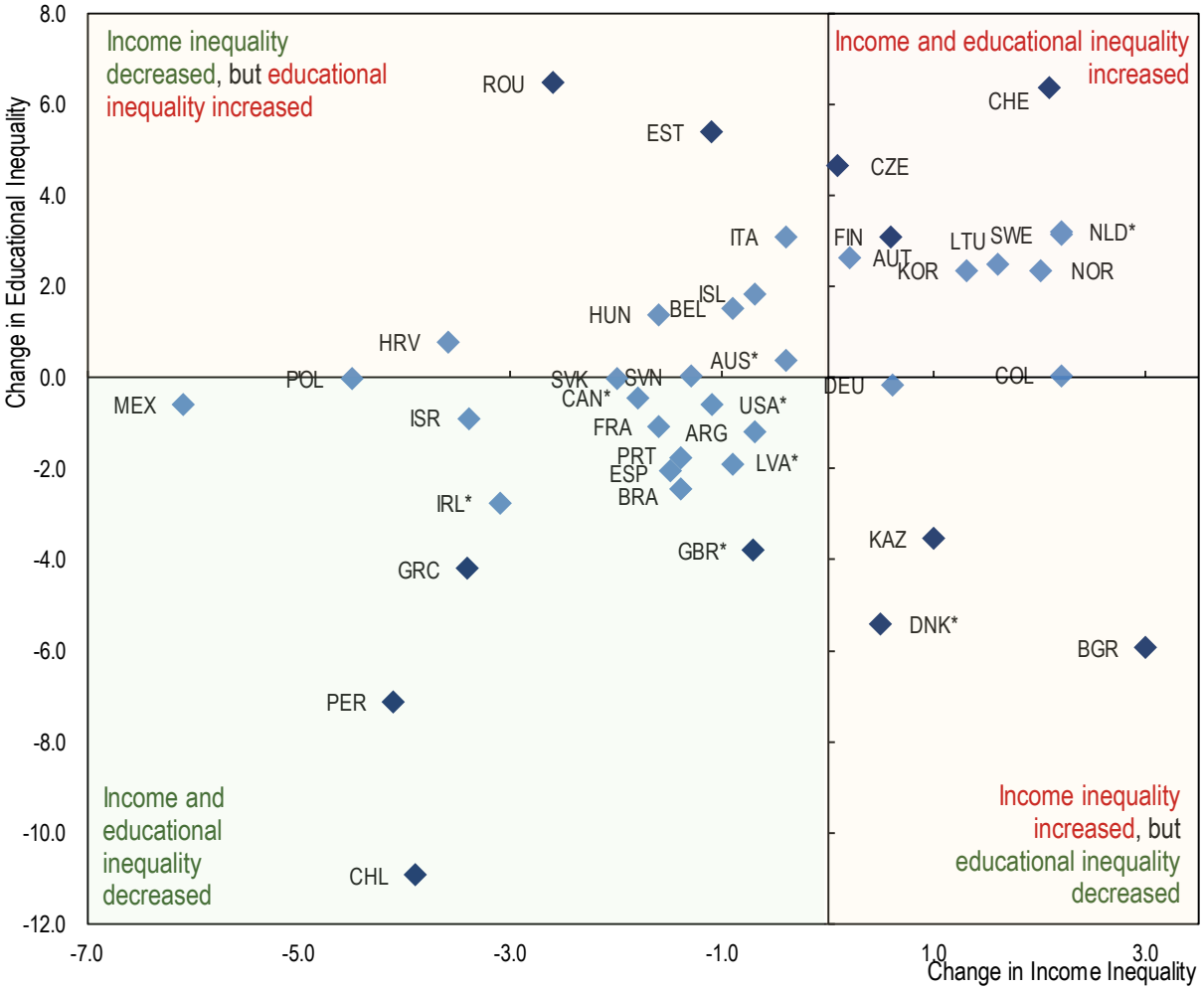
* Caution is required when interpreting estimates because one or more PISA sampling standards were not met in 2022.
Note: Education systems are shown in descending order of the share of 15-year-olds reaching minimum proficiency in all three domains in PISA 2022.
Source: OECD (2016[6]), PISA 2015 Database, https://www.oecd.org/en/data/datasets/pisa-2015-database.html; OECD (2023[7]), PISA 2022 Database, https://www.oecd.org/pisa/data/2022database/.

Furthermore, despite the extensive efforts that students, teachers, schools and communities have made to close performance gaps, significant disparities persist in student learning outcomes. Even in the wake of the COVID-19 pandemic, the relationship between student performance and socio-economic status has remained relatively stable across OECD countries and economies from PISA 2012 to PISA 2022 for mathematics and science, with only a slight improvement in reading. This was a challenging context where teachers, students and families showed remarkable resilience as they adapted overnight to sometimes fully new learning contexts, such as learning online (OECD, 2020[8]).

But while education systems were able to protect to some extent the most disadvantaged students from the effects of this largely disruptive context, inequities continue to hinder student outcomes. Notably, socio-economic background still accounts for around 16% of the variation in student reading performance during this period (OECD, 2023[2]). Although many countries and economies have been able to reduce both income and educational inequality, an emerging trend shows that several are following an inverse pathway, with growing disparities in one or both areas (Figure 1.3). Efforts need to intensify as education institutions and teachers face the challenge of better supporting different student socio-economic backgrounds and forms of diversity.

Figure 1.3. Inequality trends suggest equality remains a distant goal for many (2012-2022)

Change in the share of variance in PISA mathematics performance explained by students' socio-economic background (PISA ESCS Index - change in educational inequality), and the change of Gini Index (change in income inequality)



* Caution is required when interpreting estimates because one or more PISA sampling standards were not met.
Note: 1. Change in the PISA ESCS (Economic, Social and Cultural Status) index from 2012 to 2022; Change in the Gini Index from 2012 to latest available year for countries and economies with available data. The scale of Gini Index varies from 0 (equality) to 100 (inequality). 2. Countries and economies marked in **dark blue** have statistically significant differences in PISA results from 2012 to 2022.
Source: The World Bank Group (2024[9]), Gini Index (indicator), https://databank.worldbank.org/source/gender-statistics/Series/SI.POV.GINI; OECD (2023[7]), PISA 2022 Database, https://www.oecd.org/pisa/data/2022database/.

The 2022 *Ministerial Declaration on Building Equitable Societies Through Education* (OECD, 2022[10]), marked a formal commitment by OECD education ministers to empower education professionals and develop policies that promote quality and equity in student learning. Achieving this vision requires bold action to reimagine education systems and support educators. Policymakers, teachers, and institutional leaders must work together to enhance, adopt, or even disrupt current practices to strengthen teaching quality.

For this, education systems must urgently address both immediate and longer-term needs for the teaching profession. On one hand, many OECD countries and economies face a critical imbalance between the supply and demand of teachers across various education levels and sectors, which is eroding the capacity to provide high-quality education. While responding to meet this challenge, education systems facing shortages can also learn from how other education systems are managing to keep the profession attractive despite contexts of change. On the other hand, rapid advances in AI offer a timely opportunity to rethink the teaching profession. For example, as AI continues to reshape the labour market, education has emerged as a high-growth sector, with roles in teaching and institutional leadership projected to increase by 10% between 2023 and 2027 – particularly in vocational and higher education – to meet the rising demand for reskilling and upskilling (World Economic Forum, 2023[11]). Furthermore, by carefully integrating AI into educational practices, teachers' roles can be redefined to focus more on the human-centric and relational aspects of their work, including for stronger pedagogies and collegial work, community engagement and more meaningful interactions with students.

This pivotal moment presents an opportunity to rethink how teachers are supported in their work (Box 1.1) to succeed in rapidly evolving educational landscapes.

Box 1.1. A snapshot on the state of the teaching profession in schools across OECD countries and economies

Who they are

- **Age:** The teaching profession is ageing. In 2022, 41% of teachers were aged 50 or older at upper secondary level, up from 38% in 2013, on average across the OECD.
- **Gender:** The profession remains predominantly female. In primary education, 83% of teachers are women, while in lower and upper secondary education, the proportion is lower but still high at 68% and 60%, respectively in 2022.

Working conditions

- **Working time:** On average, teachers in general upper secondary education in OECD countries and economies worked about 1 577 hours per year in 2023, varying from 1 197 hours in Luxembourg to 1 980 hours in Chile.
- **Salaries:** Salaries generally increased since 2015 in real terms, but they often lag behind those of other similarly educated professionals. On OECD average, teachers in primary education earned 81% of similarly educated professions' salaries in 2023, while in lower and upper secondary, the share was higher, but still below the OECD average at 84% and 88%, respectively.
- **Class size:** The average primary school class size in OECD countries and economies was 21 students, but this varied by country from 15 to 31 students in 2022. There was a slight reduction across OECD countries and economies between 2013 and 2022.

Skills and certifications

- **Baseline qualifications:** On OECD average, 78% of teachers (in schools attended by 15-year-olds) held a bachelor's degree in 2022. During the same year, only 44% of them held a master's degree, with many countries and economies requiring it for secondary education teachers' full qualification.
- **Digital skills**: According to reports from principals in PISA 2022, on OECD average, 87.6% of students are in a school whose principal agrees or strongly agrees that teachers have the necessary technical and pedagogical skills to integrate digital devices in instruction. Yet, for fewer than half of students, school principals consider that teachers have sufficient time to prepare lessons integrating digital devices or have access to support technical staff.

Perceptions within the profession

- **Professional satisfaction:** In TALIS 2018, the majority of teachers reported feeling satisfied with their jobs, with 76% stating that the advantages of being a teacher clearly outweigh the disadvantages. However, only 26% agreeing that teaching is valued as a profession.
- **Stress levels:** In TALIS 2018, 18% of teachers reported experiencing stress "a lot" during their work. Stress is most linked to heavy workloads, with administrative tasks and being held responsible for students' achievement.
- **Professional autonomy**: On OECD average, 85% of teachers reported having control over determining course content, and 96% over selecting teaching methods. Teachers who reported higher levels of autonomy in the classroom tended to perceive higher job satisfaction.

Source: OECD (2024[1]), *Education at a Glance 2024: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en; (OECD, 2023[2]), *PISA 2022 Results (Volume II): Learning During – and From – Disruption*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/a97db61c-en; OECD (2020[12]), *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, OECD Publishing, https://doi.org/10.1787/19cf08df-en.

The shared challenge of teacher shortages

Although the scope and severity of teacher shortages vary across systems and levels of education, with some not experiencing them as a strongly hindering issue for teaching and learning, in other education systems they are widely acknowledged as a pressing challenge. Recent evidence suggests that these have worsened over the past years in these education systems and are likely to continue. With this, they now face the dual challenge of attracting new teachers while retaining and supporting current teachers to meet increasingly complex classroom demands.

Data from the EPO Survey 2024 underscore the growing severity of teacher shortages in these contexts, further indicating the pressing need for effective policy responses to close the gap between supply and demand. In England (United Kingdom), the Department for Education reported that teacher vacancies increased by 20% to 2 800 in November 2023, up from 2 300 in November 2022 and more than doubling from the 1 100 vacancies in November 2020 (Department for Education, 2023[13]). Germany expects teacher supply shortages to persist until at least 2030 (Ministry of Education and Cultural Affairs, 2023[14]). In Slovenia, all levels of education are projected to face teacher shortages by 2023 (Slovenian Government, 2023[15]), while Finland anticipates undersupply in vocational education, adult education, and early childhood education and care (ECEC) (Education administration statistical service, n.d.[16]). Similarly, Australia is facing a shortfall of around 21 000 qualified ECEC professionals, with an additional 18 000 needed to meet demand in coming years (Jobs and Skills Australia, 2024[17]).

As noted by one OECD country in the EPO Survey 2024, education systems facing the challenge of teacher shortages cannot solve it solely through better teacher distribution:

> *"Modelling results show that even if teachers were employed full-time, all teachers had dual qualifications, and effective use was made of teachers' abilities in primary and secondary schools within the same educational institution and nearby schools, there would still be an inadequate residual demand and supply. In rural districts with smaller schools (fewer classes at each level) and long distances between schools, these surpluses become more noticeable."*

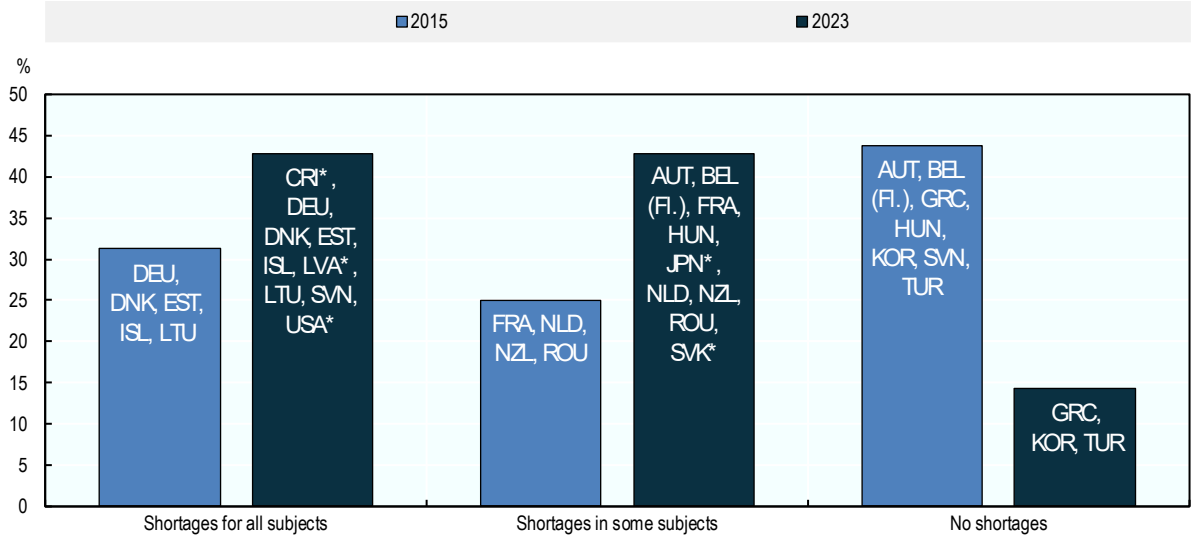
As such, having more teachers, and better allocating them while ensuring they are empowered to deliver quality education in changing contexts, is essential.

Having enough teachers in times of shortages

Data from Education at a Glance 2024 shows that across 21 education systems during the 2022/23 academic year, 9 education systems reported teacher shortages across all subjects in terms of unfilled vacancies, while another 9 faced shortages in specific fields. Greece, Korea and Türkiye were the only countries and economies that did not report major shortages (Figure 1.4). However, even in these education systems, PISA 2022 data indicate that some schools still perceived them to a certain extent.

Figure 1.4. More education systems are struggling to fill vacancies with qualified candidates (2015-2023)

Percentage of education systems by type of teacher shortages



Notes: 1. Teacher shortages mean either some vacancies were not filled by fully qualified teachers at the beginning of the academic year or, in countries and economies with competitive examinations, that the number of available teaching positions exceeded the number of successful candidates in the competitive examination conducted at the end of the preceding academic year. The fact that certain positions are unfilled at the beginning of the year does not necessarily mean that they remain vacant throughout the school year. The number of vacant posts may also have differing impacts on countries and economies, since this chapter does not account for the overall size of the education system or workforce. 2. Countries and economies with missing data on teacher shortages for 2015 are marked with a "*". 3. Only public institutions are considered in this analysis; 21 education systems are analysed for 2023 and 16 for 2015.
Source: OECD (2024[1]), *Education at a Glance 2024: OECD Indicators*. OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

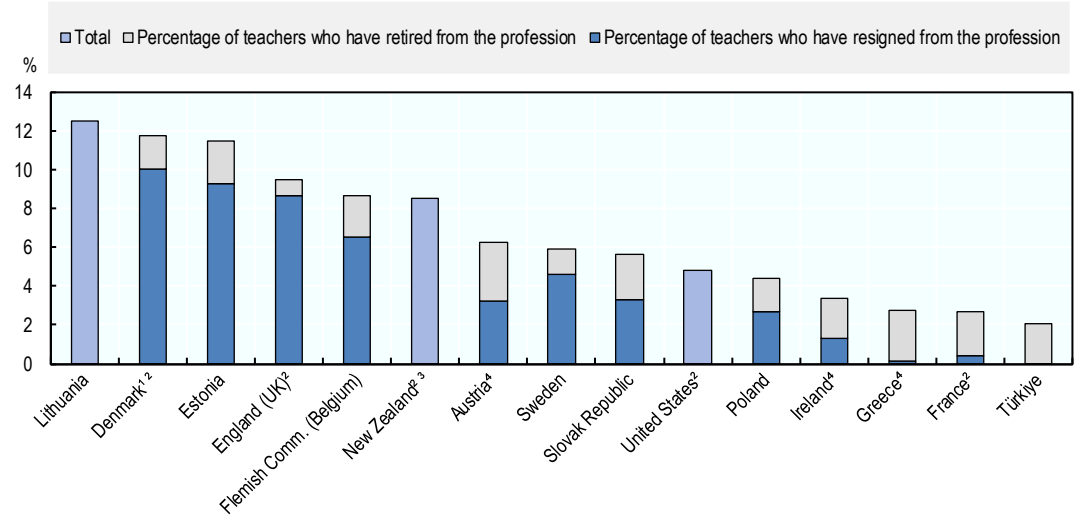
Moreover, some education systems are facing high turnover rates – driven by resignations and early retirements – leading to shortages across many regions. To address this, education systems facing them must continuously adapt to respond to evolving needs. However, national data can sometimes mask localised teacher shortages, particularly in specialist subjects or hard-to-staff areas. For example, in the

United States, some districts report no teacher shortages, while others face significant staffing challenges (OECD, 2023[18]).

According to data from 15 education systems, close to 1 in 10 fully qualified teachers leave each year due to resignations or retirement (OECD, 2024[1]). While most teachers report professional satisfaction, there are persistent issues related to societal recognition and stress, which contribute to teacher attrition. Resignation is the leading cause for teacher attrition in eight countries and economies and other participants, namely Austria, Denmark, Estonia, England (United Kingdom), the Flemish Community of Belgium, Poland, the Slovak Republic, and Sweden (Figure 1.5).

Figure 1.5. Resignation is the main driver of teacher attrition in most of the analysed OECD education systems (2022/23)

Share of fully qualified teachers who left the profession by resigning or retiring in pre-primary, primary and secondary education



Note: 1. Data for Denmark excludes upper secondary education. 2. Reference year differs from 2022/23: academic year 2021/22 for Denmark, France, the United States and England (UK), and calendar year 2021 for New Zealand. 3. Data for New Zealand includes unqualified teachers. 4. Data for Austria, Ireland and Greece excludes pre-primary education. 5. Education systems are ranked in ascending order. 6. The figure analyses both full-time and part-time teachers in public institutions.
Source: OECD (2024[1]), *Education at a Glance 2024: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

Teacher attrition issues are likely to worsen in the coming years. A 2022 survey by the National Education Union in England revealed that 44% of teachers were planning to leave the profession within five years. In Australia, a 2023 survey found that 31% of government schoolteachers planned to leave before retirement, up from 14% in 2020. Another 41% said that they "possibly" planned to leave the profession (Australian Education Union, 2023[19]). A more recent study also found that more teachers than ever intended to leave the profession before retirement (Australian Institute for Teaching and School Leadership, 2022[20]).

The consequences of high attrition are well-documented. Frequent turnover disrupts the continuity of student learning, posing barriers to quality teaching and learning (Menzies, 2023[21]). It also adds to recruitment, initial preparation and professional development costs, making it difficult to staff classrooms, particularly in specialist subject areas and in hard-to-staff contexts (Carver-Thomas and Darling-Hammond, 2019[22]). High attrition also affects the capacity of education institutions to support early career teachers and develop future institutional leaders, potentially leading to a vicious circle of further attrition over time.

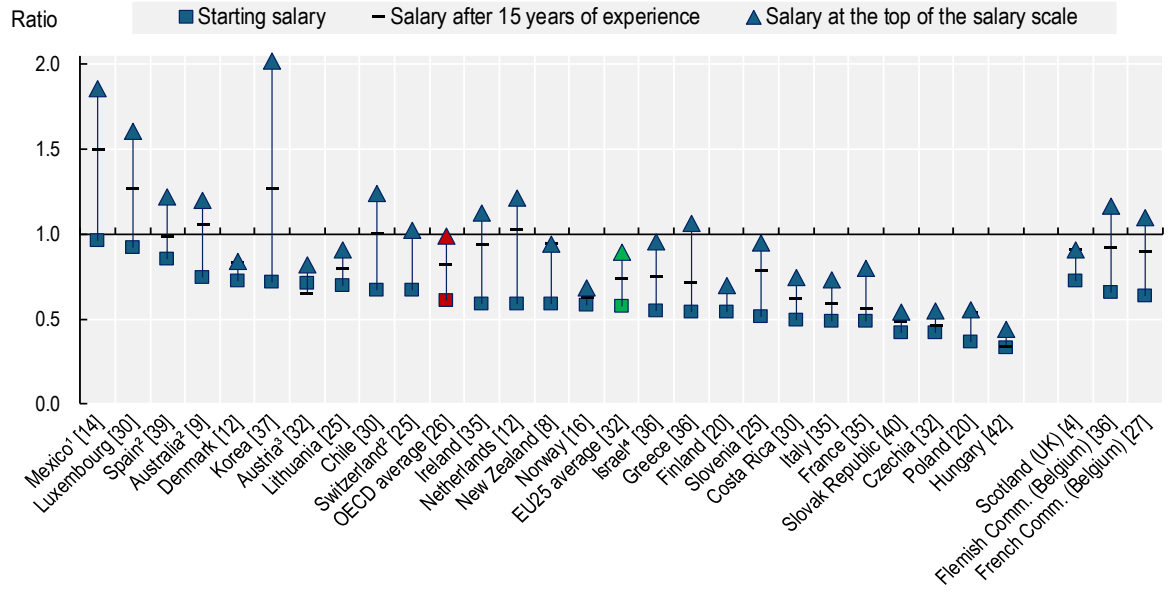
In recent years, the attrition of early career teachers has posed a challenge for education systems, making it a key area of policy attention (OECD, 2024[23]). In England (United Kingdom), retention rates have improved for early career teachers, although there has been less success among mid-career and experienced teachers (Education Policy Institute, 2022[24]). These improvements have been connected to investments in mentoring and supports for early career teachers, and comparatively less for mid-career teachers.

While not sufficient by itself, ensuring competitive salaries has been seen as an important factor in making the profession attractive throughout a teacher's career. As pointed out by Education at a Glance and other OECD evidence, pay and working conditions are seen as important for attracting, developing and retaining skilled and high-quality teachers. Teachers' salaries, whether considered in absolute terms or relative to other professions, can directly impact how appealing the teaching career is. However, teacher salaries are only one component of attractiveness; additional factors like opportunities for professional growth and collaborative learning, administrative workload, and the societal perception of teachers also play a part (OECD, 2023[18]; OECD, 2024[1]; OECD, 2020[12]).

In 2023, data for lower secondary teachers show that this remains a challenge across many OECD countries and economies. Starting statutory salaries for teachers at this level tend to be lower compared to similarly educated workers in most countries and economies, with Mexico being a notable exception. Figure 1.6 below illustrates the relative competitiveness of statutory salaries for lower secondary teachers across OECD countries and economies, providing insights on the variations in salary progression and how these can possibly impact the attractiveness of the teaching profession over time.

Figure 1.6. Lower secondary teachers' statutory salaries tend to be less competitive (2023)

Ratio of salaries of teachers with the most prevalent qualification at the time of entry in public institutions relative to the earnings of full-time, full-year workers aged 25-64 with similar educational attainment



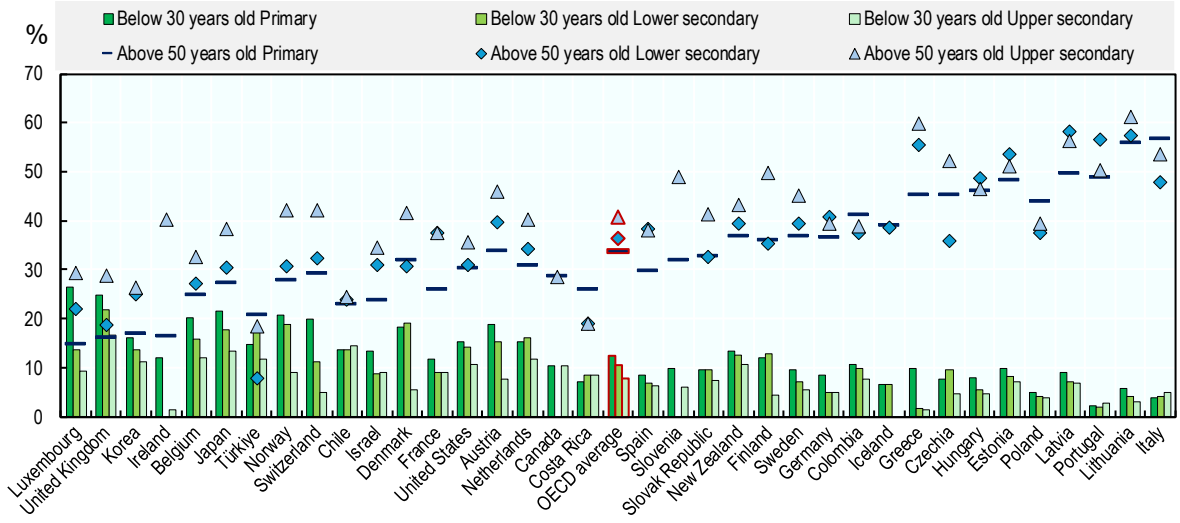
Note: The number in square brackets refers to the average number of years to progress from the starting salary to the top of the salary scale. 1. Combination of different salary scales for the same ISCED qualification requirement. 2. Weighted average of the statutory salaries across different subnational entities. 3. Starting salary is relative to the earnings of workers who have attained a bachelor's degree or equivalent (ISCED 6). Salaries after 15 years of experience and at the top of the salary scale are relative to the earnings of workers with a master's degree or equivalent (ISCED 7) or higher attainment. 4. In practice, many teachers obtain higher tertiary degrees during their service and are placed in a higher salary range. Countries and economies and other participants are ranked in descending order of relative starting salaries.
Source: OECD (2024[1]), *Education at a Glance 2024: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

For experienced teachers, salary competitiveness improves in certain contexts. By the time teachers have reached 15 years of experience, at least salary parity with other similarly educated professionals has been achieved in some countries and economies in 2023, such as Australia, Chile, Luxembourg, Mexico, the Netherlands, Korea, and Spain. However, even among these countries and economies, disparities remain when looking at the top end of the salary scale. Korea, Luxembourg, and Mexico are notable examples where teachers' salaries are considerably higher at this stage compared to other similarly educated professions. Moving forward, education systems facing teacher attractiveness issues will need to consider aspects of teacher salary evolution throughout their professional pathways. This will need to be considered though, within the broader picture of factors – such as intellectual or social – that can make teaching and appealing profession.

Retirement is also a significant issue for many education systems, as a large proportion of teachers are nearing retirement age. As pointed out in Figure 1.7, on average, 41% of teachers in OECD countries and economies were aged 50 or older in 2022 at upper secondary level (OECD, 2024[1]). The largest age gaps were observed at the upper secondary level, where the difference between younger and older teachers reached 33 percentage points, compared to 21 percentage points at the primary level and 26 percentage points in lower secondary education.

Figure 1.7. Most OECD education systems have large shares of teachers aged above 50 (2022)

Share of teachers below the age of 30 and above 50 years old, by level of education



Note: Data ranked according to the age gap in primary education.
Source: OECD (2024[1]), *Education at a Glance 2024: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

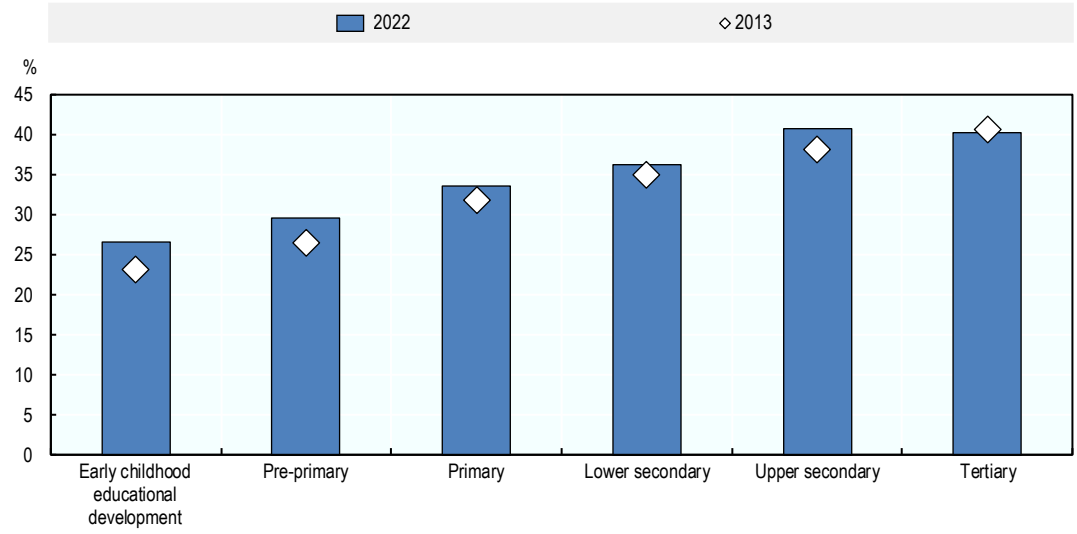
In seven OECD countries and economies, at least half of the teachers were aged 50 or more at one or more education levels in 2022. Estonia, Greece, Latvia, and Portugal have particularly high proportions of older teachers at both lower and upper secondary education levels. Italy was the only OECD country where over half of the teachers at the primary level were aged 50 or more (57%), while over half of the teachers at the upper secondary level were also aged 50 or more (54%). Similarly, Lithuania was the only education system where this was the case across all school levels (primary, lower secondary, and upper secondary education). In Czechia, this applied for teachers at the upper secondary level.

In contrast, countries and economies such as Türkiye and the United Kingdom have younger teaching forces. In 2022, Türkiye had one of the smaller shares of older teachers among OECD countries and

economies across education levels. In the United Kingdom, the share of teachers below the age of 30 exceeded the share of older teachers during the same year at primary and lower secondary education levels (OECD, 2024[1]). Although lower levels of education have a younger workforce, ageing has been more pronounced at lower levels over the last 10 years than in higher ones. Furthermore, trend data show that the average age of the teaching profession has been rising across education levels between 2013 and 2022, except for tertiary education (Figure 1.8)

Figure 1.8. The average age in the teaching profession is rising, except in tertiary education (2013-2022)

Share of teachers aged 50 and over, by level of education



Note: 1. The data refers to the OECD average. 2. For more information see Source and Education at a Glance 2024 Sources, Methodologies and Technical Notes (https://doi.org/10.1787/e7d20315-en).
Source: OECD (2024[1]), Education at a Glance 2024, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

In addressing these short-term needs, education systems need to consider longer-term transformations that make them resilient and responsive to change. Global megatrends show that addressing teacher shortage also relates to supporting teachers as adaptable lifelong learners.

Having good teachers in times of technological change

In an era of rapid technological advancement, the role of skilled teachers has never been more critical. Beyond simply addressing the number of teachers, ensuring that they possess the right skills to adapt to new educational needs is essential for student success. Data from PISA 2022 highlight this importance, showing that 25.4% of students were in schools where principals reported inadequate or poorly qualified staff (Figure 1.9). While this share was smaller than that of schools facing an overall teacher shortage (Figure 1.1), the impact on student performance is more pronounced. In schools with inadequate teaching staff, students experienced a decline of 14 points in performance, compared to a 12-point decline in schools facing teacher shortages generally (12 points) (OECD, 2023[2]).

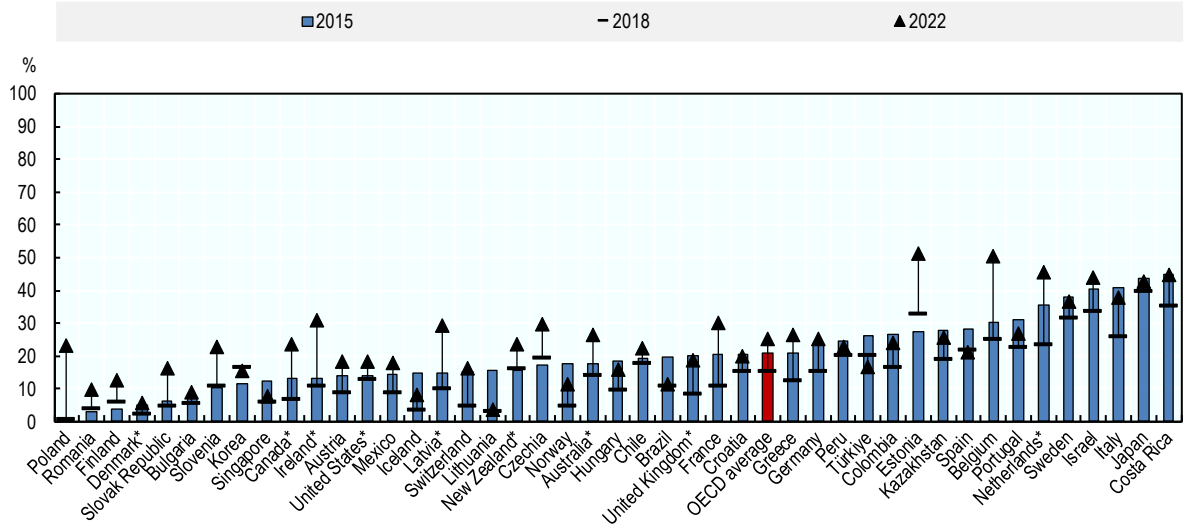
Despite previous improvements made on average across the OECD, a larger share of students in PISA 2022 were in schools where school principals reported that inadequate or poorly qualified staff hinder instruction in 2022. The average rate among OECD countries and economies initially decreased from 20.9% in 2015 to 15.7% in 2018, before rising again to 25.4% in 2022. Although the starting point may

differ largely, certain countries and regions, notably Estonia, Hong Kong (China), Poland, Belgium, and Ireland, experienced substantial increases, with rises of over 17% from 2015 to 2022.

Looking ahead, as schools increasingly integrate technology, policies aimed at developing teachers' skills and professional agency are crucial in empowering them to meet the demands of modern classrooms. By focusing on building teachers' capacity to navigate and utilise technology effectively, policymakers can support teachers in fostering high-quality, adaptable learning environments.

Figure 1.9. Shortages of qualified teachers hindering instruction are also rising (2015–2022)

Percentage of students whose school principals reported inadequate or poorly qualified teaching staff



* Caution is required when interpreting estimates because one or more PISA sampling standards were not met.
Note: Results refer to the percentage of students in schools whose principal reported that the school's capacity to provide instruction is hindered to some extent or a lot by inadequate or poorly qualified teaching staffs.
Source: OECD (2023[2]), *PISA 2022 Results (Volume II): Learning During – and From – Disruption*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/a97db61c-en.

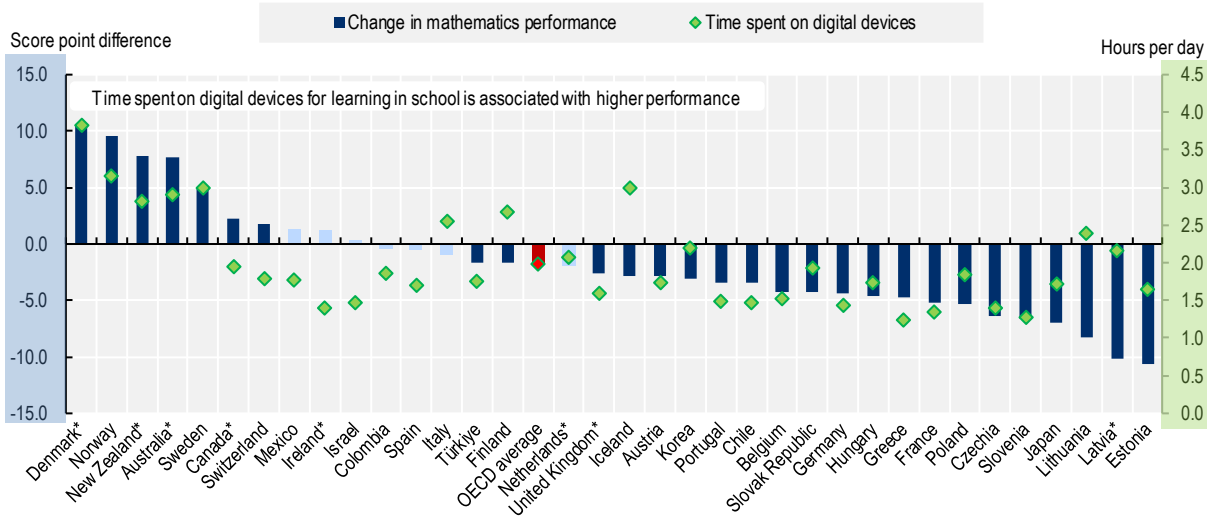
As such, alongside strengthening teachers' use of foundational pedagogies, education systems must objectively and dispassionately evaluate how best to integrate technology into teaching practices to enhance effective teaching and learning. Despite large financial investment, digital technology is not transforming teaching and learning at scale. Data from PISA 2022 indicate that while a short amount of time spent on digital devices for learning in school per day can enhance student performance, additional time beyond the first hour is typically associated with a decline in performance. According to students' reports, the average time spent learning via digital devices per school day exceeds one hour in all OECD education systems, with an average of two hours (OECD, 2023[2]). As such, 21 OECD education systems saw an overall negative association between an increase in time spent on digital devices for learning in school and mathematics performance, with an OECD average decline of 2 score points for each additional hour per day (Figure 1.10).

The failure of education systems to help teachers fully capitalise on the pedagogical opportunities that technology can offer to deliver better outcomes in foundational skills is not simply about a lack of resources and teacher capacity. In 2022, around one-in-five 15-year-olds across the OECD had principals reporting that a lack of or inadequate digital resources hindered their school's capacity to provide instruction; only around one-in-ten had principals that felt teachers in their school did not have the necessary technical and pedagogical skills (OECD, 2023[2]). In the majority of OECD classrooms, therefore, digital technologies are

available and are being used. Although there may be pockets of innovative practice through which technologies enhance outcomes, at system level they appear to be either further entrenching traditional pedagogies or changing practice for the worse. Therefore, moving forward, it is crucial for education systems to invest in a more systematic study and evaluation of instructional policies and practices, including the role of technology. This deeper understanding will enable education systems to more effectively harness the benefits that emerging technologies can bring to teaching and learning processes.

Figure 1.10. The pedagogical value of digital devices is not materialising in most OECD classrooms (PISA 2022)

Change in mathematics scores associated with student reports of time spent on digital devices for learning at school



*Caution is required when interpreting estimates because one or more PISA sampling standards were not met in PISA 2022 (see Source for more details).
Note: Education systems are shown in descending order of the score difference associated with a one-hour increase in time spent using digital devices for learning in school per day. Darker shaded bars indicate statistically significant score difference.
Source: OECD (2023[25]), PISA Database 2022, https://www.oecd.org/pisa/data/2022database/.

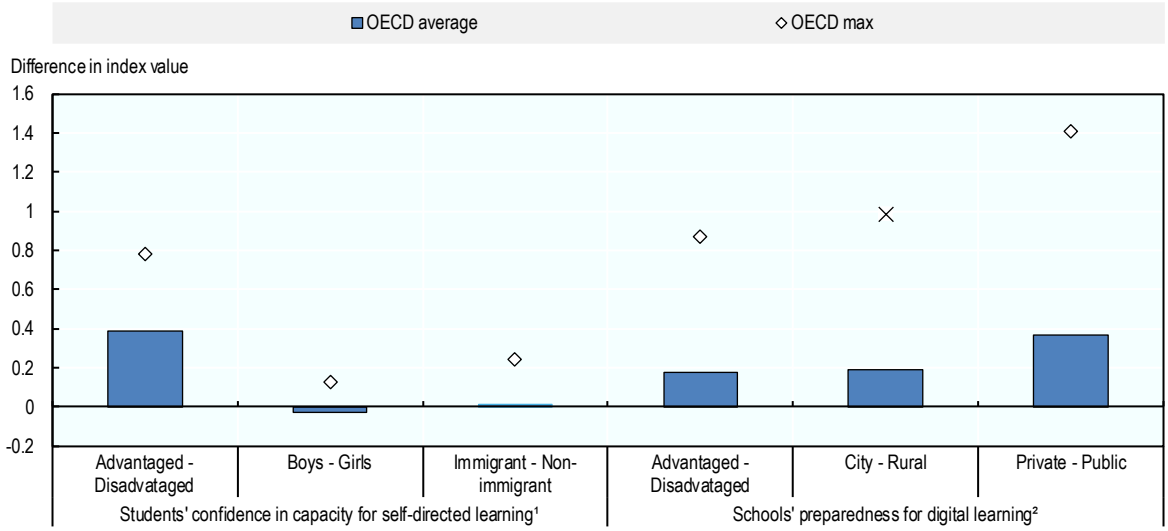
The picture is similarly concerning with regards to equity: a range of student and school characteristics have an important mediating effect on the capacity to reap the benefit of technological change (Figure 1.11). In half of the countries and economies and economies participating in PISA 2022, principals in disadvantaged schools were more likely than those in advantaged schools to report inadequate or poor-quality digital resources. In one-quarter of them, rural schools suffered more from such shortages than urban schools (OECD, 2023[2]). Furthermore, on average across OECD countries and economies, socio-economically advantaged students were more confident than disadvantaged students in learning autonomously and remotely, if schools have to close in the future. These differences hold even after accounting for student performance in mathematics (OECD, 2023[2]).

It is perhaps no surprise then that there is some emerging hesitation about the role digital technologies should play in formal education. In the EPO Survey 2024, education systems expressed concern about a lack of evidence on the effectiveness, impact and safety of rapidly evolving technologies (OECD, 2024[23]). This is indicative of a wider growing caution around digital education in some countries and economies, with efforts to reduce or better regulate related interactions in formal learning environments, particularly among younger children (Swedish Ministry of Education and Research, 2024[26]; Norwegian Directorate of Education, 2024[27]). Some countries and economies have also begun to introduce legal measures to

control the use of personal devices in schools and undertaken litigation regarding the improper use of student data by technology companies via digital resources used in schools (Global Education Monitoring Report Team, 2023[28]; Campbell et al., 2024[29]).

Figure 1.11. Student and school characteristics impact the potential of digital technologies to foster quality teaching (2022)

Indices of students' capacity for self-directed learning and schools' digital preparedness by selected student- and school-level characteristics



Note: 1. Index value according to self-reports by 15-year-olds. 2. Index value according to school leaders' reports. 3. The column in lighter blue (the OECD average for the difference between immigrant and non-immigrant students) and the point mark in the shape of a cross (OECD maximum for the difference between city and rural students) report values that are not statistically significant. 4. The socio-economic profile is measured by the PISA index of economic, social and cultural status (ESCS). A socio-economically disadvantaged (advantaged) school is a school in the bottom (top) quarter of the index of ESCS in the relevant country/economy.
Source: OECD (2023[25]), PISA Database 2022, https://www.oecd.org/pisa/data/2022database/.

The integration of digital technologies in education is therefore approaching a critical juncture. In the coming years, efforts to incorporate AI into teaching and learning must avoid repeating past mistakes. It is essential that decisions about adopting digital technologies in the classroom consider both their educational value and broader cost-benefit implications. At the same time, steps must be taken to ensure that education systems, students, and teachers can fully harness the opportunities technology offers for enhancing learning and closing equity gaps, if managed effectively.

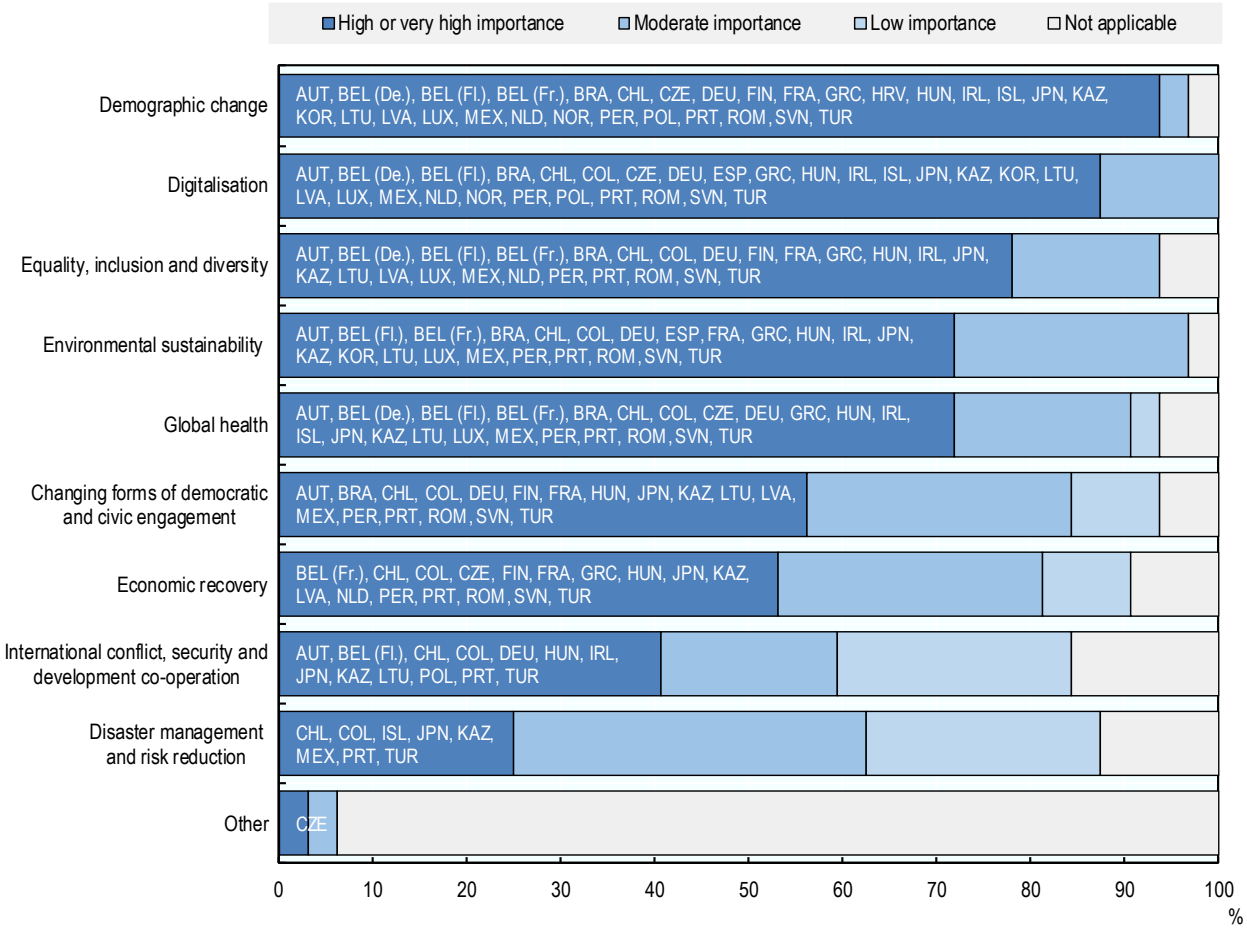
Global megatrends and the teaching profession

What long-term trends are going to affect governments' capacity to attract, retain and nurture teachers so they can effectively support student learning in education systems? The EPO Survey 2024 identified the global megatrends that ministries believe will have the greatest impact on the teaching profession between 2025 and 2030. Of the nine megatrends included in the survey, three stood out as most critical for education ministries: Demographic shifts, digitalisation, and rising inequalities (Figure 1.12).

While offering opportunities for the profession, these trends are sometimes also making it harder for education ministries to balance teacher supply and demand, worsening shortages in many regions. Policymakers therefore need to take them into account as they define new policy actions.

Figure 1.12. How much will global megatrends matter for teachers in 2025-2030 (2024)?

Education ministries' views on the importance of the implications of the following megatrends for attracting, retaining and nurturing teachers/academic staff and institutional leadership in the next five years



Note: Education ministries could select a maximum of three global megatrends that they considered of very high important implications for the teaching profession, but had no limit regarding those they could consider as of high importance. Participating education systems with responses to this question were: Austria, the Flemish, French and German-speaking Communities of Belgium, Brazil, Chile, Colombia, Croatia, Czechia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Japan, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Norway, Peru, Poland, Portugal, Romania, Slovenia, Spain, the Netherlands, and Türkiye.
Source: OECD (2024[23]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2024*, OECD, Paris.

Over 30 education systems recognised these as key drivers:

1. *Demographic Change:* Almost all participating education ministries (94%) highlighted this megatrend, which encompasses ageing populations, declining birth rates, and migration patterns, as having high or very high importance for the teaching profession.
2. *Digitalisation:* The integration of digital technologies, including AI, into daily life and work was seen as a top priority by 88% of ministries.
3. *Equality, Inclusion and Diversity:* Around 78% of education ministries identified this megatrend, which includes social recovery from recent disruptions, as crucial. Several ministries also highlighted economic recovery from shocks such as financial crises, labour market instability, inflation, and cost-of-living pressures. These findings suggest that many countries and economies

see the teaching profession's role very relevant in helping address socio-economic inequalities exacerbated by these pressures. Others may focus more on the profession's capacity to meet the needs of students from diverse backgrounds.

The prioritisation of these megatrends varied significantly across education systems. While these trends are global in scope, their implications for the teaching profession differ depending on national and subnational contexts. Among the 32 education systems surveyed, only Lithuania and Slovenia rated all 3 megatrends (digitalisation, demography, and equality) as being of very high importance. Eight other ministries identified at least two of these as top priorities.

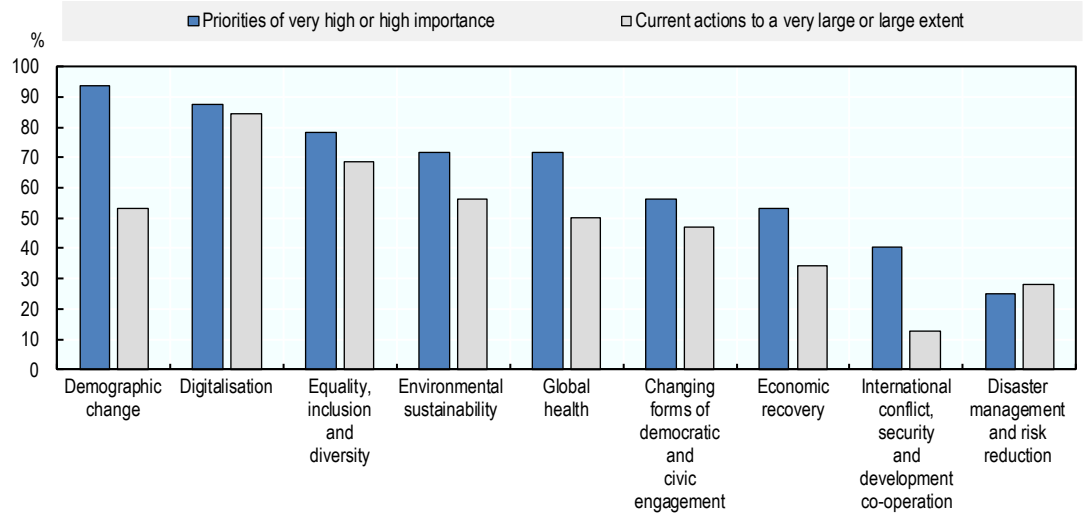
This can help explain the relatively lower importance attributed to other trends, such as *Disaster management and risk reduction* and *International conflict, security, and development co-operation*. These trends may be of high priority in specific countries and economies or regions, but are not seen as having widespread implications for the teaching profession across the OECD as a whole.

At the same time, there is a noticeable gap between the importance attributed to certain global megatrends and the extent to which ministries are actively addressing them (Figure 1.13). For example, while demographic change was the top-ranked megatrend, a 40-percentage point gap exists between the perceived importance of this trend and the reported actions being taken by ministries. This suggests that demographic change, despite being widely recognised as critical, has only recently emerged as a major concern requiring urgent policy attention.

In contrast, there is strong alignment on digitalisation. Approximately 88% of education systems identified digitalisation as a high or very high priority, and 84% reported that their policies and practices are already addressing this trend to a large or very large extent.

Figure 1.13. Global megatrends as a priority and actions taken for teachers (2024)

Education ministries' views on priority global megatrends and the extent of actions taken to address them for attracting, retaining, and nurturing teachers/academic staff and institutional leadership over the next five years



Source: OECD (2024[23]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024, OECD, Paris.

The perceptions of education ministries regarding the potential impact of global megatrends on the teaching profession are consistent with wider international evidence on trends and risks for 2030 and 2050. Digitalisation, in particular, stands out as a major trend, underscoring the need to empower teachers as informed users of digital technologies and AI while fostering critical thinking among students. This

emphasis on digitalisation aligns with broader concerns in education: in 2023, 77% of surveyed ministries identified digitalisation as a key priority for education systems over the next 5-15 years (OECD, 2023[30]). AI presents opportunities to support teachers in their daily tasks, but careful policy design is essential to ensure that technology complements rather than replaces high-quality teaching practices.

Demographic Change has also emerged as a significant concern (World Economic Forum, 2024[31]; European Strategy and Policy Analysis System, 2024[32]; Roland Berger, 2023[33]). In contrast, in 2023, only 11% of ministries considered demographic change to have a major impact on education systems in the next 5-15 years (OECD, 2023[30]). Although the survey data are not directly comparable, recent events in 2024 appear to have elevated demographic change as a critical priority.

However, while environmental sustainability was not highlighted as a top megatrend in the EPO Survey 2024, it is increasingly recognised in international cross-sectoral analyses. Teaching cannot be disconnected from the issue of sustainability. At the individual level, climate change will disrupt teaching conditions, affecting both education continuity and physical learning environments. Teachers also play a critical role in empowering learners and communities to become agents of change for sustainable development across education levels (OECD, 2023[30]). At a systemic level, teachers will be vital in promoting awareness and fostering the success of green transition policies.

These global megatrends will significantly influence teacher shortages, as education systems face new demands in digital skills for green economies in contexts of demographic change.

More specifically, demographic change and digitalisation are expected to have considerable influence in education systems' capacity to attract, retain and nurture quality teachers over the next few years to come. Some highlights of challenges and opportunities that emerge for education systems through these forces to better support the teaching profession are included below.

Demographic change

Demographic change calls for deeply rethinking teacher supply and demand. OECD countries and economies are experiencing unprecedented demographic shifts, which include:

- **Population ageing and low fertility:** By 2030, 25% of the population will be aged 65 or older on OECD average, up from 18% in 2021 (OECD, 2022[34]; OECD, 2024[35]). At the same time, fertility rates continue to decline, falling from 3.3 children per woman in 1960 to 1.5 in 2022. With countries and economies like Korea, Italy, and Greece experiencing the lowest birth rates, many OECD countries and economies now report fertility rates well below the replacement level of 2.1 children per woman, with this trend expected to persist through 2030 (OECD, 2024[36]; OECD, 2024[37]).
- **Migration and urbanisation as modifying factors:** With a 26% increase in permanent-type migration in 2022 compared to 2021, OECD countries and economies have experienced record levels of permanent migration, driven by humanitarian and labour needs (OECD, 2023[38]). However, migration alone will not fully offset low birth rates and ageing populations, particularly in rural areas, where population decline may necessitate school closures (OECD, 2024[37]).
- **Urbanisation:** Urban populations are expected to continue to grow due to migration and natural population increases (OECD, 2024[39]). The share of the population in metropolitan regions will rise from 66% to 67% by 2040, while rural regions will experience declines (OECD, 2022[34]). This shift necessitates strategic resource planning to avoid widening urban-rural disparities in education.

These developments are expected to have considerable impact on teacher supply, demand, and teacher workforce dynamics. The "low fertility future" requires education systems to re-evaluate resources for smaller student populations and address workforce demand flexibly. For instance, smaller cohorts offer opportunities for more personalised learning, where smaller classes facilitate high-impact pedagogies like student-centred teaching and peer collaboration (Blatchford and Russel, 2020[40]). Conversely, as lifelong

learning demand rises outside compulsory education, education systems must also adapt to support lifelong skill development across age groups (World Economic Forum, 2023[11]).

Demographic change also intensifies challenges within the teacher workforce. As explained earlier in this chapter, the share of teaches aged 50 or older has grown over the past decade. Having an aged teacher population can bring several benefits, as a knowledge intensive profession (André, Gal and Schief, 2024[41]). At the same time, an older workforce may lead to "habit rigidity," where established teaching routines increase efficiency but may limit adaptability to diverse student needs (Chartered College of Teaching, 2019[42]). Evidence also suggests that the use of digital technologies decreases with teacher age, necessitating additional support for older teachers to engage effectively with new tools (OECD, 2023[43]; OECD, 2019[44]). Furthermore, lower willingness among older workers to switch jobs may also lead to stagnating practice at an institutional level (André, Gal and Schief, 2024[41]). In early childhood education, where physical demands are high, an ageing workforce may further increase turnover, exacerbating retention challenges in many OECD countries and economies (Kwon et al., 2020[45]).

In the EPO Survey 2024, ministries noted varying national impacts of demographic change on teacher supply. For instance, Poland anticipates reduced teacher demand due to shrinking student numbers, while Croatia and the Netherlands report ongoing challenges in attracting and retaining teachers amidst an ageing workforce. Slovenia also highlighted the challenges of matching teacher supply and demand as older teachers retire and fewer new educators enter the profession. Ministries also highlighted concerns about declining populations leading to the closure of schools, for example, in rural areas, where this is expected to be particularly severe. The consolidation of institutional networks typically impacts higher levels of education as older students can travel more easily and as the cost of resourcing larger, more specialised institutions is greater (OECD, 2024[23]).

Effective performance management, flexible work-retirement transitions, and enhanced working conditions will be essential to maintain productivity in an ageing teacher workforce. By promoting flexible career paths and continuous professional development, systems can leverage the experience of older teachers while sustaining an adaptive, responsive educational network.

The demographic shifts across OECD countries and economies, with their long-term and largely irreversible nature, demand a proactive approach from policymakers. Key opportunities include fostering a lifelong learning society, leveraging multi-generational teams, and enhancing personalised learning. However, addressing workforce ageing, urban-rural disparities, and balancing migration's contributions will require coordinated, data-informed strategies to support resilient education systems in the face of demographic change (Table 1.1).

Table 1.1. Some opportunities and challenges regarding demographic shifts for teachers

	Opportunities	Challenges
System level	• A stronger case for a lifelong learning society to harness multi-generational skills. • Smaller student populations could enable more personalised learning, trying other pedagogical approaches.	• A "low fertility future" requires reassessing resources to cater to smaller populations. • Declining populations may lead to consolidation of education institutions. • An ageing teaching workforce needs a different type of job quality, including flexible work-retirement transitions and support for technological adoption. • Varying impacts of labour supply and demand across countries and economies, including for teachers.
Local level	• Leveraging a highly experienced teaching workforce to drive institutional improvement.	• Sustaining innovation to help institutions thrive. • Adapting human resource management for multi-age teams.

Digitalisation and AI

Digitalisation and AI remain an unrealised pedagogical promise. The use of AI in education offers transformative potential but also introduces significant challenges and uncertainties for the teaching profession. Key opportunities include personalised learning, enhanced inclusivity, and administrative efficiencies that can enable teachers to focus more on pedagogy. AI-enhanced tools, such as learning analytics and intelligent tutoring systems, can support digital infrastructure across educational institutions, facilitating daily operations and interoperability for smoother information exchange. AI-driven automation of routine tasks can further free teachers to concentrate on pedagogical activities, enhancing decision-making at both classroom and institutional levels (Varsik and Vosberg, 2024[46]). Additionally, AI tools can support adaptive learning and real-time analytics, providing accessible solutions for students with specific needs (OECD, 2023[18]).

Yet, challenges persist, including equitable access, privacy protection, and mitigating biases (OECD, 2023[18]). For example, historical and representation biases can perpetuate inequalities in teaching and learning. Measurement and aggregation biases risk overlooking diverse needs, while evaluation bias may lead to inaccuracies when non-representative samples are used (Varsik and Vosberg, 2024[46]). Early recognition of these biases is key for implementing fair and effective AI solutions.

Ministries participating in the EPO Survey 2024 assessed the opportunities and challenges of AI in teaching. They recognised digital technologies' potential to improve teaching methods, workflows, and work environments. They also stressed promoting technology's pedagogical use and fostering critical thinking in students when consuming media. Participants, including Mexico and Lithuania, highlighted the importance of understanding teachers' evolving roles in the context of digitalisation for developing learners' digital skills. Additionally, participants like Slovenia raised concerns over limited evidence on the effectiveness, impact, and safety of rapidly evolving technologies (OECD, 2024[23]).

To navigate these opportunities and challenges, AI must align with pedagogical goals, enabling teachers to benefit while preserving professional agency and student engagement (OECD, 2023[18]) (Table 1.1). Governments should also foster collaborative partnerships among educators, researchers, and EdTech developers. Dialogue with technological and social actors is essential to anticipate changes, assess implications for teaching, and identify biases in the design, implementation, and monitoring of AI tools.

Table 1.2. Some opportunities and challenges of developments in AI for teachers

	Opportunities	Challenges
System level	• Support monitoring processes and decision-making. • Promoting interoperability of systems at system level, facilitating access to information.	• Managing emerging costs while ensuring strategic investments in education. • Risk of perpetuating design biases in AI algorithms as new tools are rolled out at system level, or in the way these tools are used. • Making time-sensitive decisions with limited evidence on new technologies effectiveness and safety. • Regulating digital development wisely, protecting teachers' and learners' rights while avoiding overly restrictive actions.
Local level	• Transform professional learning and reduce workloads, allowing teachers to focus on pedagogy. • Helping address educational inequalities (e.g. access to education or individual needs).	• Engaging teachers and leaders as co-designers, co-researchers, co-developers, and co-evaluators. • Helping them to effectively integrate digital tools into their daily practice, prioritising people, strong pedagogies, and human-centred processes. • Combatting disparities in access to digital resources, as well as in students' confidence and ability to learn autonomously and remotely.

Engaging teachers and technology leaders as co-researchers, co-developers, and co-evaluators is crucial for this. In addition, governments must regulate digital development wisely, protecting learners' and educators' rights while avoiding overly restrictive actions (World Economic Forum, 2024[31]). Teachers require support to use digital technologies effectively, enhance foundational skills for all, and exploring new pedagogies aligned with education systems' core goals.

In summary, teacher shortages represent an urgent and growing challenge across OECD countries and economies, driven by a complex mix of factors. These include implications from global megatrends such as the challenges posed by demographic change and digitalisation, as well as difficult working conditions, low salary competitiveness, and increased pressures on education systems. Data from the OECD reveals a significant rise in unfilled vacancies and in the percentage of students whose school principals report that shortages are impacting the quality of instruction. These shortages are not just a local issue but are affecting student performance.

While some countries and economies have managed to maintain stability or improvement, many face worsening shortages that demand immediate policy interventions to address both teacher supply and retention. These trends underscore the need for comprehensive, long-term solutions to ensure education systems can meet current and future demands.

Policy roadmap for tackling teacher shortages in changing contexts

The global megatrends mentioned above present education systems with two key challenges, as previously explored: having enough teachers in times of shortages, which might be prioritised as urgent, and having quality teachers in times of technological change, which is an important priority. However, policymaking to address teacher shortages involves trade-offs and inherent risks. As global, national, and local factors continuously shape these mismatches between supply and demand, enhancing teaching practices becomes critical to improving education outcomes. At the same time, education systems must adapt to evolving challenges. Two significant risks stand out as policymakers plan to address teacher shortages in the coming years:

- **Prioritising quantity over quality.** While meeting the urgent need for more teachers, focusing only on recruitment risks neglecting teaching quality. If education systems emphasise filling positions without improving teaching standards, they may face stagnation or even a decline in overall education quality, particularly in sectors experiencing acute shortages such as schools and vocational education.
- **Creating long-term issues through short-term fixes.** The COVID-19 pandemic led to widespread recognition of teachers' societal value. However, this appreciation has diminished as temporary employment practices, reduced professional autonomy, and declining teacher well-being have become more common (United Nations Secretary-General's High-Level Panel on the Teaching Profession, 2024[47]). These issues hinder efforts to attract and retain qualified teachers. Higher education faces additional challenges, including contractual precarity and the increasing politicisation of academic freedom, which further obstruct efforts to enhance teaching quality (OECD, 2024[48]).

Quick fixes, such as lowering entry standards, might address immediate shortages, but they can jeopardise long-term efforts to develop a skilled teaching workforce. Such measures often result in teachers being placed in positions where they lack the necessary expertise, undermining both teacher retention and education quality. Education systems need a strategic approach that addresses both immediate teacher shortages and long-term workforce sustainability. Policies must focus not only on recruiting more teachers but also on enhancing the overall quality of teaching. Rethinking the status and societal value of the teaching profession is essential to ensure that teachers are supported to navigate evolving challenges.

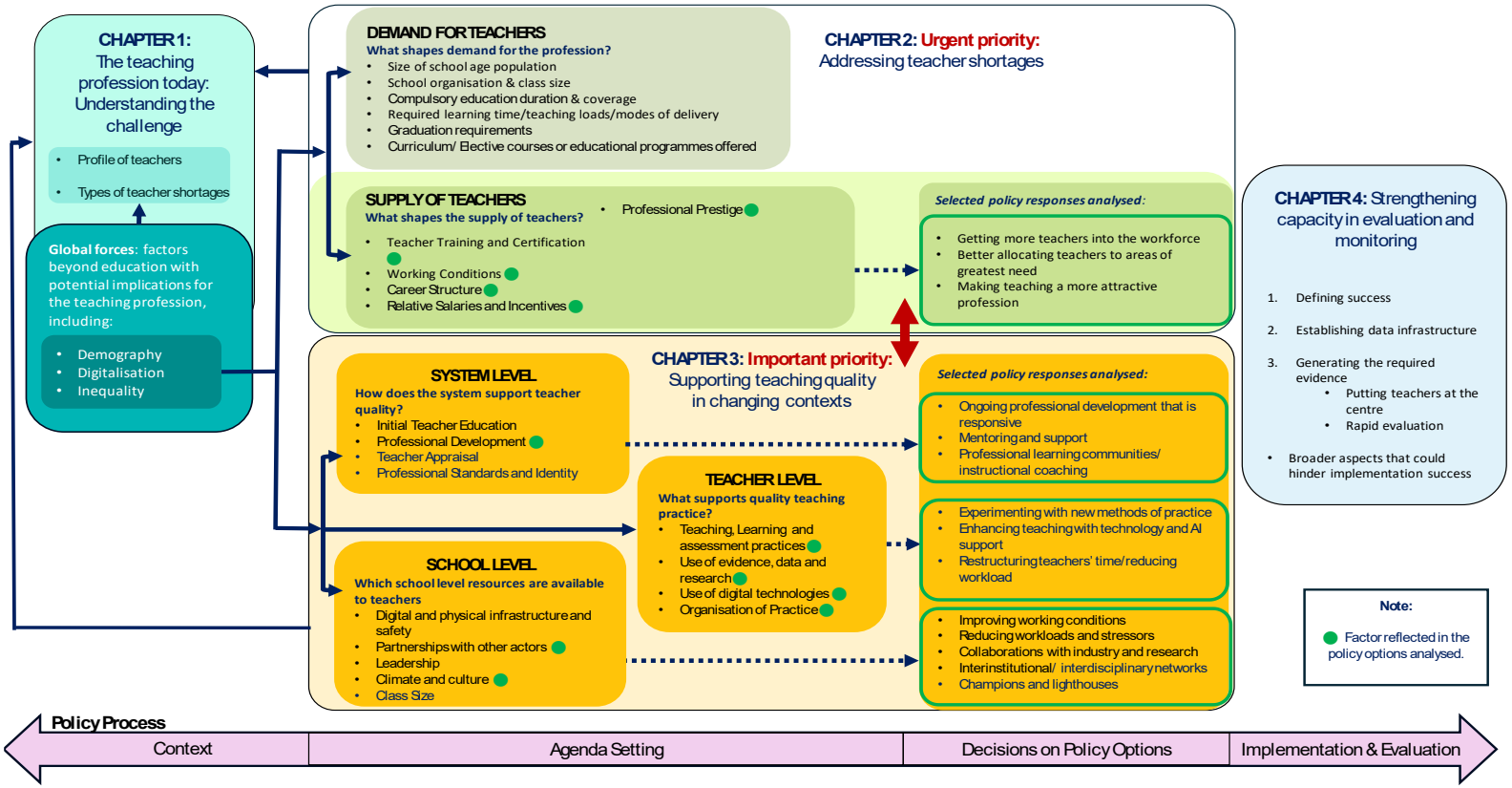
Figure 1.14 presents a comprehensive roadmap for addressing teacher shortages in a rapidly changing educational landscape, which is explored in this report. The roadmap highlights that simply increasing the number of teachers or assigning them to areas of need is not sufficient. It underscores the importance of ensuring that teachers are equipped to manage the evolving challenges driven by global megatrends such as demographic shifts, digitalisation and rising inequalities.

The figure outlines key factors influencing both the supply and demand for teachers, illustrating how professional prestige, relative salaries, working conditions, and initial preparation and professional development structures affect the attractiveness of the profession. On the demand side, it shows how elements such as school organisation, class sizes, attrition, and modes of delivery (including hybrid and digital learning) shape the need for qualified teachers.

This roadmap provides policymakers with concrete steps for policymakers to address both teacher supply and demand while improving teaching quality. It offers a clear framework to balance short-term recruitment with long-term workforce development. The roadmap also showcases relevant policy responses currently being implemented across education systems participating in the EPO Survey 2024. Additional insights have been identified through countries and economies' participation in the activities conducted by the Education Policy Outlook and the OECD Secretariat's desk-based research. The roadmap is explored more in detail in the next chapters of this report as follows:

While the report primarily focuses on school-level policy developments, it also includes examples from other education levels. Additionally, policy spotlights and in-depth analyses of recent country-level initiatives are provided to further illuminate best practices.

Figure 1.14. A policy roadmap to address teacher shortages in changing contexts



Sources: Adapted from Santiago (2002[49]), *Teacher Demand and Supply: Improving Teaching Quality and Addressing Teacher Shortages*, OECD Education Working Papers No. 1, https://doi.org/10.1787/19939019; OECD (2021[50]), Education Policy Outlook 2021: Shaping Responsive and Resilient Education in a Changing World, OECD Publishing, Paris, https://doi.org/10.1787/75e40a16-en; OECD (2019[51]), *Working and Learning Together: Rethinking Human Resource Policies for Schools*, OECD Reviews of School Resources, OECD Publishing, Paris, https://doi.org/10.1787/b7aaf050-en; OECD (2023[52]), Shaping Digital Education: Enabling Factors for Quality, Equity and Efficiency, OECD Publishing, Paris, https://doi.org/10.1787/bac4dc9f-en; OECD (2023[53]), OECD Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem, OECD Publishing, Paris, https://doi.org/10.1787/c74f03de-en.

Table 1.3. Overview of figures in Chapter 1

Figure	Title	Source
Figure 1.1	A sharp rise in teacher shortages hindering instruction in schools (2015–2022)	PISA 2022
Figure 1.2	Students' foundational skills are in decline across the OECD	PISA 2022
Figure 1.3	Inequality trends suggest equality remains a distant goal for many	World Bank and PISA 2022
Figure 1.4	More education systems are struggling to fill vacancies with qualified candidates	Education at a Glance 2024
Figure 1.5	Resignation is the main driver of teacher attrition in most of the analysed OECD education systems	Education at a Glance 2024
Figure 1.6	Lower secondary teachers' statutory salaries tend to be less competitive (2023)	Education at a Glance 2024
Figure 1.7	Most OECD countries and economies have large shares of teachers aged above 50	Education at a Glance 2024
Figure 1.8	The average age in the teaching profession is rising, except tertiary education	Education at a Glance 2024
Figure 1.9	Shortages of qualified teachers hindering instruction are also rising	PISA 2022
Figure 1.10	The pedagogical value of digital devices is not materialising in most OECD classrooms	PISA 2022
Figure 1.11	Student and school characteristics impact the potential of digital technologies to foster quality teaching	PISA 2022
Figure 1.12	How much do global megatrends matter for teachers (2025-2030)?	EPO Survey 2024
Figure 1.13	Global megatrends as a priority and actions taken for teachers (2025-2030)	EPO Survey 2024
Figure 1.14	A policy roadmap to address teacher shortages in changing contexts	Santiago (2002)

StatLink https://stat.link/sd7qya

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2 Addressing teacher shortages

This chapter explores the urgent challenge of teacher shortages, a pressing concern for education systems striving for high-quality and equitable teaching and learning outcomes. In the context of rapid societal and demographic shifts, how can education systems effectively respond to diverse and evolving teacher shortages? The chapter provides a broader strategic view of factors shaping teacher demand and supply, exploring policy responses that education systems could pursue to mitigate these shortages, with a focus on the supply side.

In Brief

Policy responses to address teacher shortages

According to responses from the Education Policy Outlook National Survey for Comparative Policy Analysis 2024 (EPO Survey 2024), teacher attraction and retention are being prioritised by a large share of education ministries, with teacher attraction gaining attention in a larger share of education ministries compared to retention. This chapter presents a range of policy responses structured within a roadmap to help shape teacher supply and demand factors (Chapter 1). According to this roadmap, factors that shape teacher demand include the size of the school age population, the duration and coverage of compulsory education, learning time/teaching loads, or graduation requirements. On the supply side, factors such as professional prestige, relative salaries and incentives, working conditions, and position availability play a role. Similarly, teacher initial preparation and professional development, certification and career structure also matter for teacher supply. Focusing on the supply side, key policy responses explored in this chapter aim to:

Get more teachers into the workforce: Increasing the supply of teachers and ensuring fully staffed classrooms is critical for education systems facing acute shortages. Policy responses analysed aim to:

- Reduce entrance barriers (Australia, England (United Kingdom) and the United States);
- Support re-entry of teachers who left the profession (Australia, Portugal and England (United Kingdom)),
- Address targeted shortages (Australia, Germany, Ireland, the Netherlands and Portugal) and;
- Propose alternative pathways into the profession (Australia, Austria, Luxembourg, New Zealand, and Teach For All).

Better allocate teachers to the areas of greatest need: Addressing teacher shortages requires not only increasing the number of new teachers but also ensuring the equitable and effective distribution of teachers where they are most needed. The policy responses in this section, although some still emerging, focus on strategies to attract new teachers while enhancing flexibility in managing the current workforce. Related policy responses analysed aim to:

- Rethink teams' skill mixes, by enhancing teaching roles in collaborative structures (Box 2.1),
- Restructuring teachers' time into teams (United States),
- Increase mobility within and outside of the teaching profession (Flemish and French Communities of Belgium and the Netherlands),
- Ensuring an equitable distribution of teachers (Australia, Peru, and the United Kingdom).

Make teaching a more attractive profession: Many factors influence the attractiveness of the teaching profession. The policy responses discussed here aim to:

- Enhance career structures that support progression (Australia, Singapore and the United States);
- Review relative salaries and incentives (Australia and England (United Kingdom)), and;
- Develop campaigns to improve the status of teaching (Australia, the Flemish and French Communities of Belgium, and Singapore).

These elements are critical in making teaching careers both financially and intellectually rewarding, so they attract high-quality candidates with diverse motivations for pursuing a teaching career.

Introduction

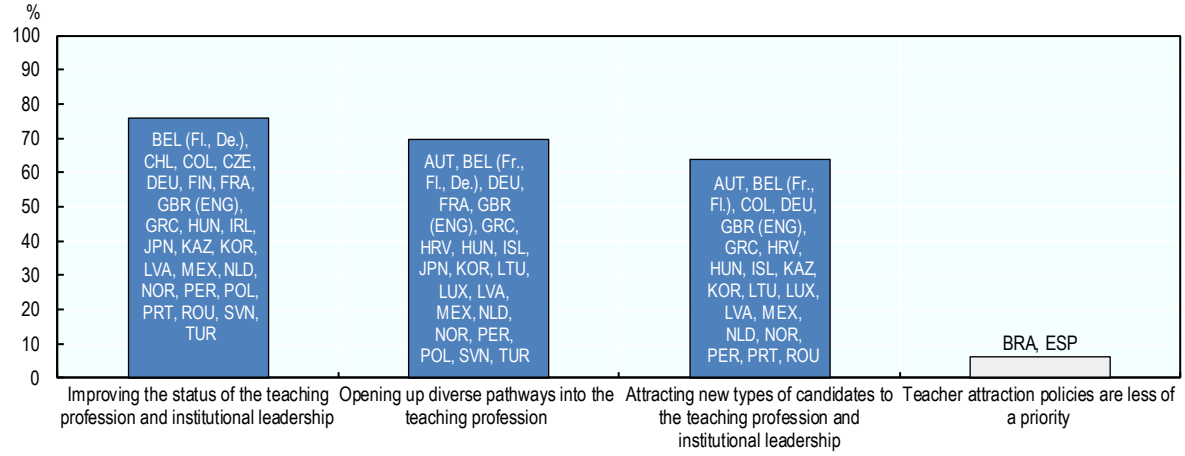
Building on the emerging challenges of teacher shortages across some OECD education systems (see Chapter 1), policymakers can explore policy responses informed by efforts in other systems. Examples gathered from the EPO Survey 2024 reveal diverse, recent initiatives to address this need. These range from local-level approaches, such as reducing barriers to entering the profession, fostering collaborative work structures, and increasing career mobility, to more systemic efforts like enhancing career pathways, reviewing salary incentives, and implementing campaigns to elevate the status and prestige of teaching.

Balancing teacher supply and demand is an urgent priority for education systems aiming to ensure high-quality, equitable teaching and learning outcomes. In response, education systems are increasingly exploring flexible career pathways that allow for dynamic movement in and out of the profession. This approach can not only help address immediate staffing needs but also align with broader labour market trends favouring adaptability and mobility. Survey responses showed a stronger focus on teacher attraction than on retention according to the EPO Survey 2024.

Regarding attraction, two-thirds of respondents prioritised raising the profession's status, enhancing institutional leadership, and diversifying pathways into teaching (Figure 2.1). While attracting new candidate types received less emphasis, 64% of systems considered it important. Notably, Brazil and Spain were the only systems prioritising teacher retention over attraction.

Figure 2.1. Priorities for attracting teachers by policy area for 2025-2030 (2024)

Percentage of education systems specifying policy areas of "high" or "very high" importance in at least one level of education

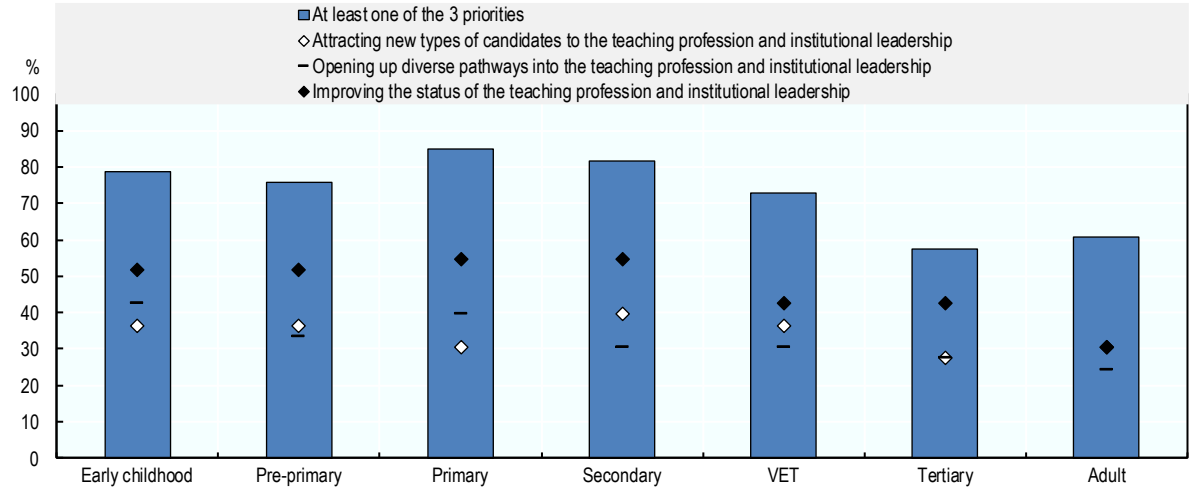


Note: A policy area of "high importance" is considered a priority for the allocation of resources and strategic focus and is expected to have a notable impact on attracting teachers. A policy area of "very high importance" is considered an urgent priority requiring immediate attention and substantial resources, with significant potential to positively influence attracting teachers.
Source: OECD (2024[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024.

Of the most frequently identified policy areas to attract teachers, improving the status of the profession, and opening up diverse pathways, are of highest priority in early childhood and care, while the need to attract new types of candidates is observed most frequently in secondary education (Figure 2.2).

Figure 2.2. Priorities for attracting teachers by education level for 2025-2030 (2024)

Percentage of education systems rating priorities related to attracting teachers to be of "high" or "very high" importance



Note: The considered priorities are: "Attracting new types of candidates to the teaching profession and institutional leadership", "Opening up diverse pathways into the teaching profession (e.g. for new entrants, for second career entrants and/or for returners) and institutional leadership", "Improving the status of the teaching profession and institutional leadership (e.g. increasing salaries and career prospects, enhancing perceived societal value)". Education systems could select priorities for more than one level of education.
Source: OECD (2024[1]), Education Policy Outlook National Survey for Comparative Policy Analysis, OECD, Paris.

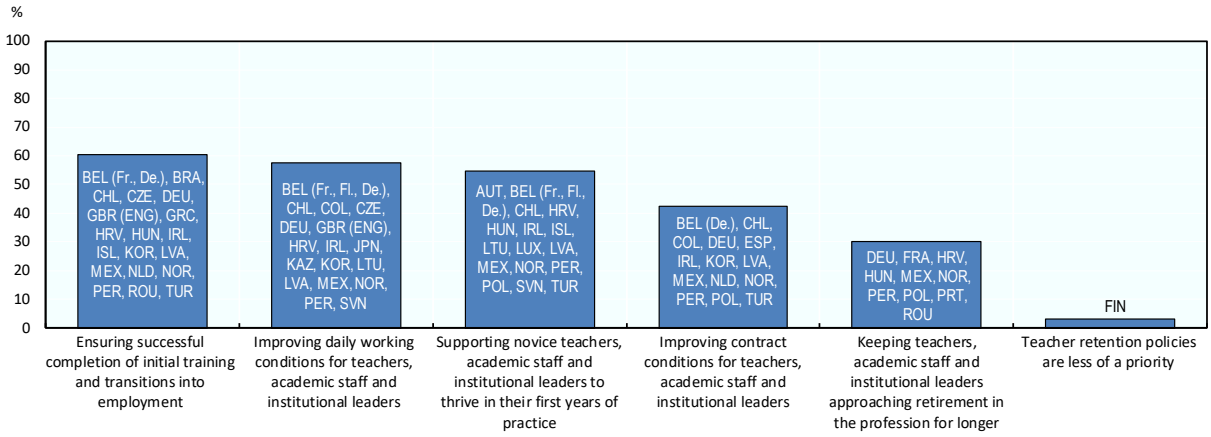
Policy context

Increasing teacher supply appears to be an encompassing priority across many education systems. Evidence collected by the OECD suggests that most education systems are focused on increasing the overall size of the teacher workforce, according to analysis of the policy examples provided through the EPO Survey 2024. About 90% of participating education ministries indicated they had introduced policies since January 2023 that seek to attract teachers and educational leaders across any level of education. Relatively few systems highlighted policies that aim to attract teachers to targeted areas of specialisation or locations. For example, England (United Kingdom) and Peru have created a bonus payment to attract teachers to positions that are hard-to-staff.

Additionally, addressing teacher retention challenges to decrease attrition and teacher demand is considered a priority of high or very high importance for education systems for the period ahead (Figure 2.3), with aspects of retention most often reported for the secondary education level (Figure 2.4). About two-thirds of participating education ministries indicated they had introduced policies since January 2023 that seek to retain teachers and educational leaders across any level of education. The most commonly identified policy areas include ensuring successful completion of initial education and transitions into employment and improving daily working conditions. For example, this includes reducing stress and workloads, supporting well-being, and focusing on supporting novice teachers, academic staff and institutional leaders to thrive in their first years of practice.

Figure 2.3. Priorities for retaining teachers by policy area for 2025-2030 (2024)

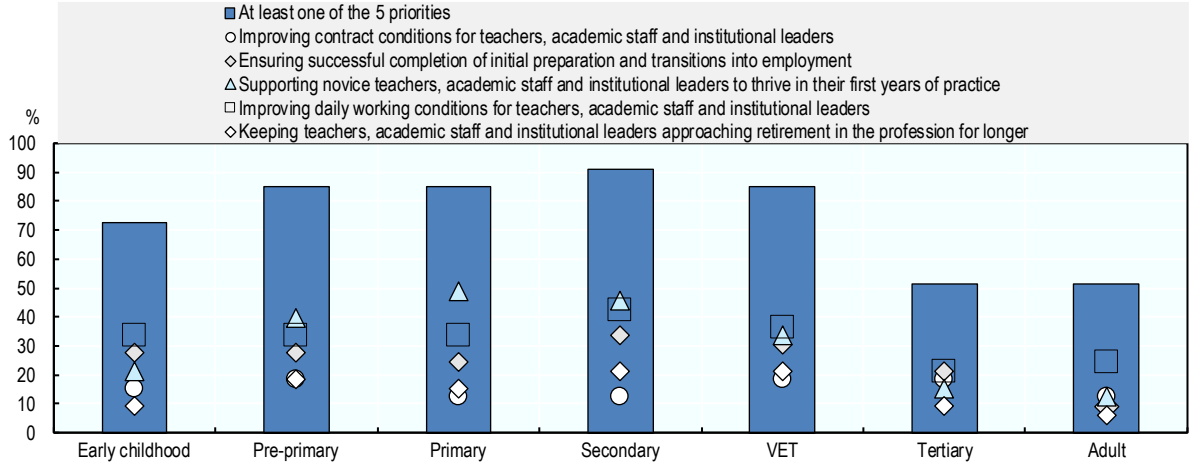
Percentage of education systems specifying policy areas of "high" or "very high" importance in at least one level of education



Note: 1. A policy area of "high importance" is considered a priority for the allocation of resources and strategic focus and is expected to have a notable impact on retention. A policy area of "very high importance" is considered an urgent priority requiring immediate attention and substantial resources, with significant potential to positively influence retention. 2. Some 33 education systems are considered in the analysis.
Source: OECD (2024[2]), Education Policy Outlook National Survey for Comparative Policy Analysis, OECD, Paris.

Figure 2.4. Priorities for retaining teachers by education level for 2025-2030 (2024)

Percentage of education systems rating priorities related to retention of teachers to be of "high" or "very high" importance



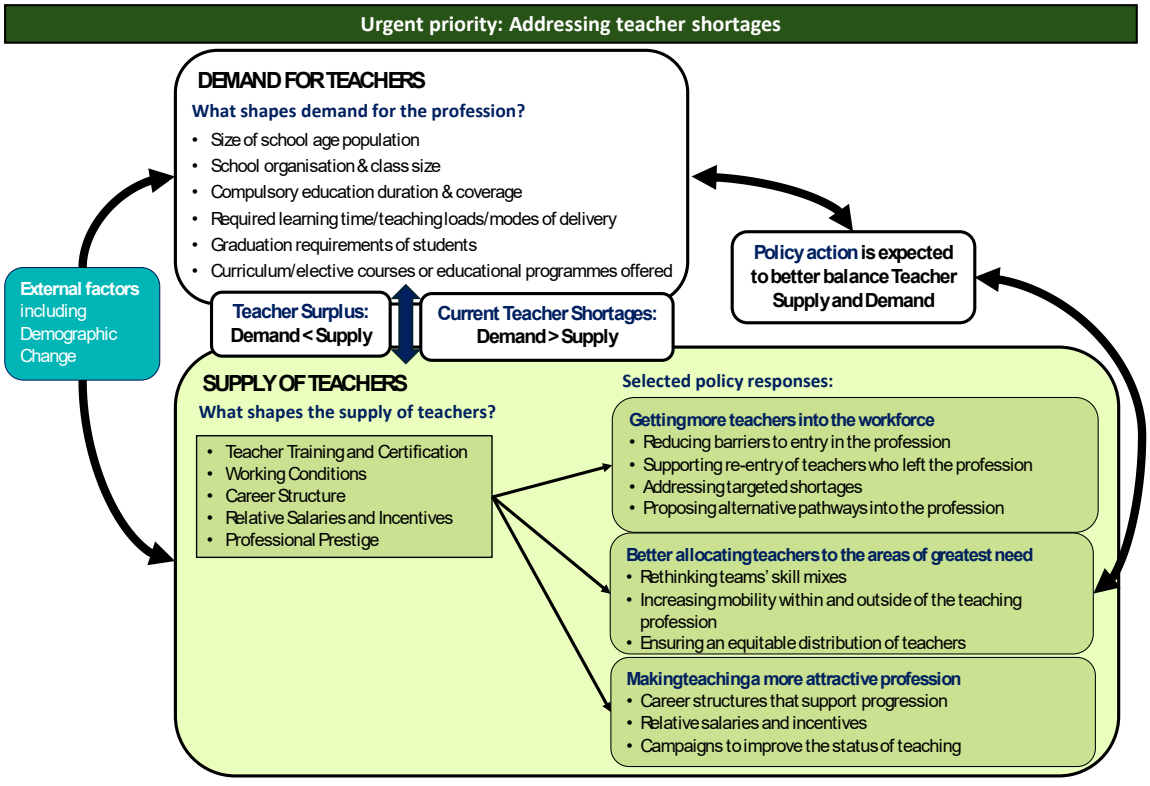
Notes: 1. Education systems could select priorities for more than one level of education. 2. Some 33 education systems are considered in the analysis. 3. The considered priorities are: Ensuring successful completion of initial preparation and transitions into employment for trainee teachers, academic staff and institutional leaders; improving contract conditions for teachers, academic staff and institutional leaders (e.g. leave, allowances, flexible work arrangements.); supporting novice teachers, academic staff and institutional leaders to thrive in their first years of practice; improving daily working conditions for teachers, academic staff and institutional leaders (e.g. reducing stress and workloads, supporting well-being); keeping teachers, academic staff and institutional leaders approaching retirement in the profession for longer.
Source: OECD (2024[1]), Education Policy Outlook National Survey for Comparative Policy Analysis, OECD, Paris.

However, addressing these priorities calls education systems to reflect on the broader context in which they operate. Addressing the resulting emerging needs, along with pre-existing ones, will require education systems a deeper rethinking of how to reorganise the teaching workforce. While addressing teacher retention remains an important policy focus, there is increasing recognition that attrition can also present opportunities for renewal and diversification within the profession. Modern workforce trends highlight the benefits of enabling teachers to transition in and out of the profession, bringing in diverse skills and experiences from other sectors. Education systems are exploring policies that accommodate flexible career paths, acknowledging that dynamic in-routes and exits may better align with the aspirations of younger generations and evolving labour market trends (OECD, 2024[3]).

Policy responses

Teacher supply and demand are shaped by a variety of factors, as outlined in Figure 2.5. On the demand side, factors identified include the size of the school age population, the duration and coverage of compulsory education, learning time/teaching loads, or graduation requirements. On the supply side, factors such as professional prestige, relative salaries and incentives, working conditions, and position availability play a role. Similarly, teacher preparation, certification and career structure also matter for teacher supply.

Figure 2.5. Organising framework for teacher supply and demand and this section



Note: Adapted from Santiago (2002[4]), Teacher Demand and Supply: Improving Teaching Quality and Addressing Teacher Shortages, OECD Education Working Papers, No. 1, OECD Publishing, Paris, https://doi.org/10.1787/19939019.

While some of these factors can be influenced by education policy settings, many are also driven by broader external forces beyond the control of the education sector. For instance, megatrends affecting labour markets, historical motivators such as social mobility and job security, and the global COVID-19 pandemic, which has added pressure to education systems, all can have influence (Biddle, 2021[5]). In parallel, demographic changes – including declining populations and fewer school-aged children – are expected to reduce teacher demand in certain countries and economies.

Responses to the EPO Survey 2024 show a large array of efforts undertaken in education systems focused particularly on teacher supply. The following section therefore identifies some of these policy efforts, to propose them as policy responses for policymakers. That said, when exploring them, they should remain mindful of the factors shaping teacher shortages on the demand side. Other OECD reviews and working papers provide an in-depth exploration (Santiago, 2002[4]; OECD, 2019[6]).

This section outlines policy efforts undertaken across three key areas to address teacher shortages: increasing the pool of teachers in the workforce, better allocating teachers where they are needed most and making teaching more attractive. The complexity and variability of teacher shortages mean that there is no one-size-fits-all solution. Short-term policy responses to increase teacher supply can address urgent needs, but longer-term structural responses are also essential for creating flexible and strategic responses to teacher shortage challenges. Policymakers must therefore balance immediate interventions with strategies for equitably allocating teachers to areas of greatest need, while ensuring teaching is attractive and supportive for the workforce.

Getting more teachers into the workforce

Policy responses

This section discusses strategies to expand the supply of teachers in the context of shortages, by focusing on:

- **Reducing barriers to entering into the teaching profession**: Making it easier for individuals to enter the teaching profession, such as financial incentives and streamlined certification processes.
- **Supporting re-entry of teachers who left the profession**: Targeting teachers who left the profession, possibly benefitting from a new array of skills they could bring with them.
- **Addressing targeted teacher shortages**: Focusing on targeted interventions, such as incentives to address subject-specific or location-specific shortages.
- **Proposing alternative pathways into the profession**: Proposing non-traditional entry routes, such as fast-track programmes and career-changer initiatives, that aim to bring diverse candidates into teaching.

The following policy responses aim to expand the number of teachers in the workforce, especially in response to immediate shortages.

Reducing barriers to entering the profession

Reducing barriers to entry and completion by creating more affordable pathways into teaching is a key policy response for addressing targeted shortages. This approach aims to increase the number of entrants into initial teacher education or alternative pathways, while also supporting candidates to complete their qualification. For example:

- In **England (United Kingdom),** bursaries and scholarships for up to GBP 30 000 are available tax-free for initial teacher education students in priority secondary subjects such as chemistry, computing, mathematics and physics. These financial incentives are designed to attract more applications. Additionally, Targeted Retention Incentive payments of up to GBP 6 000 after-tax are offered to early-career teachers in these subjects who choose to work in disadvantaged schools.
- In the **United States,** financial support initiatives for students enrolled in initial teacher education programmes have been introduced to reduce barriers to entry and facilitate successful completion. States such as Arizona, Mississippi, Texas, Washington and Washington DC have experienced increases in enrolments and completions between 2008/09 and 2021/22. Identified factors contributing to this success include federal pandemic relief funds, paid residencies for students, the implementation of Grow Your Own (GYO) initiatives. GYO programmes support local community members in becoming teachers by offering tuition reimbursement, scholarships, and other supports (see Annex A for further details).
- In **Australia**, the Commonwealth Teaching Scholarships provide financial support to new undergraduate and postgraduate students in exchange for teaching in government schools or government-run early learning centres for a period equivalent to their study duration. Between 2024 and 2028, the programme will offer up to 5 000 scholarships of up to AUD 40 000 for undergraduate and up to AUD 20 000 for postgraduate students commencing full-time study in accredited initial teacher education programmes. Additionally, a top up payment of AUD 2 000 may be available to those undertaking their final professional placement in remote areas.
- From July 2025, **Australia** will also introduce the Commonwealth Prac Payments, aimed at assisting students in managing the costs associated with mandatory placements in fields such as teaching, nursing and midwifery, and social work. The initiative seeks to reduce financial barriers to entry and improve completion rates in these fields.

While these initiatives seem promising in their aim to address immediate shortages, evidence on the long-term effectiveness of these measures is still inconclusive or limited due to the recency of implementation. It is therefore crucial that education systems monitor outcomes, and remain alert to potential consequences that can undermine long-term teacher retention (OECD, 2005[7]; OECD, 2019[6]). An example of these could be reduced teaching quality or negative experiences for pre-service or early-career teachers, particularly if they lack access to high-quality initial teacher education and adequate support early in their careers. Moreover, while financial incentives and streamlined certification pathways have been shown to increase enrolments temporarily, without concurrent efforts to enhance teaching quality and ensure comprehensive preparation, such measures can lead to high attrition rates among new entrants. Policymakers must therefore balance the need for quick fixes with sustainable, evidence-based workforce planning (Kelly, Sim and Ireland, 2018[8]). An example of the actions Iceland has taken to increase enrolments in initial teacher education is included in Annex A.

Supporting re-entry of teachers who left the profession

Encouraging re-entry of teachers who have transitioned to other careers aligns with a broader vision of teaching as a dynamic profession. While education systems should aim to reduce attrition due to factors such as poor working conditions and low job satisfaction, not all types of departures should be viewed as problematic. This approach recognises the value of diverse career experiences, which can enhance teaching quality and drive innovation, while also reflecting broader labour market trends towards increasing career mobility, fluid and diversified career trajectories, and longer working lives (OECD, 2024[3]). Education systems could benefit from flexible re-entry pathways that facilitate smooth transitions back into the profession, attracting teachers who may wish to return later in their careers and who could fill workforce gaps, bringing new skills with them. Several education systems are implementing initiatives to facilitate easier re-entry into the profession and encourage teachers to return after career changes or breaks:

- In **England (United Kingdom),** a pilot programme is testing the effectiveness of financial incentives in encouraging teachers to return to the workforce, recognising the importance of this strategy for addressing staffing needs, particularly in the context of childcare expansion reforms.
- In **Portugal,** 'exceptional and temporary' measures are being introduced to encourage the return of teachers who have left the profession. This initiative targets schools most affected by teacher shortages by, among others, providing salary increases for teachers who are eligible for retirement, in order to help these schools be staffed with experienced professionals (Diário da República, 2024[9]).
- In **Australia,** the National Teacher Workforce Action Plan includes a review of the number of registered teachers not currently in the workforce. Following this, a plan will be developed to attract these teachers back to the profession, which may include identifying alternative roles beyond traditional classroom teaching, such as mentoring (Australian Government Department of Education, 2024[10]).

This represents a significant opportunity for education systems to clarify re-entry routes at multiple stages across a career, and effectively benefit from the support of teachers who are returning to the profession. However, many education systems may lack accurate data on the number and characteristics of potential returnees and their motivations, which could limit their ability to capitalise on this opportunity strategically. Working with initial teacher education institutions to collect data about their graduates could be a first step for this.

Addressing targeted shortages

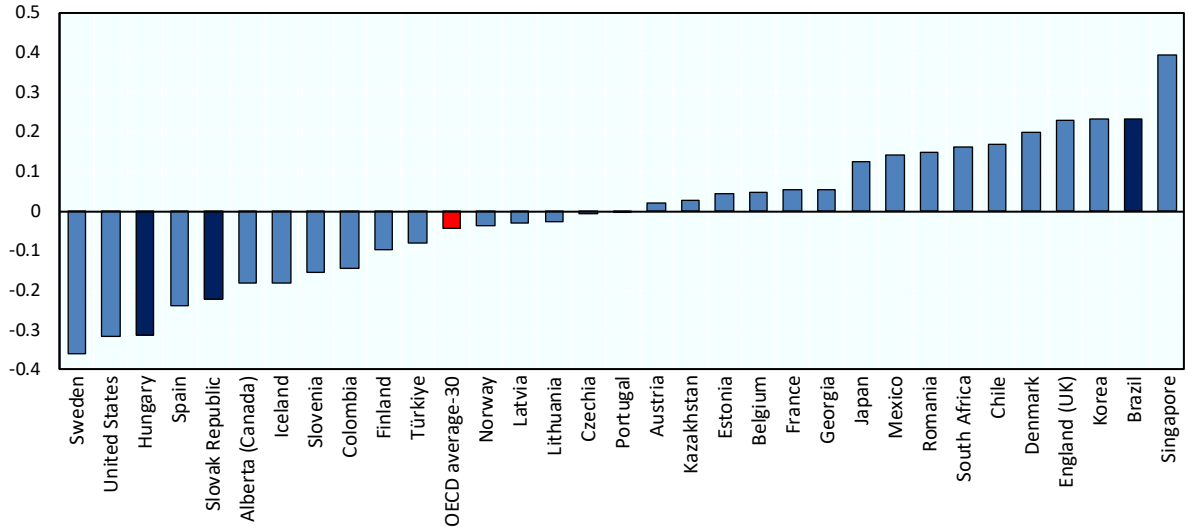
Education systems are adopting creative and flexible solutions to address immediate and acute shortages and ensure that classrooms remain staffed. These strategies include increasing the pool of new teachers (e.g. those enrolled in initial teacher education) and optimising the allocation of existing teachers to cover shortage areas. While some approaches offer short-term relief, others present opportunities to rethink workforce flexibility and staffing models.

- In **Australia,** Western Australia has implemented an initiative allowing final year pre-service teachers to work as relief teachers under limited registration, creating a new pool of teachers to alleviate immediate shortages.
- In **Portugal,** higher education teachers and PhD researchers with appropriate pedagogical preparation, are being employed in schools to alleviate these shortages (Diário da República, 2024[9]).
- Similarly, **Germany** has also adopted measures enabling academics to teach in subject areas experiencing shortages.
- In **Ireland,** a pilot teacher-sharing scheme was introduced in 2023 to offer teachers of high-demand subjects full-time teaching contracts and increase teaching hours for those employed part-time. Under this initiative, teachers are shared between a cluster of two schools. This pilot is set to run for three academic years, aimed at facilitating senior secondary school provision. The Department for Education acknowledged potential challenges around scheduling and travel time and indicated that funding may be provided for timetabling consultancy services or software to support the process. While there is no evidence yet on the scheme's effectiveness, insights gained from this pilot will be useful for informing future approaches to address teacher shortages.
- In the **Netherlands**, schools in the five largest cities are piloting alternative scheduling approaches, including adjustments to the curriculum and the use of 'external professionals' for teaching. These skilled professionals, who lack formal teaching qualifications, can work up to one day per week or a maximum of 22 hours per month (Arbeidsmarkt Platform Primair Onderwijs, n.d.[11]).

At the same time, according to the Teaching and Learning International Survey (TALIS) 2018 results, there is no clear statistically significant link between teachers' workplace well-being and stress levels in relation to the number of schools in which they work (Figure 2.6). This suggests that the quality of working conditions in these schools – such as balanced workloads and the effective implementation of flexible working arrangements – is likely to play a more pivotal role in the success of these initiatives.

Figure 2.6. Working in more than one school has no clear link with teacher well-being and stress levels (2018)

Relationship between workplace well-being/stress and working in more than one school



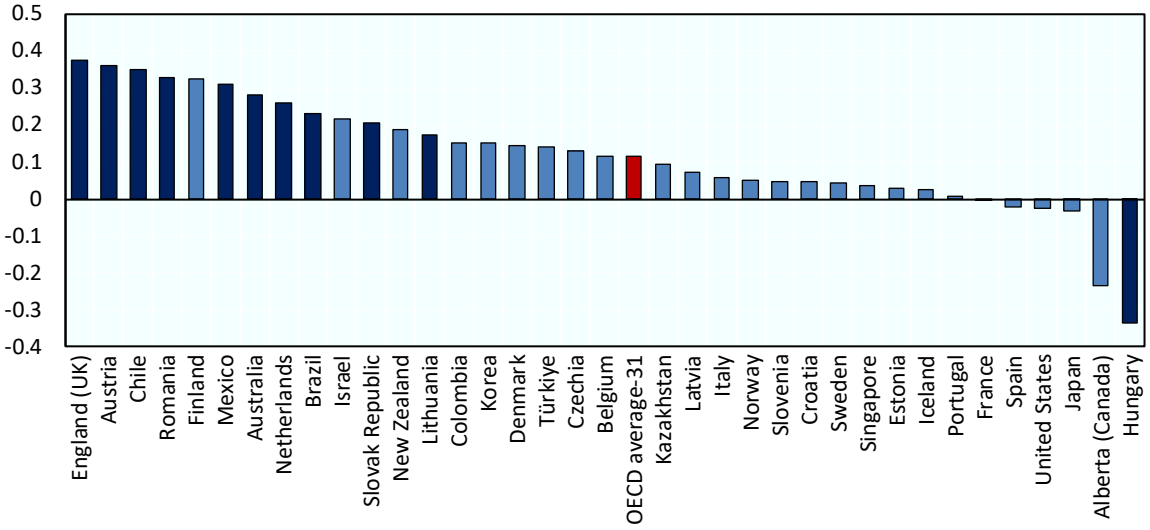
Note: 1. These refer to the results of linear regression based on responses of lower secondary teachers and principals. The dependent variable is the index of workplace well-being and stress. The control variables of the regression are: dummy variables for fixed-term contract with more than 1 school year, fixed-term contract with less than or 1 school year, part-time contract (71-90% of full-time hours), part-time contract (70% or less of full-time hours), being female, and working in a privately managed school, and other variables for age, experience as a teacher at current school, classroom composition (students from socio-economically disadvantaged homes), school location index, and school size. 2. The values in **dark blue** are statistically significant. The OECD average is in red (not statistically significant).
Source: OECD (2020[12]), *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, OECD Publishing, Paris, https://doi.org/10.1787/19cf08df-en.

Further analysis reveals that full-time teachers generally report higher levels of job satisfaction compared to part-time teachers across most education systems (Figure 2.7), with this relationship being statistically significant at the OECD level. These findings are important when considering policies that offer flexible workforce models, including full-time or part-time teaching arrangements in one or more schools.

A possible explanation for the higher job satisfaction among full-time teachers is the greater job stability and security they may experience, along with better access to professional development and opportunities to build stronger relationships with colleagues and students (Toropova, Myrberg and Johansson, 2020[13]; McJames, Parnell and O'Shea, 2023[14]). These factors can contribute to a deeper sense of belonging within the school community. While part-time teachers in sharing schemes or similar roles may also achieve these benefits, care must be taken to avoid overburdening them with excessive workloads or unrealistic expectations. Designing part-time positions in a way that achieves flexibility and ensures a satisfying experience is crucial for making the profession more responsive to shortages and appealing to new entrants.

Figure 2.7. Full-time teachers tend to report higher job satisfaction levels than part-time teachers in most OECD education systems (2018)

Relationship between the index of job satisfaction and working full-time



Note: 1. These refer to the results of linear regression based on responses of lower secondary teachers. The dependent variable is the index of job satisfaction, and the displayed independent variable is a dummy variable for working full-time (the reference category is working part-time). The control variables are a dummy one for being female, age, years of experience as a teacher at current school, index of workplace well-being and stress, and classroom composition (share of low achiever students, of students with behavioural problems, and of students from socio economically disadvantaged homes). 2. The education systems highlighted in **dark blue** have statistically significant values. The OECD average is also statistically significant and highlighted in dark red. 3. The index of job satisfaction measures teachers' satisfaction with their current work environment and satisfaction with the profession.
Source: OECD (2020[12]), *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, OECD Publishing, Paris, https://doi.org/10.1787/19cf08df-en.

Proposing alternative pathways into the profession

As part of broader systemic policy efforts, efforts to increase the supply of teachers and attract new groups through alternative pathways and models are also common across OECD education systems. These approaches not only open the profession to individuals who might not have previously considered teaching, but they also typically offer fast-tracked entry into the profession. This makes them a potentially valuable mechanism for addressing teacher shortages, as evidenced by the examples discussed below.

As such, alternative pathways are a policy area to increase the supply of teachers, attract new groups of potential teachers, and provide additional flexibility for addressing immediate teacher shortages. These offer options different to traditional routes and often provide routes into the profession for those wishing to train 'on the job' or who are working in other careers or roles (European Expert Network on Economics of Education (EENEE), 2023[15]). While the features of these models vary, they typically target individuals without teaching qualifications and aim to recruit diverse candidates with professional experience in other fields, new groups of teachers and career changers.

- **Austria** has increased the number of initial teacher education students by 17% since implementing their 'Excellent Profession' (Klasse Job) strategy (according to the EPO Survey 2024). The strategy focuses on attracting three new groups: career changers, high school students aged 17 or 18 considering a teaching degree and people interested in teaching specific subjects as a secondary job. Additionally, from 2025, Austria will implement the *Students Teach Students* programme, to provide high school students with a taste of the teaching profession.
- **Austria** also offers career changers opportunities in early childhood and care, and lower and upper secondary level secondary education ("Quereinstieg"). Typically, these persons come from the private sector or research fields and can teach general education subjects. So far, more than 6 250

persons have registered, with about 2 940 certified career changers ready to apply for job offers, and over 700 employed for the 2024 school year.

- **Luxembourg** has introduced new initial teacher preparation pathways, including a Bachelor in Pedagogical Training, aimed at individuals with related degrees. Additionally, the government has committed to expanding training opportunities to alleviate, among other things, teacher shortages in the early childhood sector.
- **New Zealand**'s Teacher Supply Package includes initiatives to attract overseas teachers, recognising migration as a key avenue to increase teacher supply. The programme provides grants to support overseas teacher recruitment, meet hiring costs, and assist with relocation, tapping into a broader pool of prospective teachers, particularly in the face of migration trends.
- In **Australia**, the High Achieving Teachers programme is an employment-based alternative pathway into teaching designed to recruit high-achieving university graduates to work in schools facing teacher shortages while they complete their teaching qualification. The programme then supports participants to complete an accredited teaching qualification and will fund an additional 1 500 places from 2025 through new pilot initiatives.
- **Teach For All** operates as an alternative model that aims to address educational disparities by recruiting top university graduates for two-year teaching commitments in underserved schools (Teach For All, n.d.[16]). This model combines a philosophy of attracting the "best and brightest" to solve educational challenges with a fast-tracked teacher preparation process (typically 6-7 weeks) (Price & McConney, 2013) and seeks to inspire a personal calling among participants to addressing educational inequity both in and outside of the classrooms. Rather than supplying a significant proportion of teachers, the goal is to develop enough leaders to drive systemic transformation in education.

For alternative pathways to effectively contribute towards increased teacher supply and quality teaching outcomes, it is essential to maintain rigorous standards that ensure that individuals entering the profession are well-prepared for the classroom and the context in which they work. Just like for initial teacher education, preparation must include well-structured and supported experiences that also build a deep understanding of the educational environments where teachers will be working. These factors play an important role in facilitating transitions and supporting teachers to remain in the profession (OECD, 2019[6]).

In the coming years, it will be crucial to ensure that alternative pathways and models not only adequately prepare teachers for the classroom, but also serve as a lever for directing teachers to areas of greatest need. Some promising programmes are already beginning to achieve this goal. For instance, the Grow Your Own (GYO) initiatives in the **United States,** highlighted in Annex A, aim to recruit teachers from local communities, providing support for certification and building a diverse teaching workforce.

Better allocating teachers to the areas of greatest need

Policy responses

This section discusses strategies to better allocate teachers to areas of greatest need, by focusing on:

- **Rethinking teams' skill mixes:** Enhancing teaching roles in collaborative structures, and restructuring teachers' time into teams.
- **Increasing mobility within and outside of the teaching profession**: Encouraging teacher mobility both within the profession (across roles and levels) and outside of it.
- **Ensuring an equitable distribution of teachers**: Particularly for disadvantaged or hard-to-staff schools.

Addressing teacher shortages requires more than bringing new teachers into the profession. It also involves managing and distributing teachers where they are most needed. The policy responses discussed in this section not only aim to address teacher recruitment but also offer solutions for improving career flexibility and providing multiple pathways to enter or return to the profession. For example, by allowing teachers to work in various environments or move across education levels and locations, these policies aim to promote more dynamic and flexible careers.

While such approaches can help alleviate immediate teacher shortages, there are concerns about ensuring that teachers are consistently placed where they are most needed in the long term. Striking a balance between flexible, short-term measures and long-term strategic workforce planning will remain a key area of attention for policymakers.

Rethinking teams' skill mixes

Enhancing teaching roles in collaborative structures

One approach to addressing teacher shortages is to develop a more flexible workforce that leverages the skills of other professionals while deepening individual teacher expertise based on strengths and preferences (McGrath, 2023[17]).

In the short term, creating hybrid staff profiles, such as digital integration specialists or data analysts, can complement teachers' skills. This collaborative model allows teachers to learn from these professionals, enhancing their capabilities in areas like digital technology and data analysis to support student learning outcomes. The aim in the longer term should be for teachers to also acquire these skills themselves, building deep subject-matter expertise and digital competencies, rather than relying on supplementary roles. By investing in teacher preparation and professional development, education systems can gradually reduce dependency on external support and ensure sustainable improvements in teaching quality (OECD, 2023[18]).

Evidence suggests that hybrid roles can facilitate strategic collaboration, shifting education systems from a transactional approach to a more integrated model of digital transformation. Similar strategies have been successfully implemented in the health sector (Box 2.1), but careful evaluation is needed before scaling these models in education.

While the concept of "boundary spanners" has shown promise in the health sector, its applicability to education remains to be considered with care. In the short term, roles like digital integration specialists can help address immediate skill gaps and support teachers in adapting to new technologies. However, without

clear definitions and role boundaries, there is a risk of generating uncertainty among teachers and creating dependencies that could undermine the goal of enhancing teachers' own skills.

Box 2.1. Insights from the health sector: Developing hybrid skillsets for digital transformation

Advanced technologies offer significant benefits to the healthcare sector, including more effective, efficient, people-centred services, enhanced surveillance, system management and resilience. However, while the use of AI is emerging in some areas of health care, most applications remain in the research and development stage.

One approach to bridging the gap between health and technology has been the development of "boundary spanners" – professionals who possess skills and experience in both sectors. Efforts in this direction include:

- In **England (United Kingdom)**, the National Health Service (NHS)'s Digital Academy aims to create a cohort of at least 300 hybrid clinical/digital leaders. The course combines leadership, change management, health and citizen informatics, data analytics and user-centred design. The Academy has shown impact on digital transformation in the NHS. Participants apply research findings from their dissertations to practice, and their participation can establish them as digital leaders among peers and managers. Formal networking opportunities for participants are key for impact.
- In **France**, a collaboration between one of Europe's leading cancer hospitals and two engineering schools has launched a training initiative for young computer scientists to gain a foundational understanding of medicine, while medical researchers are introduced to the basics of AI.
- The Carle Illinois College of Medicine in the **United States** is the world's first engineering-based medical school, training physicians at the intersection of engineering, science and medicine. This unique approach aims to develop health care professionals who can drive transformative solutions in the field.

Alongside formal professional development opportunities, systems will need to adapt workforce structures to ensure staff with hybrid profiles can pursue relevant and fulfilling jobs with a sustainable career track. This can help incentivise talented individuals to take time out of health practice to obtain additional training and certification. Strategic, co-ordinated and sustained resourcing is needed to ensure new positions are available as population-based funding may not incentivise organisations to adapt workforce structures.

Source: Acharya, A. et al. (2022[19]), "Evaluating the impact of a digital leadership programme on national digital priorities: a mixed methods study", BMJ Open, Vol. 12/4, https://doi.org/10.1136/bmjopen-2021-056369; Oliveira Hashiguchi, T., L. Slawomirski and J. Oderkirk (2021[20]), "Laying the foundations for artificial intelligence in health", *OECD Health Working Papers*, No. 128, OECD Publishing, Paris, https://doi.org/10.1787/3f62817d-en; Socha-Dietrich, K. (2021[21]), "Empowering the health workforce to make the most of the digital revolution", OECD Health Working Papers, No. 129, OECD Publishing, Paris, https://doi.org/10.1787/37ff0eaa-en.

High-performing education systems like Estonia and Korea show that a more sustainable approach is to focus on enhancing teachers' digital competencies directly (OECD, 2021[22]). Evidence from the Education Endowment Foundation also suggests that roles like teaching assistants are most effective when they complement, rather than substitute, teacher instruction (Education Endowment Foundation, 2021[23]).

Given the mixed evidence from other countries, it is crucial to evaluate these hybrid models carefully before widespread adoption. The ultimate objective should be to empower teachers to acquire these skills themselves, ensuring that any structural changes support long-term capacity building rather than only serving as temporary fixes.

Restructuring teachers' time into teams

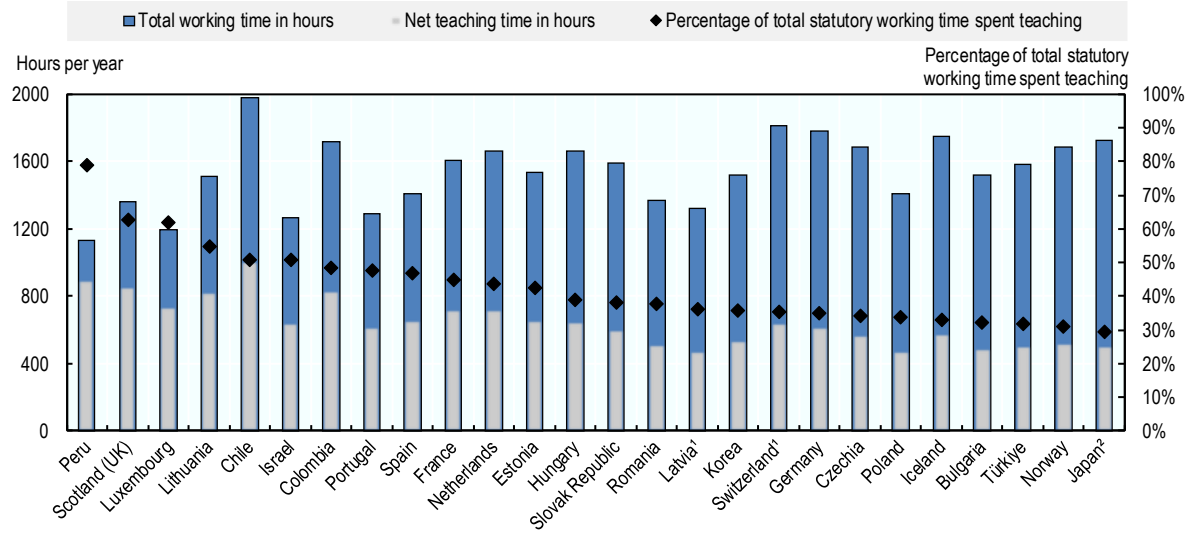
Another policy response that can help education systems to manage their existing workforce involves team-teaching and collaborative models. While still recent, these approaches not only offer potential solutions to teacher shortages, but also aim to address the pressing issue of teacher workload and the need to retain teachers in the profession.

In many education systems, teachers are required to engage in a wide variety of tasks, many of which are non-teaching related (see Figure 2.8). This signals the breadth and complexity of teachers' work and indicates that they may often be doing tasks that take them away from their core teaching responsibilities.

Although many non-teaching tasks, such as professional development and teamwork with colleagues are important for improving teaching quality and building stronger relationships with students (El Islami, Anantanukulwong and Faikhamta, 2022[24]), managing teacher workloads requires a careful balance. Education systems must protect teaching time while providing space for teachers to engage in activities that can support the holistic development of students (See also Chapter 3).

Figure 2.8. Teachers spend most of their time on non-teaching tasks and responsibilities (2023)

Statutory working time in hours per year, in public institutions, by education system



Note: 1. Actual teaching time. 2. Average planned teaching time in each school at the beginning of the school year. 3. Countries and economies and other participants are ranked in descending order of the percentage of total statutory working time spent teaching.
Source: OECD (2024[25]), *Education at a Glance 2024: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

At school-level, structures and staffing models in some education systems are exploring alternative ways to balance teaching and non-teaching responsibilities. Rather than reducing time spent on core teaching tasks, these models redistribute responsibilities across teams of teachers with different specialisations and skill sets. This intends to allow individual teachers to focus on key teaching and non-teaching tasks relevant to their role, alleviating the need to juggle a wide variety of responsibilities.

Approaches for collaborative teaching explored in this section seek to foster opportunities for collaborative work among colleagues, planning, connection, and targeted student support, with more flexibility within the day to undertake this work. Furthermore, if well implemented, team teaching can be particularly beneficial for novice teachers, as working with experienced teachers can help improve their self-efficacy and job satisfaction (OECD, 2019[26]). Some examples from the **United States** include:

- The Next Education Workforce in the Mesa public school system (**Arizona**), which builds teams of 3-5 educators with distributed expertise to work with cohorts of 60-90 students, shifting away from a traditional one-teacher, one-classroom model where work is done largely in isolation. Teams consist of educational leaders, professional educators, paraeducators and community educators. The team-teaching approach has shown positive impacts on teacher retention and student outcomes. In Mesa, teachers working in the team-teaching models report lower attrition rates, receive higher evaluations, and are more likely to recommend teaching to a friend. These teachers are also more likely to remain teaching in their district than their colleagues in traditional classroom models, even when accounting for differences in characteristics (CPRE, 2024[27]). To-date, the model operates in over 40 schools.
- Opportunity Culture is a staffing model that adopts a Multi-Classroom Leader role, and other team-teaching roles, to boost the reach of excellent teaching to more students. Under this model, schools are not required to fill every teacher vacancy. The model rethinks the roles of teachers and the structures in which they work: each teacher in the Multi-Classroom Leader role leads a small teaching team, providing guidance and on-the-job coaching while continuing to teach. Schools redesign schedules to provide additional school-day time for teacher planning, coaching and collaboration (Opportunity Culture, n.d.[28]). Surveys showed high satisfaction and a desire to continue the initiative in their schools. There is also evidence of improved student learning in the **Texas** district in the 2020/21 pandemic school year (Opportunity Culture, 2024[29]). At the time of writing, 65 sites in 13 states across the United States have used these staffing models.
- In **Mississippi**, the McComb school district focuses on reimagining the role of peer-to-peer mentorship and brings together collaborators across the district and within schools. This model requires restructuring teaching time and creating flexible spaces for new roles, offering teachers greater autonomy (National Center on Education and the Economy, 2024[30]).

Similarly, a 2018 study of blended and personalised learning models from eight schools and districts in the United States highlighted the potential effectiveness of shifting away from traditional models in certain contexts. The study identified that shifting the roles of teachers away from the one-teacher one-classroom model, resulted in highly collaborative teams, and intensive coaching cycles that enhanced teaching quality and personalised learning for students (Christensen Institute, 2018[31]).

Team teaching models offer several benefits that can help alleviate teacher shortages in three ways:

1. *Optimising teacher's use of time and resources:* These models support the optimisation of the use of teachers' time and resources.
2. *Providing personalised learning experiences:* By allowing teachers to focus more on specific student needs, these models appear to support the delivery of deeper and more personalised learning experiences, where implemented with fidelity.
3. *Strengthening student-teacher relationships:* Team-based approaches can provide students with several key adults in their education experience, reducing the impact of teacher turnover and dependencies on individual teachers, facilitating learning continuity and a sense of safety and predictability for students (Menzies, 2023[32]).

These approaches offer potential solutions for mitigating teacher shortages for the shorter term, but there is mixed evidence regarding the pertinence of this approach for the longer term. In high-performing systems, such as Singapore, there is a stronger emphasis on individual teacher-led instruction – while seeing the profession as highly collaborative – and less reliance on shared teaching responsibilities (Asian Development Bank, 2022[33]). This suggests that the effectiveness of team-teaching models may be context-dependent and require thorough evaluation.

Furthermore, although team-teaching models show promise for some contexts, their implementation needs to be mindful of managing workload and stress. It will be important to ensure that responsibilities are

distributed evenly across staff with the appropriate skills, and that sufficient resources are allocated to support teachers in managing larger student cohorts. This will involve rethinking the structures and organisation of schools to encourage collaboration and allocating expertise where it is most needed (Podolksy et al., 2016[34]). Furthermore, when moving towards more flexible forms of education, the tensions related to physicality and distance, and autonomy and support, need to be carefully considered to ensure quality teaching and learning outcomes (OECD, 2018[35]).

Increasing mobility within and outside of the teaching profession

Another policy response that some countries and economies are implementing for increasing the teacher supply is to introduce workforce arrangements that enhance teachers' mobility within and outside of the teaching profession. This includes allowing teachers to work concurrently in other fields, catering to individuals with diverse professional interests who want to teach, but might otherwise consider the opportunity cost of teaching. Embracing models that allow teachers to move in and out of the profession can also make teaching more appealing to younger generations who value diverse career experiences (OECD, 2024[3]). Examples of such initiatives are the following:

- In the **Netherlands**, teachers who combine their teaching job with a job in another field are referred to as "hybrid teachers". It is estimated that around 50 000 teachers work in this way. Several initiatives have been developed to encourage and facilitate hybrid teaching. For example, the Brainport Eindhoven region, in collaboration with various educational institutions and companies, has started a pilot to give technicians the opportunity to engage in hybrid teaching for 4 to 8 hours a week in vocational education and training (VET). However, this pilot is currently limited to regional implementation and has not yet been scaled more widely.
- The **French Community of Belgium** has introduced innovative policies, such as creating a new "expert status" that allows individuals to combine teaching with work in other sectors. Although still in the early stages of implementation, this initiative is promising, as it may attract high-achieving professionals who value the flexibility to pursue multiple careers.
- Additionally, the **French Community of Belgium** is introducing "guest teachers", which opens the education system to professionals from diverse backgrounds. This initiative aims to allow school boards in secondary education, part-time arts education, and adult education centres to convert teaching hours into credit to appoint guest lecturers. The initiative has been extended to primary education and secondary special needs education. A similar initiative exists in the **Flemish Community of Belgium**, where guest teachers with at least three years of professional experience are deployed for temporary assignments to bring their expertise into schools.

In higher education, mobility between industry and government could be promoted, while in VET, opportunities could be expanded for in-company trainers to become VET trainers, or for industry professionals to teach VET part-time and vice versa (OECD, 2021[36]).

These policies show promise and align with broader trends towards more fluid and diversified careers (OECD, 2024[3]), but their implementation requires careful management to ensure positive working environments, as well as to avoid fragmentation within the teaching profession and disruptions to student learning. Furthermore, although increasing mobility within and outside of the teaching profession can help diversify career pathways, evidence from high-performing systems suggests that maintaining a focus on building deep expertise within the teaching profession may better support student outcomes. Systems like Singapore have historically prioritised strong internal professional development (Gomendio, 2017[37]) over external mobility, highlighting the need for a balanced approach. Furthermore, differences between education levels mean that successful models in one context may not transfer easily to others. Therefore, such policies should be piloted and evaluated locally before being expanded on a larger scale.

Ensuring an equitable distribution of teachers

Teacher shortages and high rates of attrition disproportionally affect disadvantaged schools, threatening the quality of education in high-poverty, hard-to-staff schools and vulnerable communities (Billingsley and Bettini, 2019[38]). The Programme for International Student Assessment (PISA) data show that schools serving more disadvantaged students tend to suffer from more shortages of staff than schools serving students from more privileged backgrounds (OECD, 2023[39]). This inequitable distribution of staff is driven by several factors, including teachers' personal preferences, working conditions, and available incentives.

Examples of policies that aim to attract teachers to hard-to-staff schools, targeted areas of specialisation or locations are outlined below. Other initiatives can include enhanced leadership opportunities, accelerated permanent employment status, extra leave/holidays, and/or subsidised accommodation, and recruitment campaigns to attract teachers in areas of need.

- In **England (United Kingdom),** financial incentives are offered to teachers in shortage areas. In addition, promotional campaigns aim to build interest in teaching, with a focus on subjects such as maths, physics, chemistry, languages, and computing. Internships for undergraduates and Master's Degree students in these subjects further aim to strengthen the pipeline of future teachers.
- In **Peru,** a bonus payment encourages teachers to take up posts in rural and border areas. However, research has shown that while the bonus improves retention in these schools, it can have negative effects on surrounding schools, redistributing shortages rather than resolving them, and with no direct effects on student learning. The authors argue these results are due to the poor pedagogical skills of the teachers being mobilised by the scheme and suggest that a reasonable policy alternative is a scheme that targets talented teachers with larger bonuses (Castro and Esposito, 2022[40]).
- In **Victoria (Australia),** the Teaching Academy of Professional Practice partnerships are targeted teacher education and university-school partnerships that aim to better prepare teachers to work in disadvantaged and diverse settings. These give pre-service teachers mentoring and professional development opportunities to improve teacher readiness to work in these school communities.

At the same time, efforts to attract teachers to hard-to-staff schools face a number of challenges. Many financial initiatives are short-term, and dependent on external funding. They are also limited in their ability to address the systemic issues that often drive teachers to leave the profession (McPherson, Lampert and Burnett, 2024[41]). Poor working conditions – such as heavy workloads and limited resources and levels of administrative and collegial support – are common in hard-to-staff contexts (Pogodzinski, 2014[42]). Efforts to ensure an equitable distribution of teachers are evolving to include strategies that embrace flexible career models.

Rather than solely aiming to retain teachers in hard-to-staff schools for extended periods, education systems are exploring approaches that support temporary assignments, shared teaching roles, and rotational positions. These models can allow teachers to gain diverse experiences while addressing immediate staffing needs in challenging contexts. That said, caution is needed. For the longer term, evidence from high-performing systems like Estonia suggests that prioritising stable, well-supported teaching positions may be more effective in ensuring equitable outcomes (Santiago, 2016[43]). Schools will also need to intentionally nurture relationships, establish routines and culture, and create opportunities for informal professional development to ensure positive outcomes for teachers (Menzies, 2023[32]).

Research indicates that strategies and supports to prepare teachers for challenging school contexts specifically should be an important element of both alternative pathways and initial teacher education (McPherson, Lampert and Burnett, 2024[41]). Evidence shows that teachers are most effective in hard-to-staff schools when they receive evidence-based professional development tailored to the diverse

and/or high-needs settings in which they work, and when they hold practical knowledge of the context of their students' lives (Bastian and Marks, 2017[44]).

Another key aspect for ensuring equitable staff distribution across schools is the design and implementation of equitable funding allocation mechanisms. Equitable funding systems require reliable evidence on the adequacy of funding, particularly in relation to socio-economic disadvantage or geographical location (OECD, 2019[6]). That said, a well-designed funding formula can provide an efficient, equitable, stable and transparent method for distributing resources.

Research on teacher preferences also suggests that teachers typically prefer to work close to their homes, families and friends, even when they obtain their initial teaching qualification elsewhere (OECD, 2019[6]). In hard-to-staff locations where teacher shortages persist, initiatives such as Grow Your Own can play a vital role in meeting local teacher demand (see Annex A). However, further evaluative evidence is needed to assess long-term impact of these initiatives on teacher supply.

Making teaching a more attractive profession

Policy responses

This section discusses strategies to make teaching a more attractive profession, by focusing on:

- **Enhancing career structures that support professional growth**: Aiming for well-defined career progression opportunities that can make teaching more appealing, allowing teachers to develop expertise and take on leadership roles.
- **Reviewing relative salaries and incentives**: Shaping salary structures and financial incentives aimed at attracting and retaining high-quality teachers.
- **Developing campaigns to enhance the status and prestige of the teaching profession**: Developing initiatives and public campaigns that aim to raise the societal value of teaching and make it a more attractive career choice.

Although a great deal of research focuses on teacher remuneration as a key lever for addressing teacher supply challenges, it is only one of many factors that can render a profession attractive. In addition to salaries, working conditions, opportunities for progressional growth, and professional prestige are important to make teaching careers attractive, not only financially but also intellectually (OECD, 2024[25]; OECD, 2023[45]). The following policy responses are areas for policy attention to meet expectations of individuals with varying intrinsic and external motivations for pursuing a teaching career.

Enhancing career structures that support progression

Career structures that support progression can help improve teacher supply by making the profession more intellectually and financially appealing for prospective teachers, while also keeping teachers in the profession for longer (McGrath, 2023[17]). Introducing differentiated career paths can offer teachers greater scope for continued professional growth after 15 or 20 years on the job, particularly in systems with flat career structures (OECD, 2019[26]). Limited growth opportunities may otherwise lead teachers to leave the classroom and take up roles in school leadership or education administration, or the profession altogether. Well-designed career structures, by contrast, can increase long-term motivation and retention by providing recognition for good performance, and match individuals to responsibilities that fit their skills and interests. They provide opportunities for roles and responsibilities (Patil, 2023[46]), that make the profession more diverse and attractive (Snoek, Dengerink and de Wit, 2019[47]).

Teachers' careers can offer both vertical and horizonal opportunities for progressional growth. Vertical career paths typically follow a ladder structure, with teachers progressing through formal positions or roles that come with distinct responsibilities and increasing levels of responsibility within the classroom. In contrast, horizontal career paths can allow teachers to focus on areas of expertise, either within inside or outside the classroom, often involving specialisation in a particular aspect of the teaching profession. In such roles, expert and experienced teachers may take on responsibilities such as curriculum or instructional leadership, subject specialists, or mentoring and coaching responsibilities (Wenner and Campbell, 2017[48]).

Ensuring there are other opportunities for teachers to remain in the classroom, while facilitating career growth, are important features of several education systems:

- In **Singapore,** a notable example of how supporting career progression improves retention, teachers can pursue career progression (vertical) and specialisation (horizontal) along a three-track career ladder. Teachers can develop and progress along different fields of excellence: teaching track, school leadership track and senior specialist track. These avenues allow teachers to remain in the classroom and continue their professional growth. A similar three-track ladder exists in early childhood teaching. This enhances the intellectual attractiveness of the profession, allowing teachers to see opportunities for growth, challenge and responsibility.
- In **Victoria (Australia)**, learning specialists are teachers who remain close to the classroom, while being able to share expertise and contribute to professional development within schools. Across OECD countries and economies, similar new instructional specialist and master teacher roles for excellent teachers offer higher remuneration and different responsibilities.
- In **Maryland (United States)**, a "career ladder" allows teachers to take on new responsibilities with increased pay, such as coaching or supervising newer educators and working with student teachers, as their careers progress (University of Maryland, College Park, 2024[49]).

Viewing teachers' and leaders' careers as a continuous learning journey with various avenues for progression and flexibility is important for increasing the intellectual appeal of the profession and retaining teachers for longer (Box 2.2).

Box 2.2. Insights from other professions: Work organisation and flexibility that support retention

Other professions such as healthcare, nursing and care, face similar workforce retention challenges as those in education. Like education, these sectors are addressing the root causes of attrition by improving working conditions, offering mental health and well-being support, and enhancing salaries where compensation is cited as a key reason for leaving. Beyond these traditional approaches, these professions are seeking to innovate in response to a changing world and adopting new approaches to retain their workforce in competitive global markets.

Flexible work arrangements have been embraced across different professions and sectors of the economy, including in public administration, where flexibility is experienced in two ways: adapting working hours, and/or adapting their work location. These arrangements are intended as tools to improve productivity, enhance employee engagement and attract and retain an increasingly diverse public sector workforce (OECD, 2023[45]). Indeed, flexible working is seen as a key advantage in attracting and retaining talent, particularly as workers increasingly seek flexible environments, though sector-specific impacts may vary. While flexible working arrangements can be more easily facilitated given the increased use of blended and online learning, there are further possibilities for flexible working across the various levels of education, for example, with more adaptable schedules.

Education can also look to other knowledge professions for examples of how the work is organised and structured. Workers in these professions were originally defined as "high-level workers who apply theoretical and analytical knowledge, acquired through formal training, to develop products and services" (Drucker, 1959[50]). These knowledge professions, including information technology fields, analysts, design thinkers, lawyers and researchers, typically operate in different structures and conditions to education. They commonly deploy agile teams – small groups of people with complementary but different skill sets who work cross-functionally, in contrast to education where traditionally an individual teacher takes primary responsibility for a class (at school level). These professions also foster collaborative work and encourage degrees of specialisation with the talent pool. Digital technologies and AI solutions are being adopted to support distributed teams in their knowledge creation processes (IBM Education, 2023[51]). This is providing access to information that workers need to generate value, and the sharing and creation of resources (Liu, Gou and Camarinha-Matos, 2020[52]).

Sources: IBM Education (2023[51]); What is a knowledge worker and what do they do? https://www.ibm.com/blog/what-is-a-knowledge-worker-and-what-do-they-do/, Accessed 6 September 2024; Liu, Gou and Camarinha-Matos (2020[52]); Towards Agile Operation for Small Teams in Knowledge Intensive Organizations: A Collaboration Framework; doi://10.1007/978-3-030-62412-, Accessed 6 September 2024.

Reviewing relative salaries and incentives

Relative salaries and incentives can impact the supply of potential teachers, influencing decisions on whether to become a teacher, where to work, and how long to stay in teaching or whether to return to the profession (Santiago, 2002[4]).

According to OECD estimates, teachers' salaries are lower than those of similarly educated workers in almost all countries and economies with available information, although they tend to increase with the level of education (OECD, 2024[25]). For instance, many education systems struggle to recruit teachers in key subject areas such as mathematics, science, or technical skills, where higher salaries are available in the general labour market. Comparatively low salaries are frequently regarded as one of the factors contributing to shortages of qualified candidates for school-level positions. Lower salaries can impede a system's ability to attract high-quality individuals (OECD, 2019[6]).

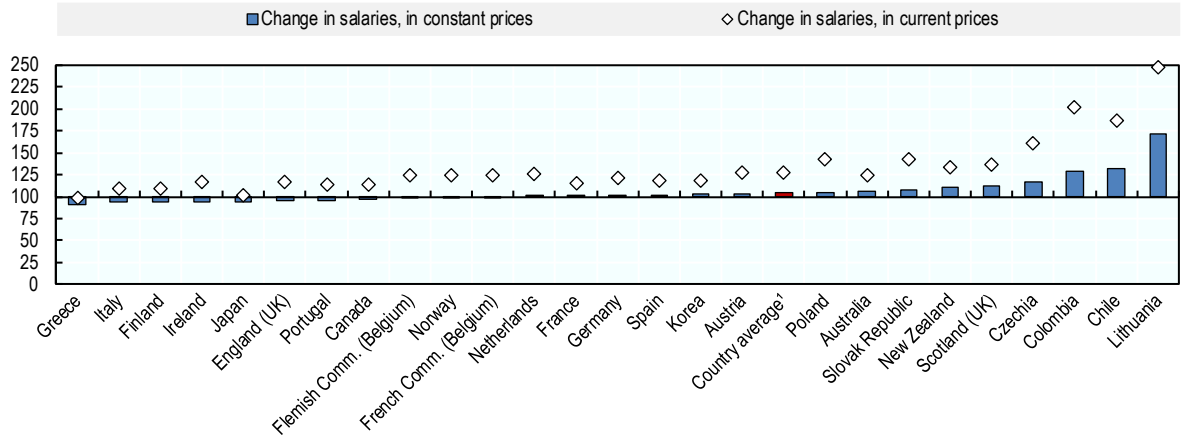
In OECD countries and economies where data are available, teacher salaries have generally remained stagnant over time. Increased teachers' nominal salaries have often failed to translate into real wage gains, as Figure 2.9 shows. However, some education systems have made efforts to increase absolute salaries over time, growing more than 20% in real terms in Lithuania, Chile and Colombia (OECD, 2024[25]).

Reforming teacher compensation can be challenging due to the complexities involved in salary adjustments (OECD, 2019[6]). Policymakers must navigate the lengthy process and associated uncertainties. Compensation reforms take time to impact the workforce, so this policy response should be viewed as part of long-term workforce planning strategy rather than an effective tool for addressing immediate and acute teacher shortages.

While compensation and benefits are important policy levers, there is no one-size-fits-all solution to the design of effective salary scales. Systems must consider their unique economic context, including local labour market conditions, private sector wages, and the scope for competitive starting salaries. Policymakers should also consider how to balance pay rises across a teacher's career and explore performance-based pay differentiation. Higher expenditure on salaries may also reduce the resources available for other areas critical to student outcomes (OECD, 2019[6]).

Figure 2.9. Teacher salaries have remained stable between 2015 and 2023

Index of change in annual salaries of lower secondary teachers with most prevalent qualifications after 15 years of experience from 2015 to 2023 (2015 = 100)



Note: 1. Excludes Australia, Chile and Colombia as data for some years are missing between 2015 and 2023.
The change in constant prices refers to the change in salaries assuming the same level of purchasing power between 2015 and 2023 (that is, in 2015 prices), whereas change in current prices refers to the nominal change in salary amount between 2015 and 2023. Countries and economies are ranked in descending order of the change in salaries in constant prices. See Table D3.6 and Table X2.5 for data and under Chapter D3 Tables for StatLink. For more information see Source section and Education at a Glance 2024 Sources, Methodologies and Technical Notes (https://doi.org/10.1787/e7d20315-en).
Source: OECD (2024[25]), *Education at a Glance 2024: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/c00cad36-en.

In some contexts, monetary incentives have shown promising results for allocating teachers where they are most needed. For example, performance bonuses, recruitment bonuses, loan forgiveness, higher salaries and equitable funding for schools have been found effective for attracting teachers to roles in challenging schools (Education Endowment Foundation, 2023[53]).

Based on the policies identified through the EPO Survey 2024, financial incentives are one of the most common levers used by education systems to distribute teachers to areas of greatest need. For instance:

- In **England (United Kingdom)**, upfront bursaries and early-career retention payments have been introduced for key subjects. Evidence has shown that these incentives positively impact teacher supply overall, with upfront bursaries having a sustained impact on long-term teacher supply (McLean, Tang and Worth, 2023[54]). Early-career retention payments have been also found to reduce the attrition rate of eligible teachers (Sims and Benhenda, 2022[55]).
- In **Australia**, financial incentives for rural and remote teaching positions have been found to improve initial recruitment, but will have less effect on long-term retention unless these incentives are combined with supports such as housing assistance, professional development, and opportunities for career advancement (Lampert et al., 2021[56]).

The effectiveness of financial incentives depends on the design, size and context in which they are applied, such as the general framework for teacher employment and career progression. They may alleviate shortages in rural areas, although incentives can be less effective for more remote locations (Pugatch and Schroeder, 2014[57]). Furthermore, evidence suggests that while financial incentives such as scholarships and grants encourage entry into the profession, they do not always sustain long-term retention (See et al., 2020[58]). It is therefore important that additional supportive measures are considered in addition to these.

Beyond financial reasons, several complex personal and professional factors motivate teachers to teach in certain subjects or locations (Blackmore, Hobbs and Rowlands, 2023[59]). In many OECD countries and

economies, teachers and leaders are civil servants and have a high level of job security or access to benefits like pension programmes, tax exemptions, family allowances and annual leave entitlements that workers in comparable private sector positions do not (OECD, 2019[6]). Professional factors, such as opportunities to take on extra responsibilities and to engage in research and innovation, also need to be considered.

Developing campaigns to improve the status of teaching

Improving the prestige of the teaching profession and its societal value are key factors for attracting a high-quality workforce. However, key indicators suggest there is a fair way to go. Before the pandemic, TALIS 2018 data suggested that teaching was a first career choice for 66% of survey respondents across OECD, but only 26% felt that the profession was valued in society (OECD, 2020[12]).

Enhancing the attractiveness of the teaching profession over the next few years will require education systems to carefully consider the deeper systemic changes that are necessary. These include improvements to working conditions, career prospects, remuneration, recruitment and retention. Policymakers may also need to explore more targeted interventions, including quick wins or "low-hanging fruit" approaches. Many countries and economies are making comprehensive and multi-faceted efforts to increase the attractiveness of the teaching profession and to position teaching as a career of choice.

Amid these efforts, it is crucial to reflect on the narrative that surrounds the teaching profession. Recent research underscores the need for new narratives to make teaching more appealing. In some education systems, existing narratives support the "profession in crisis" discourse, while alternative narratives highlight teachers' job satisfaction and their desire to remain in the field (Towers et al., 2022[60]). Current and emerging initiatives aimed at reshaping these narratives range from promotional campaigns that emphasise the value of a teaching career to support mechanisms that enable candidates to enter initial teacher education.

These campaigns often incorporate elements from behavioural sciences, including social identity nudges (Druckman, 2011[61]) and positive messaging framing (Mols, 2012[62]) to promote the societal impact of teaching. For instance, using language that emphasises shared values and goals between potential teachers and current teachers can encourage individuals who see themselves as part of this group to consider teaching as a career (in-group/out-group dynamics). Additionally, they tap into social proof by employing techniques such as user testimonials and the "wisdom of the crowd" to persuade others to follow suit. Examples of such initiatives include the following (Figure 2.10):

- **England (United Kingdom):** Following a 2018 campaign "Every Lesson Shapes a Life", which established a brand for the teaching profession for the first time, the government has implemented the "Get Into Teaching*"* initiative (UK Government Department for Education, 2024[63]). This multi-channel campaign, coupled with a comprehensive candidate support offer and digital tools, aims to make teaching a career of choice. It also supports candidates in applying for teacher initial education. "Get Into Teaching" is exploring innovative activities to build a pipeline of future interest in teaching, focusing particularly on shortage subjects. This includes offering teaching internships for undergraduates and Master's students in fields like mathematics, physics, chemistry, languages and computing. In early childhood and care, England (United Kingdom) has also launched the "Do Something Big" national marketing campaign (UK Government, 2024[64]).
- The **Flemish Community of Belgium:** The "Teaching Is Giving Everything" (Departement Onderwijs en Vorming, 2024[65]) campaign facilitates information and shares stories that aim to elevate and enhance the status of the teaching profession. The campaign highlights the many benefits of teaching, including the satisfaction in witnessing students' growth and achievements, as well as attractive employment conditions such as competitive salaries, internet allowances, vacation periods, and, if permanently employed, job security and government pensions.

- The **French Community of Belgium:** The "Teaching, more than a profession" campaign aims to value and promote the teaching profession. It aims to deconstruct preconceived ideas about teaching and highlight the positive impact that teachers have on the lives of their students. It presents teaching as an enriching profession, carrying a deep meaning and offering many opportunities for personal and professional development (Fédération Wallonie-Bruxelles, n.d.[66]).
- **Singapore:** The Ministry of Education adopts a broad approach in promoting the value and significance of teaching (Singapore Ministry of Education, 2024[67]). It uses various media and platforms to show teaching as an attractive career, focusing on informing prospective candidates about the profession's value and the wide range of professional opportunities in education. While attributing specific outcomes to these campaigns is challenging due to the interplay of multiple initiatives, Singapore continues to attract high-quality candidates and maintains high teacher retention rates. This success reflects a high societal value placed on the teaching profession.
- **Australia:** The federal and state and territory governments have introduced a joint initiative which aims to showcase the value and importance of teachers, and encourages the public to consider a career in teaching (Australian Government, 2024[68]). It is part of an AUD 10 million national campaign that celebrates and showcases the work of teachers, as well as the opportunities a career in teaching brings. The initiative encompasses a range of videos and stories from teachers in the profession that share why they choose to teach, their inspirational stories, and the lasting impact they have had on their students.

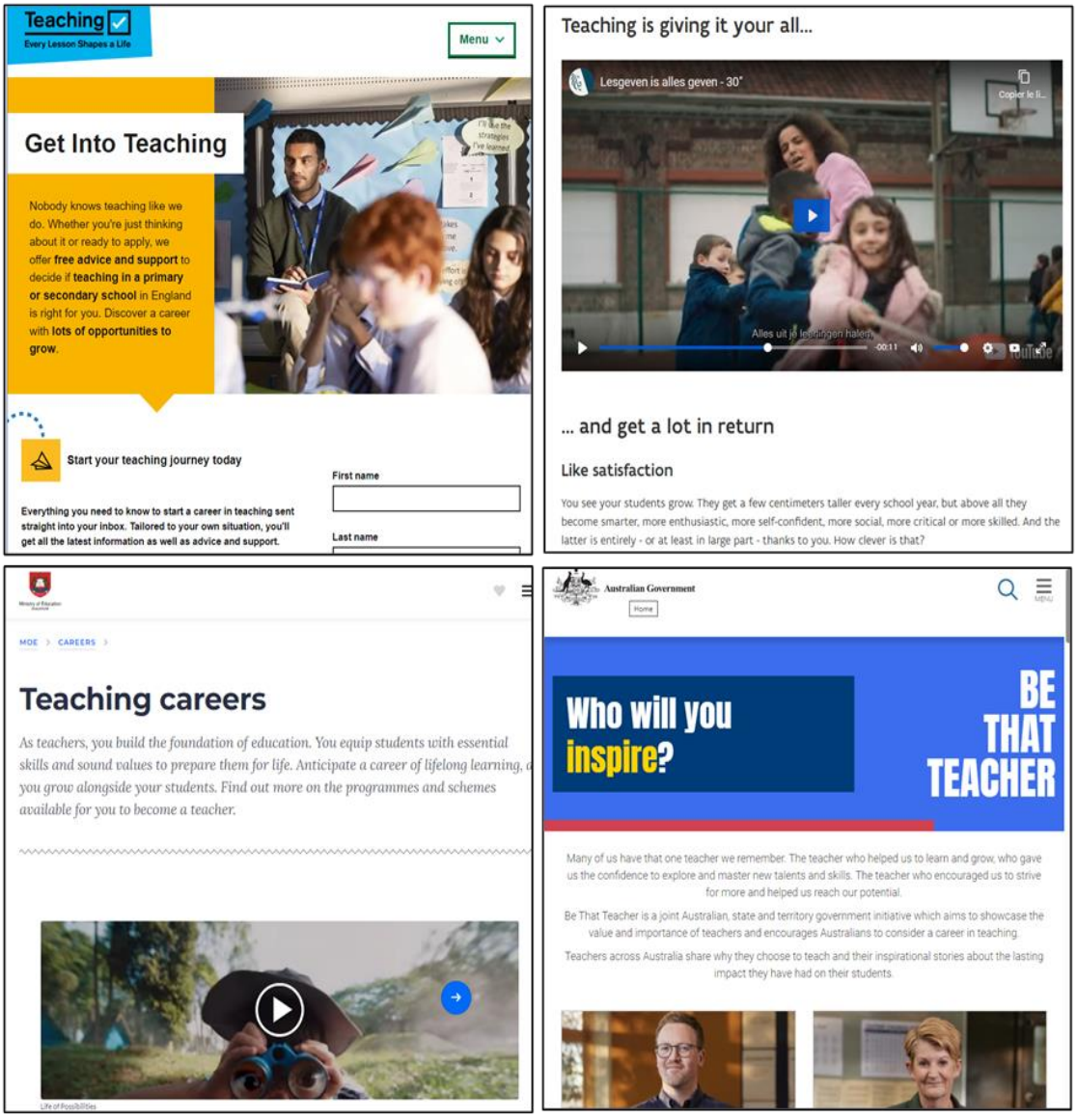
Simplification and commitment nudges are powerful tools that reduce the cognitive load and friction associated with decision-making (John and Blume, 2018[69]), making it easier for individuals to take desired action (Luo et al., 2021[70]). The "Get Into Teaching" campaign in England (United Kingdom) is an example of this approach. It simplifies the application process through multi-faceted candidate support and digital tools. The campaign's continuous presence across media reinforces its message, encouraging individuals to commit to teaching. Furthermore, the introduction of teaching internships in shortage subjects facilitates low-risk entry points, particularly for undergraduates and Master's students, making it easier for them to commit to a teaching career.

Similarly, the Flemish Community Belgium's "Teaching is Giving Everything" appears to effectively use the principle of reciprocity by proxy – it suggests that people feel a sense of obligation to give back or respond in kind when they receive something valuable, even indirectly (Goldstein, Griskevicius and Cialdini, 2011[71]; Oliver, 2019[72]). By highlighting the personal rewards teachers receive, such as job satisfaction, flexibility, and attractive employment conditions, the campaign appeals to the intrinsic motivations of potential teachers. Additionally, the campaign makes a strong use of narratives and testimonials, thus encouraging them to view teaching as a desirable and achievable career path. According to the social identity theory, people are more inclined to enter a profession when they see relatable and aspirational figures within it.

Singapore's approach to promoting the teaching profession relies on the concept of high societal respect for teachers. By consistently reinforcing this message, the Ministry creates an authority nudge, and this nurtures a bandwagon effect – where popular opinions become more popular (Farjam, 2020[73]). The broader institutional framework for teachers in Singapore supports this approach, which amplifies the effectiveness of these nudges.

Indeed, overall, these campaigns reflect a sophisticated understanding of behavioural science on the use of nudges to enhance the attractiveness of the teaching profession. However, the long-term success of these efforts will depend on their integration with broader systemic changes. Without addressing underlying issues such as working conditions, reward and recognition, pay, and opportunities for career progression, these campaigns will be limited in their long-term effectiveness.

Figure 2.10. Developing new narratives for the profession – Examples of campaigns online



Source: UK Government Department for Education (2024[63]), Get Into Teaching, https://getintoteaching.education.gov.uk/; Departement Onderwijs en Vorming (2024[65]), Lesgeven is alles geven, https://www.vlaanderen.be/lesgeven-is-alles-geven; Singapore Ministry of Education (2024[67]), Teaching careers, https://www.moe.gov.sg/careers/become-teachers; Australian Government (2024[68]), Be That Teacher, https://www.bethatteacher.gov.au/ (accessed on 17 September 2024).

The success of these campaigns will also depend on the broader societal narrative around teaching and whether candidates see that the reality of the profession meets the expectations set by the campaigns. Finding more mechanisms to meaningfully reward and recognise excellence, particularly in complex environments, can also contribute towards broader messaging that raises the status of the profession, creating a more positive cycle of attracting and retaining teachers.

Some strategic considerations based on the views from participating education systems

Drawing from the analysis in this chapter, education policymakers may consider the following steps as they strive to balance teacher demand and supply in the context of global changes, including demographic shifts:

1. **Increasing the pool of teachers approaching teaching as a dynamic profession.** Approaching teaching as a dynamic profession is essential. Expanding the teacher workforce requires flexible strategies that adapt to their changing needs. Policymakers can reduce barriers to entry by providing alternative certification pathways, such as fast-track programmes for career changers or returning professionals. Additionally, reaching out to former teachers and exploring incentives and mechanisms for their return could help address teacher shortages while benefiting from the new potential skills they bring back. In the same way, encouraging diverse recruitment, including underrepresented groups, can help meet demand in a more sustainable way.
2. **Deeply rethinking how best to allocate teachers.** The mismatch between teacher supply and demand is a challenge for education systems, particularly as ageing populations and lower fertility rates reshape the workforce, along with other demographic shifts. At the same time, this context provides an opportunity to rethink how, when, and what teachers do in their practice. The traditional concept of the isolated teacher in one classroom is becoming outdated. Education systems can embrace more collaborative approaches, helping teachers develop synergies with their peers in team-based structures. These models can allow teachers to share expertise, differentiate roles, and better meet the specific needs of their schools.
3. **Making teaching an attractive profession while considering changing demographics.** Career structures, salaries and incentives, and professional development opportunities, will need to increasingly cater to both older and younger teachers while balancing budgetary and broader systemic constraints. Supporting and engaging older teachers as lifelong learners, while attracting younger cohorts that benefit from their peer's experience, will be important. For this, developing a shared narrative that highlights teaching as a dynamic profession, along with the value and societal impact of teaching, and ensuring this narrative aligns with their daily experiences, can further enhance the appeal of the profession to attract candidates.

Table 2.1. Overview of figures in Chapter 2

Figure	Title	Source
Figure 2.1	Priorities for attracting teachers by policy area (2025-30)	EPO Survey 2024
Figure 2.2	Priorities for attracting teachers by education level (2025-30)	EPO Survey 2024
Figure 2.3	Priorities for retaining teachers by policy area (2025-30)	EPO Survey 2024
Figure 2.4	Priorities for retaining teachers by education level (2025-30)	EPO Survey 2024
Figure 2.5	Organising framework for teacher supply and demand and this section	(Santiago 2002)
Figure 2.6	Working in more than one school has no clear link with teacher well-being and stress levels	TALIS 2018
Figure 2.7	Full-time teachers tend to report higher job satisfaction levels than part-time teachers in most OECD education systems	TALIS 2018
Figure 2.8	Teachers spend most of their time on non-teaching tasks and responsibilities	Education at a Glance 2024
Figure 2.9	Teacher salaries have remained stable between 2015 and 2023	Education at a Glance 2024
Figure 2.10	Developing new narratives for the profession – Examples of campaigns online	Ministries of Education

StatLink https://stat.link/5sky2a

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3 Supporting teaching quality in changing contexts

Technological advancements, including Artificial Intelligence (AI), and broader socio-economic changes are reshaping societies. Education systems and teachers now face a dual challenge: preparing learners for future demands while continuously adapting to the evolving opportunities and uncertainties brought by new technologies. This chapter provides related guidance for policymakers, outlining key policy levers that can enhance teaching quality in contexts of technological change. It explores strategic responses for improving teaching practices and professional development at three levels: teacher, school, and system.

In Brief

Policy responses to support teaching quality in changing contexts

This chapter addresses how education systems can strategically support teaching quality amidst the complex challenges and opportunities presented by digital transformation and AI integration.

According to responses to the *Education Policy Outlook National Survey for Comparative Policy Analysis 2024* (EPO Survey 2024), harnessing the potential of digital technologies to improve teachers' professional learning is less of a priority across education ministries than using them to directly support student learning. In addition, a comparatively lower share of education ministries prioritises supporting policies that encourage teachers to adopt evidence-informed practices.

To support teaching quality in a context of change and disruption, relevant areas of policy action at the teacher level include rethinking the structure of teachers' workloads, integrating digital technologies to expand the pedagogical toolkit, and supporting evidence-informed practices to enrich teaching. At school level, teaching quality is informed and strengthened by strong relationships with colleagues and other partners, including from beyond the school walls. Relevant areas of action at system level include ongoing professional development that locates teachers' learning as close to their classroom practice as possible, and formative teacher appraisal that helps identify individual teachers' development needs. Key policy responses explored further in this chapter at each of these levels are the following:

Teachers: Supporting teachers to develop their use of evidence and technology is essential for effective teaching in digitally enhanced environments. Policy responses analysed in this chapter focus on:

- Helping manage teacher workloads to create space and time for teachers to experiment with their practice and new tools available to them, including through the support of AI (Australia, Chile, Singapore, Sweden and England (United Kingdom));
- Enhancing teaching with technology and AI (Chile, Denmark, Korea, Singapore and Spain), and;
- Engaging with research to experiment with practice (Brazil, Germany, New Zealand, Sweden and Türkiye).

Schools: Effective teaching is driven not only by individual teacher capabilities but also by the collaborative environments in which they work. The policy responses in this section focus on:

- Working with champion teachers and institutions (Finland, Korea, the Netherlands, Norway, Portugal, and England and Wales (United Kingdom)), as well as;
- Partnerships between educators, researchers, and EdTech developers to co-design digital tools that meet teachers' needs (Ireland, Korea, Lithuania, the Netherlands and Sweden).

System: Supporting improvement and inspiring change through leaders of learning at system level matters too. In this section, the policy responses analysed focus on:

- Fostering mentoring, coaching and professional learning communities systems to support both novice and experienced teachers (Australia, Austria, Brazil, Ontario (Canada), Chile, Iceland, Singapore, England (United Kingdom), and the United States);
- Diagnosing teachers' development needs (Austria, Flemish Community of Belgium, Alberta (Canada), Estonia, Finland, Japan, Singapore, and Wales (United Kingdom).

Introduction

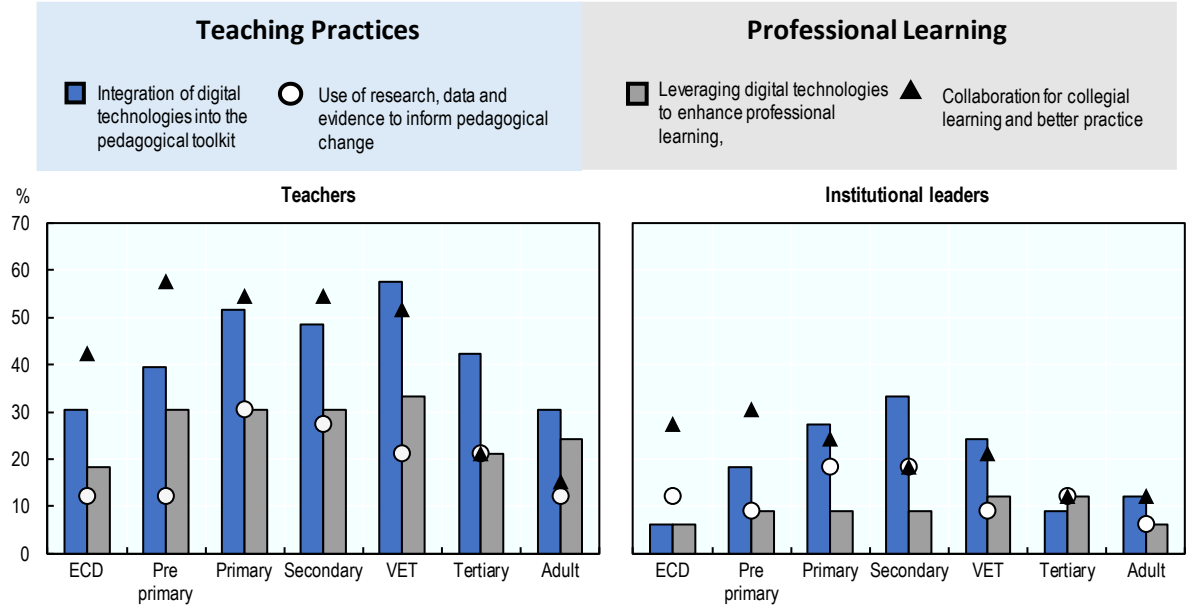
While addressing teacher shortages is a crucial challenge (see Chapter 2), it is equally essential to ensure that current teachers are supported to deliver high-quality teaching and adapt effectively within rapidly changing technological landscapes.

Insights from the EPO Survey 2024 highlight policy efforts at the teacher, school, and system levels. These efforts span traditional support measures – such as managing teacher workloads and assessing development needs – to more forward-looking strategies, including enhancing pedagogical practices with AI and fostering cross-sector collaboration with industry and research to integrate AI in classrooms effectively.

In the EPO Survey 2024, education systems outlined policy priorities for strengthening teaching practices and professional learning from 2025 to 2030 within a rapidly evolving technological landscape. Survey responses reflect a widespread focus among education ministries on fostering a collaborative teaching profession, particularly at early educational stages. However, there is a noticeably greater emphasis on integrating digital technologies to support student learning than on leveraging these tools to enhance teachers' own professional development (Figure 3.1).

Figure 3.1. Adopting digital technologies to support teaching quality compared to other priorities for 2025-2030 (2024)

Policy areas considered to be of "high" or "very high" importance for strengthening teaching practices and professional learning (n=33)



Note: 1. Early childhood educational development (ECD) refers to programmes at ISCED level 01. 2. Vocational education and training (VET) refers to programmes at ISCED levels 2-5. Based on the responses of 33 education systems to the following question: *"In your country/jurisdiction, for which education levels are the following areas of policy for strengthening teaching practices and professional learning considered as being of "high" or "very high" importance for attention in the next five years (2025-30)?"*. Respondents were restricted to selecting a maximum of three priority areas per education level.
Source: OECD (2024[1]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024.

This disparity represents a key missed opportunity, as AI technologies offer considerable potential for advancing professional learning. Applications range from more authentic-feeling simulations (Markel et al., 2023[2]) to virtual coaching and mentoring that provide tailored feedback (Neumann et al., 2021[3]), and enhanced data collection and analysis to gain better insights into teacher development (Salas-Pilco, Xiao and Hu, 2022[4]).

A notably low proportion of education systems also reported active initiatives to enhance teachers' and leaders' use of research, data, and evidence to drive pedagogical and institutional change. This is surprising given the recent policy focus on evidence-informed teaching practices (OECD, 2022[5]) and the growing recognition that while understanding "what works" in education has increased, translating this knowledge into effective practice remains a challenge (Gorard, See and Siddiqui, 2020[6]). Policymakers and teachers often underutilise the knowledge at their disposal, not from a lack of interest but due to gaps in structures, mechanisms, and a culture that supports evidence-based practice (Gorard, See and Siddiqui, 2020[6]). For evidence-informed innovation in teaching practices to flourish, policy efforts must address these foundational challenges.

Policy context

The 2022 OECD Ministerial Declaration on Building Equitable Societies Through Education represents a collective commitment by OECD education ministers to reimagine education. This pledge includes ambitious goals: "to create and realise a bolder vision on leveraging spaces, time, technology, and human resources for more effective and inclusive learning" and to "acknowledge and address the evolving roles of education professionals, developing policies that empower them" (OECD, 2022[7]). Despite pressing challenges such as teacher shortages and workforce demands, OECD education systems are urged to maintain momentum on these essential commitments.

Findings from the EPO Survey 2024 indicate that governments place less emphasis on AI-enhanced professional learning for teachers than on AI applications for student learning – a pattern that aligns with broader trends. A review of policy guidance documents shows that while AI integration to support student learning is well-represented, few documents consider AI's role in advancing teachers' professional development (see Annex B). This suggests a pressing need for strategic planning on digital technology adoption that equally enhances outcomes for both students and teachers. Furthermore, in EdTech too, investment in technology that supports teachers, including their professional development, makes up only a fraction of the total market. For example, less than 5% of Europe's 200 most promising EdTech startups in 2024 focused on teacher support (HolonIQ, 2024[8]). Similarly, in academia: a recent systematic review of research into AI adoption in higher education revealed that only 17% of the 138 studies considered had teaching staff as the intended users of AI for learning (Crompton and Burke, 2023[9]).

The integration of digital technologies in education stands at a critical juncture. Transactional approaches have often led to high resource investment with limited educational impact in student outcomes (see Chapter 1). Going forward, it is essential that decisions regarding digital technology adoption in classrooms balance educational value with broader cost-benefit considerations. Education systems must strategically embrace the complementarity between evidence-informed methods and technologically enhanced practices to drive meaningful transformation in teaching.

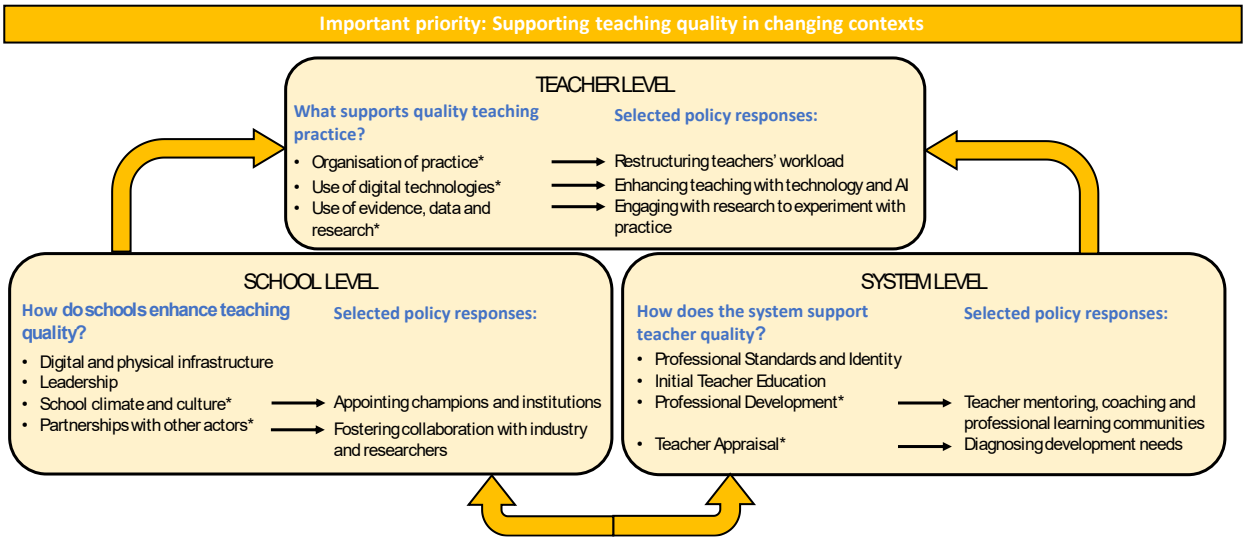
Achieving this balance, however, is challenging. Rapid global changes continually introduce new complexities into teaching and learning processes. Digital technologies exemplify this issue: swift innovation and gaps between research, industry, and classroom practice mean that educational policies must often operate under conditions of uncertain cost-effectiveness regarding new methods' educational value. By bringing teachers closer to evidence generation and empowering them as experimenters and digital innovators in their classrooms, education systems can more effectively support the translation of knowledge into improved practice. Policy plays a crucial role in fostering teaching quality that adapts to

rapid technological advances, especially developments in AI. In 2023, the OECD and Education International issued guidelines on the effective and equitable use of AI in education, underscoring the importance of granting teachers the agency needed to critically engage with digital technologies (OECD, 2023[10]). Building on this foundation, the following analysis explores policy responses that aim to empower teachers to adopt an evaluative mindset, enabling them to experiment responsibly with AI to provide high-quality, evidence-informed, and technologically enhanced teaching.

Policy responses

How can policy strategically support the continuous enhancement of teaching quality in the years ahead? In a rapidly evolving technological landscape, education systems must equip teachers to better navigate the opportunities, challenges, and uncertainties of this context. This calls for policies that empower teachers to take a leading role in applying evidence-informed practices, particularly in the use of AI and other digital technologies. Figure 3.2 provides an overview of key areas of action for policymakers focused on nurturing teaching quality. Drawing on responses from the EPO Survey 2024 and additional desk-based research, it also summarises specific policy responses aimed at promoting evidence-informed and technologically enhanced teaching practices in today's classrooms. Each of these policy responses is explored further in the following sections of this chapter.

Figure 3.2. Areas of action and policy responses for enhancing quality teaching in changing contexts



*Policy areas of action covered in this chapter.

Note: This diagram builds on a conceptual framework for managing teacher demand and supply published in Santiago (2002[11]), *Teacher Demand and Supply: Improving Teaching Quality and Addressing Teacher Shortages*. It isolates the elements of that framework specifically related to teaching quality, updating areas of action based on developments in education research and digital technologies in the intervening period. The selected policy responses have been identified and added based on responses to the OECD (2024[1]), *Education Policy Outlook National Survey for Comparative Policy Analysis 2024* and additional desk-based research.

In education systems that prioritise agency and professionalism, enhancing teaching quality begins with empowering teachers themselves. This entails giving them the time, space, tools, and mindset required to continuously enhance their everyday practice. Key areas of action include rethinking the structure of teachers' workloads, integrating digital technologies to expand the pedagogical toolkit, and supporting evidence-informed practices to enrich teaching.

Teacher-level actions alone are insufficient to foster high-quality practices that respond effectively to rapid technological changes in every classroom. High-quality teaching is shaped by the broader school and system environments in which they work; policymakers must therefore consider complementary actions at these levels to create an integrated support structure for teaching quality.

At school level, teachers' professional judgement is informed and strengthened by strong relationships with colleagues and other partners. Schools therefore have a critical role to play in enhancing teaching quality through nurturing a collaborative school climate and fostering partnerships beyond the school walls with other actors with relevant expertise. Beyond these areas, other key school-level actions that policymakers can consider when addressing teaching quality include supporting school leadership (see Pont, Nusche and Moorman (2008[12]) and enhancing physical and digital infrastructure or resources (see OECD (2018[13]; 2023[14]).

System-level policy actions are important for aligning the efforts of individual teachers and school teams into a cohesive approach. These actions can help education systems to drive progress at scale and towards clear strategic goals. Relevant areas of action in times of rapid change include ongoing professional development and formative teacher appraisal. In both cases, school-embedded approaches that bring system structures for teaching quality as close as possible to the everyday work of teachers are particularly impactful. School and system-level actions are thus mutually reinforcing. Other policy areas that support teaching quality at system level are professional standards and identity (see Guerriero (2017[15])) and initial teacher education (see OECD (2019[16])).

This section outlines policy efforts across three levels – teacher, school, and system – each of which plays a vital role in supporting teaching quality. By addressing these interconnected levels, policymakers can build a robust framework that supports teachers' ability to adapt, innovate, and excel in an evolving educational landscape.

Teacher level

Policy responses

This section outlines strategies to support teaching quality at teacher level, by focusing on:

- **Restructuring teachers' workload:** Leveraging AI tools to streamline non-core tasks, incorporating workload considerations in policy processes and regularly reviewing workloads to also identify effective support measures.
- **Enhancing teaching with technology and AI:** Establishing structures that work directly with teachers to foster pedagogical innovation and developing national strategies that support teacher-led AI integration.
- **Engaging with research to experiment with practice:** Empowering teachers to engage critically with research, also encouraging adaptive and experimental approaches to pedagogical practice informed by high-quality evidence.

Prescribing changes in teaching practice may help teachers do things better, but it rarely gets them doing better things. Such approaches also tend to overlook practices that they should stop doing. To foster a professional culture in which teachers proactively adapt practice in evolving educational contexts, policy must provide teachers with the time, space, and resources needed to experiment in real-world setting, taking full advantage of the tools and knowledge available. It also needs to support them to develop an evaluative mindset, through which teachers engage in deeper and sometimes more critical enquiry processes, are prepared to question the status quo, and view failure as a necessary part of the learning process (Golden, 2020[17]). The three sections that follow offer related policy responses.

Restructuring teachers' workload

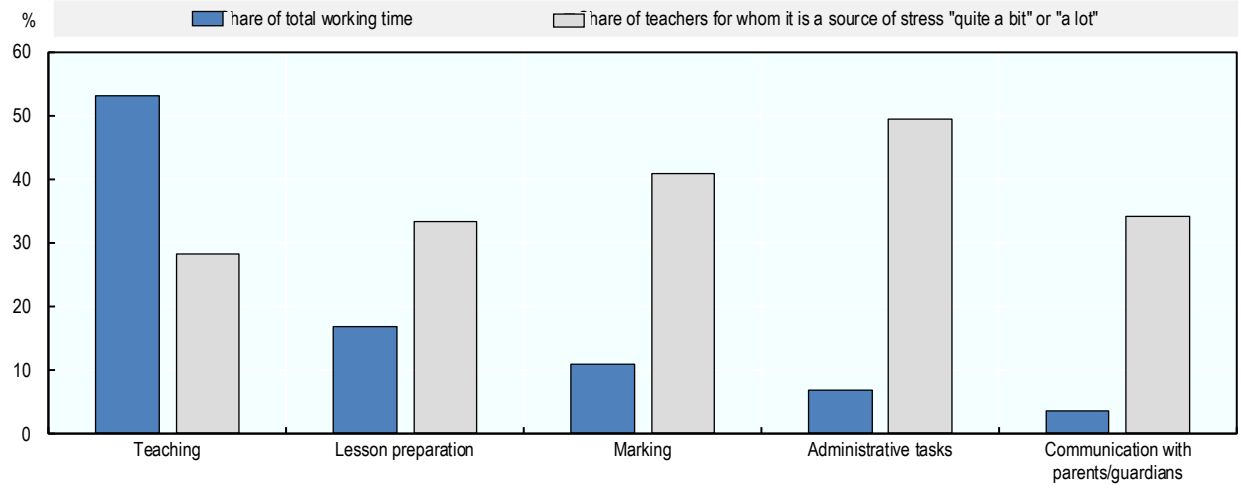
Teachers across OECD countries and economies face significant workload pressures (OECD, 2020[18]), compounded by the need to make rapid, high-stakes decisions in dynamic educational settings (Creagh et al., 2023[19]). Such demands are linked to elevated stress levels, affecting teachers' work-life balance and increasing their risk of burn out (Bakker et al., 2007[20]; Collie, Shapka and Perry, 2012[21]; Klassen and Chiu, 2010[22]). Over-burdened or highly stressed teachers are more likely to resort to habit dependency in the classroom and routine procedures at school level that push out innovation (Wotherspoon, 2008[23]). In addition, workload erodes job satisfaction, elevating the risk of attrition and reducing the attractiveness of the profession (OECD, 2020[18]).

Research consistently shows that increasing teacher workloads are largely driven by an expansion of "non-core" tasks within teachers' work (Creagh et al., 2023[19]). Indeed, in many countries and economies, statutory teaching hours amount to less than half of total working time: in 2023, on average across the 23 OECD education systems with available data, 58% of upper secondary teachers' working time was spent on non-teaching activities. Many of these activities – such as professional development and teamwork with colleagues – can enhance the quality of practice. Other tasks, such as communication with parents, acting as a class or form teacher and engaging in extra-curricular activities, help build stronger relationships with students, a key factor in quality education outcomes (OECD, 2024[24]).

Effectively managing teachers' workloads requires a balanced approach that prioritises time for quality teaching while safeguarding teachers' mental health and work-life balance. Some might think that one option is to reduce teaching hours. OECD data indicates that teaching hours declined between 2013 and 2023 in 18 out of 34 education systems with available data (OECD, 2024[25]; 2020[26]). However, reducing teaching hours can be difficult to implement in workforce shortage contexts and may be an overly simplistic solution to managing teaching workloads. Insights from the OECD's Teaching and Learning International Survey (TALIS 2018) indicate that time spent on teaching tasks is a less strong contributor to teacher stress compared to other factors. In contrast, administrative tasks and non-core responsibilities, such as communication with parents and paperwork, have a significantly larger impact. Therefore, targeted reductions in non-teaching tasks, rather than teaching hours, could be more efficient in reducing stress and improving teaching quality (OECD, 2020[18]) (Figure 3.3).

Figure 3.3. Teachers experience higher stress at work in non-teaching tasks (2018)

Teachers' working tasks by share of total working time and share for whom it is a source of stress



Note: OECD average-31.
Source: OECD (2020[18]), *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, TALIS, OECD Publications, Paris, https://doi.org/10.1787/19cf08df-en.

AI and digital technologies hold significant potential for alleviating non-teaching tasks, such as marking, administration, and communication with parents. By leveraging these technologies, education systems can reduce the administrative burden on teachers, as highlighted in Figure 3.3. Research shows that Large Language Models (LLM) can improve marking efficiency, reduce associated costs, and decrease grading bias (Li et al., 2024[27]). International data indicates that AI technologies could help teachers reallocate half of the time currently spent on administrative tasks like form filling, emailing, and resource planning (Bryant et al., 2020[28]). Additionally, AI can promote cooperative and student-centred learning, which has been linked to increased job satisfaction and self-efficacy (Anton and Van Ryzin, 2024[29]).

Policy efforts focusing specifically on leveraging AI technologies to reduce workload are nascent. Some early measures across OECD countries and economies and beyond include:

- In 2023, **Singapore** launched two Learning Feedback Assistants. The Language Feedback Assistant for English provides basic feedback on students' spelling and grammar. Teachers are then encouraged to build on this by engaging in the more complex aspects of written language, such as creative expression and tone. The Short Answer Feedback Assistant provides suggested grades and auto-generated content-related feedback for close-ended, short answer questions for all subjects and grade levels. This allows teachers to more quickly check students' knowledge and understanding, generating a first draft of grades and comments that they can then edit and build on (Ministry of Education, 2023[30]).
- **England (United Kingdom)** recently announced funding for a project to create a data pool of previously published government documents including curriculum guidance, lesson plans and anonymised pupil assessments. This will be made available to selected AI companies, specialising in developing tools that help teachers mark work, create teaching materials, and assist with routine school admin. These companies will be able to use the data to train their tools (Department for Education, 2024[31])
- Of 28 high-level policy guidance documents related to the use of AI in education analysed for this report (see Annex B), 17 reference the potential of AI to reduce teacher workload or make certain tasks more efficient. Common ideas include using AI tools for lesson preparation and resource creation, including differentiation by student needs; AI assistants to take on administrative tasks or provide straightforward support to students; AI technologies that can help with marking or grading, when appropriate; and AI-enhanced communication tools that facilitate interactions with parents or students. A small number of these documents also emphasise that AI-supported workload reduction can only have impact if systems avoid a situation in which AI development simultaneously adds to workload or responsibilities in other areas, and if time gained can be dedicated to enhanced practice (U.S. Department of Education, Office of Educational Technology, 2023[32]; European Commission, 2022[33]).

These efforts to leverage AI specifically build on broader approaches to workload reduction that have emerged across a wider group of OECD education systems in recent years. The OECD has previously identified the following approaches to helping teachers make the most of their working time: 1) balancing policy frameworks that regulate time use while supporting school-level flexibility to respond to changing needs; 2) building a common understanding of teachers' core tasks and broader priorities that optimise their time; 3) fostering collaboration with other staff in schools who can relieve some of the burden of non-teaching tasks (Boeskens and Nusche, 2021[34]).

In relation to the first approach, a few countries and economies are including workload considerations in policy processes:

- **Australia** is in the process of developing a Teacher Workload Impact Assessment. All new initiatives related to the teacher workforce will be reviewed before they can be implemented.
- **England (United Kingdom),** through a commitment in the Education Staff Well-being Charter (2021), has pledged to embed teacher and leader workload reduction into all educational policy development and delivery.

Policy efforts in recent years indicate that some countries and economies have also been implementing efforts related to the second approach, in particular through reviewing teacher workloads and developing related guidance for teachers and schools. This includes:

- In 2023, **Chile** published a Guide to Well-being and Workplace Health for Educational Teams following growing concerns about teachers' mental health following the COVID-19 pandemic. Workload is identified as a key risk factor. Related guidance includes better defining roles and responsibilities within schools and fostering collaborative professionalism (Ministry of Education, 2023[35]).
- A national inquiry in **Sweden** has been tasked with proposing measures to reduce administrative tasks for teachers to make more time available for planning and teaching activities, with recommendations due in March 2025 (Ministry of Education, 2023[36])
- **England (United Kingdom)** established three Workload Review Groups in 2016 which published recommendations to increase efficiency in lesson planning, marking and data management. From this, the Workload Reduction Toolkit supports schools to identify and address workload issues and assess the impact of related strategies. Research into related efforts in 80 schools found that teachers' weekly working time was reduced by round 1.5 hours (more when controlling for the impact of COVID-19) and the more aware staff were of the Toolkit, the greater the reduction. Efforts to reduce workload were associated with improved teacher well-being, which was in turn linked to higher student attainment. Key success factors included assigning responsibility to someone for implementing related efforts, using technology to automate data management processes and prioritising teacher-designed interventions (Churches and Fitzpatrick, 2023[37]; OECD, 2021[38])

Except for efforts in England (United Kingdom), there is so far little evaluative evidence regarding the impact of policy initiatives that seek to reduce teacher workload. However, a systematic review by Creagh et al. (2023[19]) suggests that policymakers should also consider teachers' subjective experiences. Teachers' perceptions of heavy workloads often result from a disconnection between the kind of teacher they want to be and the teacher they have time to be. In addition, the intensification of teachers' work is frequently tied to broader policy shifts towards accountability and performativity.

Similarly, viewing AI as a silver bullet for reducing teachers' administrative burden is overly simplistic. In fact, there is a real risk that such efforts could inadvertently increase perceived workloads. Research has shown that digital technologies can heighten symptoms of exhaustion, anxiety, and perceived stress among teachers (Fernández-Batanero et al., 2021[39]). Moreover, reducing time spent on administrative tasks will only support quality teaching if the time gained is sufficient for teachers to engage in activities that directly improve practice. Thus, workload reduction efforts alone are unlikely to lead to higher teaching quality.

Enhancing teaching with technology and AI

Recent advancements in AI present new opportunities to enhance teaching quality, particularly through personalised teaching and learning. AI's ability to interpret data patterns – such as student comprehension levels or common errors – enables it to suggest next steps and offer corrective guidance that can improve learning outcomes. Additionally, through continuous engagement in the learning and thinking process, AI evaluates the outcomes of prior strategies and generates new, refined approaches (Hwang, 2022[40]).

Intelligence tutoring and adaptive learning systems build on these capabilities to assess individual students' mathematical understanding and learning preferences, providing personalised feedback and instruction at the student's pace (Hwang, 2022[40]). Meta-analyses indicate that the tools have a small but statistically significant effect on mathematics performance among primary school students. For older students, they have been shown to lead to higher learning outcomes compared to teacher-led, large-group instruction, non-AI computer-based instruction, and traditional textbooks or workbooks. However, there was no significant difference in outcomes when compared to human-led individualised tutoring or small group instruction (Ma et al., 2014[41]). Generative AI also has a demonstrated impact on learning outcomes among older students through targeted tutoring, data analytics and learning pattern recognition (Sun and Zhou, 2024[42]).

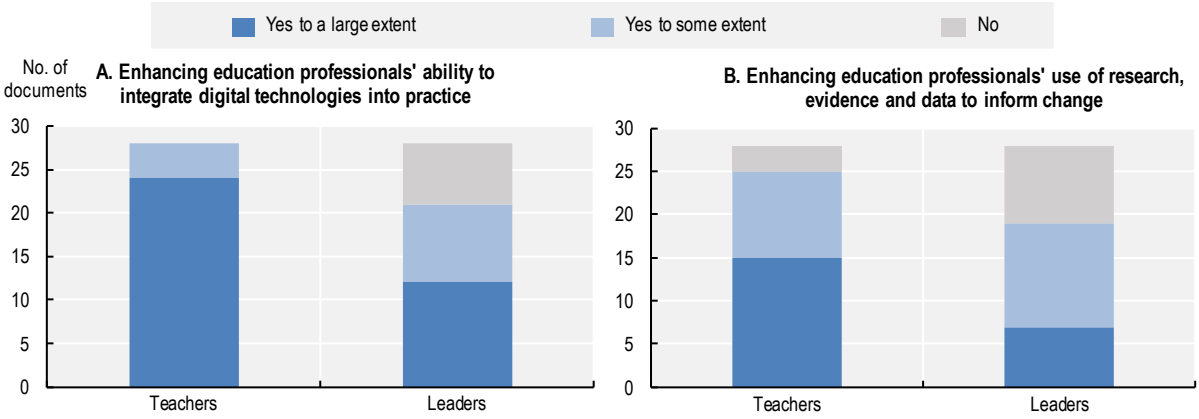
However, the pedagogical benefits of digital technologies, including AI, cannot be realised without carefully designed, implemented, and evaluated digital education reforms. Initiatives that simply expand access to digital devices often fail to improve student performance. For technology to add pedagogical value, teachers must know how to implement it effectively. This need is increasingly relevant as new technologies such as AI and smart technologies are best understood as socio-technical systems that require human-technology collaboration (OECD, 2023[43]). Research indicates, for example, that the quality and quantity of the teacher's instructional support are the most significant factors mediating AI's capacity to enhance student learning outcomes (Alharbi, 2023[44]; Blake, 2016[45])

It is essential that teachers are not only equipped with digital devices and skills, but also develop a deep understanding of the added pedagogical value these technologies can bring. This understanding empowers them to implement technology in ways that enhance student learning and encourages critical reflection on the most appropriate ways to use technology – and, indeed, when it may be best not to use it (OECD, 2024[46]). Teachers benefit from having time, space, and resources to experiment with digital tools, as well as support in developing an evaluative mindset. Such a mindset enables them to explore the integration of digital technologies critically, informed by both practice-based evidence from their peers and broader research and data.

In integrating cutting edge technologies, many education systems recognise the benefit of promoting evidence-informed innovation. Analysis conducted for this report of 28 high-level policy guidance documents on AI in education reveals that 26 documents advocate for enhancing teachers' use of research, evidence and data on AI and digital technologies, with 16 of them doing so to a large extent (Figure 3.4). Cited strategies include supporting teachers and leaders to pilot AI applications at classroom and institutional level; encouraging active collaboration between researchers, developers and practitioners; and ensuring careful monitoring and evaluation to weigh up the value and trade-offs of AI.

Figure 3.4. Most countries and economies report promoting an evidence-informed use AI in education (2024)

Policy areas addressed in high-level guidance documents for using AI in education



Note: Based on analysis of 28 high-level guidance documents from 26 education systems (Australia; Austria; the Flemish and French Communities of Belgium; Bulgaria; Quebec [Canada]; Chile; Croatia; Czechia; Denmark; Estonia; European Commission; Germany; Japan; Korea; New Zealand; Norway; Poland; Spain; Sweden; Türkiye; California, Federal; Oregon, Washington [United States]; England [United Kingdom]). The documents were prepared or commissioned by education authorities. Document types include frameworks, guidelines, norms or principles, recommendations and visions or position papers. Documents were identified through desk-based analysis conducted in May and June 2024 and consultations with countries and economies up to October 2024.
Source: For the list of documents consulted, see Annex B.

Several education systems have been working to foster teacher-led integration of digital technologies. One approach has been establishing dedicated structures that work directly with teachers to promote pedagogical innovation:

- The Centre for Innovation within **Chile**'s Ministry of Education aims to strengthen the innovation capacity of the education system. Reflecting this organisationally, a team for technological innovation works alongside a much larger team for pedagogical innovation. The Centre's Innovation Network for Educational Transformation (2022) was established to strengthen professional collaboration and learning among educators and schools and help scale-up good practice in digital and pedagogical innovation. In 2022, the Network ran a national campaign to highlight and learn from innovative approaches developed during the period of the pandemic and post-pandemic recovery. The Network organised in-person and online workshops at both regional and national level through which education actors were invited to share and explore examples of innovation. On an ongoing basis, educators can also submit innovations to the Network which then organises and reports them via the website of the Center for Innovation (OECD, 2024[47]).
- In **Denmark**, the Knowledge Centres for IT in Teaching promotes the use of advanced digital technology in VET, offering professional development courses for teachers. The centre has also established a network of pedagogical staff and a network of leaders to facilitate the exchange of ideas, practical and technical knowledge and to address common challenges. In addition, two knowledge centres for automation and robot technology each work with more than a dozen VET schools to support teachers to operate virtual reality equipment and robots and incorporate them into their teaching practice (OECD, 2023[14]).
- **Spain**'s National Institute of Educational Technologies and Teacher Professional Development (INTEF) is responsible for the integration of digital technologies in education and related teacher professional development. It co-ordinates four main types of activities: 1) developing and providing open educational resources; 2) delivering professional development activities to promote teacher

digital competences; 3) promoting digital education to different stakeholders (teachers, schools, students, and parents) through initiatives and guidelines; and 4) coordinating teacher collaboration and innovation. Among the Institute's various projects, the Classrooms of the Future initiative seeks to foster both technological and pedagogical innovation, transforming traditional classrooms into dynamic, segmented areas designed for different types of active learning. These spaces also feature advanced tools such as digital boards, touchscreens, and Virtual Reality glasses. To achieve official recognition, participating schools must adhere to specific criteria which are both pedagogical and technological in nature. This includes using active learning techniques and digital technologies and ensuring the active participation of teachers and the broader school community (OECD, 2023[48]).

Among the education systems leading the integration of AI technologies in education, one approach has been developing national strategies for AI in education on teacher-led innovation:

- **Korea** seeks to transform its already high-performing education system through the adoption of AI in education, with an emphasis on a pedagogical paradigm shift. To achieve this, Korea is developing AI-based textbooks but also aims to build a system culture of teacher-led innovation (see Annex A).
- **Singapore**'s "Transforming Education through Technology" Masterplan 2030 focuses action on leveraging new technologies to better customise learning for every child and strengthening and scaling the culture of sharing and adapting technology-enabled lessons, resources, and good practices (Ministry of Education, 2023[49]). The implementation process has included a focus on teacher-led innovation, with the intention of empowering educators to take an active role in shaping how they integrate AI into their practice.

Engaging with research to experiment with practice

In addition to having the time, space, and tools to enhance their practice, teachers also need to develop a mindset that pushes them to become the change agents of their own professional practice. This includes policy approaches that can empower teachers to experiment in the classroom as reflective, enquiry-driven practitioners. Reflective practice is often included in professional standards and some initial teacher education curricula. In **Türkiye**, for example, The Century of Türkiye Education Model (2024), highlights teacher reflection as one of nine key facilitators of a holistic education approach (Ministry of National Education, 2024[50]).

While embedding a new mindset across the teaching profession will require considerable time and diverse policy efforts, education systems can also take more targeted steps. Policy that encourages teachers to critically engage with research evidence and interpret it within their specific contexts can support the effective use of evidence (Rickinson et al., 2023[51]). For instance, action research models can allow teachers to address challenges in specific contexts, by questioning their own practices, exploring relevant theory, trialling new approaches, and generating new knowledge (McKenney and Reeves, 2020[52]). Teacher inquiry processes also support teachers to systematically investigate and understand problems within their context, leading to deeper insights into their practice (Yalvac et al., 2023[53]; Cochran-Smith and Lytle, 2009[54]). Other empirically tested approaches include reflective dialogue, generative discourse and learning conversations (see Brown and Portman in OECD (2023[55])).

Some education systems have introduced policies that support educators to better engage with and apply research, specifically in their teaching of foundational skills. Perhaps due to the close collaboration with the research community, these approaches have been evaluated. In Brazil, New Zealand and Sweden, policy efforts led to evidence-informed changes to teaching practice, as well as increased teacher reflection and self-efficacy (Baptista and Melo, 2023[56]; Standard of Proof, 2023[57]; Österholm et al., 2016[58]). In Sweden, these efforts showed a long-term positive impact on school leaders' efforts to strengthen the teaching and professional learning cultures of their schools (Österholm et al., 2016[58]). In New Zealand,

research showed a positive impact on student outcomes (Standard of Proof, 2023[57]). Based on the evaluations, one success factor for these policies lies in challenging everyday pedagogical practice through high-quality evidence that is adaptable to different teachers' needs:

- The academic rigour of stimulus material appears key. In **Brazil**, the capacity of the Reading and Writing in Early Childhood Education programme (2024) programme to develop teachers' intellectual autonomy was identified as the main outcome by both evaluators and participants (Baptista and Melo, 2023[56]). Meanwhile, in **Sweden**, evaluators of the Mathematics Boost (2015) and Literacy Boost (2012) found that impact on practice was less evident for teachers of older students partly because they found the material less relevant or intellectually stimulating (Österholm et al., 2016[58]; Skolverket, 2020[59]).
- Implementation design for **Germany**'s Qua-math – Developing Teaching and Training Quality in Mathematics (2023) initiative seeks to ensure the material can meet the needs of different teachers. Teachers can select among one of the five pedagogical principles for mathematics that are embedded in an array of learning modules based on their needs. Research teams will continuously review and update the modules throughout the ten-year programme based on feedback and empirical developments (Prediger and Selter, 2024[60]).
- Beyond stimulus material, facilitators also help balance academic rigour and responsiveness to teachers' needs. **Brazil** and **Sweden** appointed researchers as facilitators, to help participants have access to high-level expertise as they engage with and discuss material. In contrast, in the United States, a trial to enhance data-informed practice found no impact on teaching largely because facilitators were not experienced data specialists (Gleason et al., 2019[61]).

A second factor in the success of these policies is ensuring an openness to local adaptation, interpretation, and experimentation:

- In **Germany**, informed by professional learning and implementation science, facilitators are encouraged to be flexible and open to different ways of engaging with the programme. Rather than seeking implementation fidelity, the policy designers have identified six core aspects that facilitators must embody with the freedom to develop their own approaches beyond that (Prediger and Selter, 2024[60]).
- Similarly, in **New Zealand**, evaluators of the Better Start Literacy Approach (2021) recognised that participants are adapting their practice in different ways that clearly reflect local and institutional contexts (Standard of Proof, 2023[57]).

Scaling up these efforts is a challenge. In New Zealand and Sweden, programmes have been hard to implement in small or rural schools, partly because the model is not suitably flexible for contexts with limited human resources (Standard of Proof, 2023[57]; Ramböll Group, 2016[62]). Delivering these processes at scale is resource intensive and likely requires a long-term commitment. This suggests education systems may need to prioritise contexts where these processes can have the greatest impact on enhancing teaching quality. Current examples indicate that this prioritisation is already occurring, with a focus on teachers of foundational skills. Additional opportunities for targeted policy include supporting teachers in disadvantaged or low-performing schools and mid-career or experienced teachers, who may benefit most from re-evaluating established practices.

The evaluations raise concerns about the sustainability of positive effects resulting from implementing these processes. Follow-up studies in Sweden showed that improvements in teaching practices and mindset began diminishing 18 months post-intervention. In practice, fostering and sustaining the mindset required for quality evidence-informed teaching requires broader cultural change across the system. Policy action in Norway over the past eight years offers valuable insights into strategies for achieving this type of systemic change (see Annex A). Moreover, the following school- and system-level policy responses are designed to support the effective use of evidence, with relevant policy examples provided.

Looking ahead, AI holds significant potential to support teachers in experimenting with new practices. Augmented and virtual reality, for example, can provide educators with context-specific practice opportunities in low-stakes environments. This can give them highly personalised, structured learning experiences that have been shown to improve creative problem solving, self-efficacy, dialogic learning, and inclusive pedagogies (Huang et al., 2022[63]; Mena, Estrada-Molina and Pérez-Calvo, 2023[64]). Specialised LLMs, such as GPTeach, can also support teachers to practice certain instructional sequences or scenarios through interactive chat, with transcripts that facilitate professional reflection (Markel et al., 2023[2]). However, these approaches remain in the early stages of development and are not widely institutionalised.

School level

Policy responses

This section discusses strategies to improve teaching quality at school level, by focusing on:

- **Working with champion teachers and institutions:** Formalising their roles within school structures and ensuring they contribute to a broader effort to scale good practice, as well as reimagining their roles as leaders of learning rather than merely policy enactors.
- **Fostering collaboration with industry and researchers:** Establishing horizontal structures that bridge distinct professional communities, as well creating dedicated spaces and processes that facilitate meaningful exchanges across professional and institutional boundaries.

Teacher-level policy action can provide teachers with the resources and mindset to enhance teaching practice in changing contexts. School-level policy actions build on this by creating a professional climate that enables empowered teachers to thrive, mainly by establishing a collaborative culture that fosters relational expertise. Collaborative school environments can also offer teachers the collegial support needed to experiment with integrating digital tools into the pedagogical toolkit, engage with research, and explore its practical application in their teaching.

Working with champion teachers and institutions

Expertise within education systems is often siloed within individual teachers, leaders, or institutions. Appointing champion teachers or institutions to support peers in developing their practice can help translate isolated innovations into broader, system-wide change. This approach has been recognised in implementation and innovation science as an effective strategy to enhance practice (Brown, White and Kelly, 2021[65]; Drechsler et al., 2021[66]).

Appointing digital champions in schools has emerged as a clear policy trend aimed at enhancing the use of digital technologies in education. By 2019, nearly half of European countries and economies had implemented policies appointing digital champions in schools. These champions are typically responsible for a combination of pedagogical tasks, such as consulting teachers on digital technology use and facilitating professional learning, alongside logistical tasks (European Commission/EACEA/Eurydice, 2019[67]). This policy trend continues to evolve with new technologies: in Korea, for example, recent policies designate schools with a strong record of integrating digital technologies as “AI Schools”, tasking them with championing the integration of AI into pedagogies and to support experimentation with AI.

At the same time, despite evidence that champion roles can effectively promote evidence-informed teaching by influencing behaviours and attitudes towards research use (Gorard, See and Siddiqui, 2020[6]), their use remains limited in this area. In 2021, only 22% of education systems participating in the OECD’s Strengthening the Impact of Education Research policy survey reported appointing research champions

(i.e. someone working in a school who has specific responsibility for facilitating research use) and 32% reported having embedded researchers (i.e. someone with a research background working in a school to facilitate research) (OECD, 2022[5]). Although no system-level policies appointing teacher champions for research use were identified for this report, examples emerge of some institutions in both school and higher education. Available evaluations suggest a positive impact on practice although the direct effect on student outcomes remains unclear.

Several success factors emerge from related policy evaluations and implementation reports on the appointment of champions in schools. Firstly, formalising the role of teachers and institutions acting as champions in the school's structures can help ensure they have sufficient agency to affect change:

- Through competitive selection processes with clear criteria**, Korea**'s Teachers who Upgrade Classes with High Tech and AI pilot schools (see Annex A) and **Norway**'s Centres for Excellence in Education (2011) have been able to establish greater legitimacy for champions teachers and institutions.
- For **Finland**'s Digital Tutor Teachers (2016) and **Portugal**'s Digital Ambassadors, the allocation of protected time, either within or on top of their teaching load, has been key. This is made possible through financial support from the respective ministries. Between 2016 and 2020, education providers in Finland could access earmarked funding for both local and regional digital tutor activities. Those involved identified these additional resources as the highest contributing factor to success and around three-quarters of schools reported that an end to subsidies would trigger a reduction or termination of activities (Pennanen et al., 2021[68]). Nevertheless, by 2020, many providers had taken steps to ensure that the digital tutor teachers could continue following the end of allocated funding (Pennanen et al., 2021[29]). Finland is currently undertaking research into how widely the model, and other digital supports, are in use across the system.

Secondly, there may be value in moving beyond individualistic approaches, ensuring champions are part of a collaborative effort that informs education systems' knowledge needed to understand how to scale up:

- In **Finland,** regional networks of Digital Tutor Teachers have been identified as a contributing factor to success as they support tutors' own professional learning and help mobilise knowledge of good practice (Pennanen et al., 2021[68]).
- Research in **Norway** highlights that collaboration may be the key to extending the reach of institutions appointed as champions to professionals who are more resistant to changing their practice. Evaluators suggest strategically collaborating with early adapters and adopters in other institutions as multipliers who can then influence their own networks (Kottmann, Westerheijden and van der Meulen, 2020[69]).
- In **England (United Kingdom)**, among the Research Schools (2018) appointed to work with peer institutions in challenging contexts to promote the use of evidence in teaching, those that more successfully influence changes in practice have been found to draw on a complex network of local relationships, which typically predate their appointment as a champion institution, although their new roles enabled them to expand their reach further both locally and beyond (Gu et al., 2020[70]).

Finally, evaluations and implementation progress reports indicate that a promising next step – and a challenge – for education systems will be reimagining the roles of champions, envisioning them as leaders of learning as opposed to enactors of a specific policy:

- In **Finland**, evaluators suggest shifting the focus of the tutor role from the use of digital technologies specifically, to pedagogical innovation and expertise more broadly. This could alleviate pressure on school leaders while also building on one of the key positive impacts of the tutor network (Pennanen et al., 2021[68]). Similarly, in **Portugal**, evaluators suggest building on the capacity of Digital Ambassadors, in collaboration with local professional development and technology centres, to facilitate professional learning that is bottom-up and locally responsive. This can help overcome

the one-size-fits-all approach typical of policy implementation (Wastiau, Looney and Laanpere, 2024[71]).

- Qualitative research indicates that the teachers appointed as Research Champions within the Cardiff Partnership for Initial Teacher Education in **Wales (United Kingdom)** support student teachers' research engagement at the same time as learning from them. They also help establish a culture of research engagement among the wider teaching profession, particularly as part of a broader research community made up of student teachers, teaching staff, initial teacher education providers and wider research groups (Beauchamp et al., 2020[72]).
- In the **Netherlands**, institutions aspiring to be appointed as Expertise Schools within the Development Power Programme (2023) undergo an intensive, tailor-made programme supporting teachers and leaders to guide other schools in research-based methods. Therefore, expertise schools are not simply appointed because they demonstrate best practice, but because they have developed the skills to nurture best practices in others (Development Power, 2024[73]).

These experiences indicate that policymakers can do more to capitalise on the opportunities offered by champion teachers or institutions to drive innovation in teaching practice. This involves expanding their roles in areas of practice in which the application of such models has so far been limited, namely the use of research, evidence, and data in teaching. Additionally, a clear vision is needed for how champions can promote innovation at scale: education systems need to broaden their view of how individual champions fit into a system-wide, collaborative innovation eco-system. Finally, as part of a broader effort to rethink the teaching profession, systems can consider how these specialist roles can strengthen and diversify the teaching workforce, improve practice, and increase attraction and retention (see Chapter 2).

Fostering collaboration with industry and researchers

Empowered teachers should be supported to become co-designers, co-researchers, co-developers and co-evaluators of new tools, knowledge, and practice. Many digital tools for education are designed in a way that devalues the pedagogical expertise of teachers and the social and emotional nature of teaching, its sensitivity to local and individual contexts and inherent complexity (Holmes, 2023[74]). To overcome this, partnerships between teachers, EdTech and/or researchers help teachers engage more actively in iterative, reciprocal processes and move away from the traditional linear models of production and uptake (Schlicht-Schmälzle et al., 2024[75]; Molenaar and Sleegers, 2023[76]). As teachers participate in this type of user-driven innovation, it can therefore become easier for them to better align their needs with the end products. This type of partnership can also increase trust and understanding between different professional communities (OECD, 2023[14]).

Such approaches are becoming increasingly relevant as countries and economies work to implement human-centred AI in education. Guidance from the OECD and Education International identifies the co-creation of AI-enabled digital learning tools as one of nine key guidelines to harness the opportunities offered by AI and mitigate its risks to equity, quality and efficiency (OECD, 2023[10]). Nevertheless, only 7 of the 28 high-level policy documents on the integration of AI in education analysed for this report reference the need for collaboration between teachers and developers, 4 of which extended this to include researchers too (see Annex B). Nearly all of these focused specifically on the need for co-creation, noting that this should go beyond simple representation or consultation in order to involve teachers as designers from the earliest stage in the design process (U.S. Department of Education, Office of Educational Technology, 2023[32]; Kenniscentrum Digisprong, 2023[77]). Some also emphasised the importance of teachers' role as reviewers or evaluators of products and that this can be most impactful when done in rapid and continuous feedback loops (INTEF, 2024[78]; Conference of Ministers of Education, 2024[79]).

Despite the recognised importance of partnerships, practice, research, and development typically remain siloed in education. For example, in digital technology, scientific researchers mainly focus on fundamental research with a limited exploration of classroom applications, while entrepreneurs often lack practical

educational and pedagogical expertise (OECD, 2023[48]). Although various partnership models exist for integrating research, evidence and data in teaching practice, those that connect teachers and researchers are typically small-scale and often bottom-up (Schlicht-Schmälzle et al., 2024[75]). This fragmented landscape inhibits both the quality and pace of progress in innovative teaching practices.

System-level efforts identified for this analysis suggest that expanding the scope and cohesion of partnerships requires long-term efforts, reaching up to ten years in the Netherlands, for example. Moreover, these efforts appear to emerge in systems with established foundational cultures in either digital education, such as Korea, or evidence-informed practice, as in the Netherlands and Sweden.

Evaluative evidence and implementation progress indicates some emerging success factors for these policies, corroborated by academic literature, which can help guide education systems undertaking similar efforts. Firstly, bringing together professionals with distinct cultures and practices can impose a variety of bureaucratic and hierarchical barriers to collaboration (Schlicht-Schmälzle et al., 2024[75]). Therefore, horizontal structures can help bring distinct professional communities closer together:

- In the **Netherlands**, the inclusion of school boards within the formal governance arrangements for the National AI Education Lab is noted as a strength, even if this practice is not always associated with partnership approaches (Molenaar and Sleegers, 2023[76]).
- In **Korea** (see Annex A), the regional governance structure of the EdTech Soft Labs, which aligns these communities with subnational offices of education, is seen as facilitating their collaboration to respond more directly to regional specialisation strategies and to localised education challenges (Lee, 2023[80]).
- In **Sweden**, it is now more common for partners in the Education, Learning, Research programme (2017) to establish formal agreements at the start of each relationship defining goals, roles, and responsibilities. Best-practice examples show that business and institutional planning include these agreements to increase accountability and sustainability of the initiatives (National Coordination Group ULF, 2022[81]). Furthermore, agreements are established at each governance layer: strategic objectives are established in a national agreement and then reflected in regional and individual partnership agreements.

Secondly, establishing a "partnership infrastructure" of dedicated spaces and processes facilitates boundary crossing between professions and institutions:

- "Third spaces" are essential. In Korea and Sweden, the emphasis has been on physical spaces. **Korea**'s EdTech Soft Lab is designed as an active participatory space (Ji-hye, 2022[82]) while in **Sweden**, multiple spaces at different levels within partner organisations provide a venue for in-depth discussions that increase mutual understanding (National Coordination Group ULF, 2022[81]). Meanwhile, **Ireland**'s Teachers' Research Exchange (T-REX) (2017) and **Lithuania**'s EdTech Center testing platform (2022) illustrate how digital technologies can be used to create dedicated spaces for collaboration in contexts where the system-level culture is less developed and partners are more geographically or professionally isolated (McGann et al., 2020[83]).
- Systematised processes for collaboration are also important. In **Ireland**, communities can collaborate through T-REX, which offers three model processes for shared activities and supports collaboration without enforcing a single partnership model (McGann et al., 2020[83]). In the **Netherlands,** an overarching reference framework guides collaboration, updated annually based on the experiences of various partnerships and evolving empirical evidence (NOLAI, 2023[84]). **Korea** is developing common and optional functions for EdTech Soft Labs to create exemplar operating models (Lee, 2023[80]).

Calls to increase collaboration between educational professionals, digital developers and researchers are not new. However, in the coming years they will become increasingly urgent: education systems cannot hope to capitalise on the opportunities offered by new technologies to address old and emerging challenges in an ethical, human-centred way without committing to concrete steps that answer those calls at scale. Moreover, such partnerships can help solidify teaching as a more attractive, forward-looking profession.

System level

Policy responses

This section discusses strategies to improve teaching quality at system level, by focusing on:

- **Fostering teacher mentoring, instructional coaching, and professional learning communities:** Expanding the scope of programmes to support ongoing collaborative inquiry rather than time-bound, project-specific initiatives; making teaching and learning more tangible subjects of analysis; and facilitating teachers' engagement in structured collaborative professional learning through digital technologies.
- **Diagnosing teachers' development needs:** Strengthening self-assessment within regular formative appraisals, including through digital tools, and implementing collaborative foresight processes to better anticipate future development needs.

School-level actions can help establish an environment where strong professional relationships enable teachers to continuously enhance their practice. System-level structures and processes, in turn, ensure that empowered teachers who actively seek out opportunities to improve teaching quality in dynamic contexts can align their efforts with broader strategic priorities. The following policy responses present possible structures and processes to ensure high-quality professional learning for in-service teachers.

Fostering teacher mentoring, instructional coaching, and professional learning communities

OECD education systems invest considerable resources in teachers' and leaders' professional development, covering costs such as professional services, travel, subsistence, and staff cover (TNTP, 2015[85]). In England (United Kingdom), schools annually spend nearly USD 4 000 per teacher on professional development – just under 3% of total spending, although this likely underestimates the full cost (Brande and Zuccollo, 2021[86]). In the United States, research estimates annual district-level spending on staff development at just under USD 18 000 per teacher (TNTP, 2015[85]).

Ensuring that investments in professional learning translate into better practice for improved student outcomes is essential. Professional learning models that foster deep collegial relationships between colleagues have been identified as powerful drivers of teacher development, bringing multiple benefits that help justify resource investment, including competence development and engagement, job satisfaction and enhanced self-efficacy, creative thinking and experimentation (OECD, 2020[1]; Viac and Fraser, 2020[2]; Vangrieken et al., 2017[3]). When implemented at the institutional level, collaboration can enable teachers to co-develop tailored solutions to shared problems in ways that are relevant and applicable to their mutual context. This helps narrow the knowledge transfer gap common in teacher professional learning (Hemsley-Brown and Sharp, 2003[87]).

For novice teachers and leaders, mentoring can facilitate transitions to the workforce, increasing commitment to and understanding of the profession (Zhao and Zhang, 2017[88]; Rodrigues and Mogarro, 2019[89]). In TALIS 2018, teachers who took part in some kind of induction activity tended to feel more confident in their teaching abilities and more satisfied with their job (OECD, 2019[90]). Moreover, mentoring

also enables experienced teachers and leaders to continue their professional growth, share expertise and grow in their specialisation.

Mentoring structures are widespread across OECD education systems. In the Programme for International Student Assessment (PISA) 2022, 82% of students attended schools where teacher mentoring is available, although only a minority (19%) are in schools for whom it is mandatory (OECD, 2023[91]). In recent years, several education systems have been expanding the scope of mentoring programmes:

- **Victoria (Australia)** is expanding a promising pilot of the Career Start programme, which will provide mentoring support to all government schools across the state. This includes reduced time for face-to-face teaching to engage with induction supports, a dedicated mentor to accelerate the development of teachers' teaching practice, networking opportunities within local learning alliances, and professional learning to develop professional practice, professional identity, and support well-being.
- **Austria** introduced a mandatory one-year induction period for new VET teachers in 2019. This includes practical professional development in "practice schools" under the supervision of experienced professional mentors (OECD, 2021[92]).
- In 2018, **Ontario (Canada)** extended its New Teacher Induction programme to include any teacher in the first five years of their practice. A key element of the programme is continuous mentoring by an experienced colleague. Longitudinal research shows that participating novice teachers have made meaningful and sustained improvements in confidence, efficacy and instructional practice and show commitment to ongoing professional learning. Formal and informal mentorship or support from colleagues were seen as particularly helpful, with relationships between mentors and mentees and between the mentors themselves identified as key to successful implementation (Frank et al., 2021[93]).
- Under the Early Career Framework **England (United Kingdom)** has introduced an entitlement for all early career teachers to a funded two-year package of structured professional development and support. This includes additional time off from their school timetable for training and mentoring during the first two years, tailored training materials for them and their mentors, and targeted support from approved providers. In 2024, survey data revealed that for 84% of early career teachers, mentors are the key source of advice and support for any concerns or queries. They are viewed as particularly important among mentees with concerns about their progress in reviews and assessments or about the quality of their induction (Department for Education, 2024[94]).

Beyond mentoring for novice teachers, several countries and economies are implementing institution-based peer learning models, where teachers and leaders work together in small professional learning communities (PLC) or engage in instructional coaching. Empirical evidence strongly supports the effectiveness of PLCs in enhancing teacher practice and student outcomes, although context is crucial (Brodie, 2019[95]; Sébastien, Branka and Vincent, 2020[96]). Similarly, meta-analyses of instructional coaching show large positive effects on practice and a smaller positive effect on student achievement (Kraft, Blazar and Hogan, 2018[97]).

Among the policies identified for this report, Quality Teaching Rounds in Australia and MyTeachingPartner in the United States have shown a positive impact on reading and mathematics performance for learners of different ages through randomised controlled trials, (Gore et al., 2023[98]; Foster, 2021[99]). Across policies, there is also evidence of increases in teachers' enthusiasm, collegiality, and reflective capacity.

While professional learning communities and instructional coaching are not new practices in OECD education systems, there is now a growing body of empirical and policy evidence that policymakers can use to level-up existing efforts.

Success factors include favouring ongoing collaborative inquiry as opposed to time-bound, project-specific approaches:

- In **Iceland**'s Education Complex initiative (2020) and the Coaching via Skype (2017) programme in **Ceará (Brazil)**, the strong interconnection between the programmes and the daily work of teachers is seen as contributing to their success (Sturludóttir et al., 2021[100]; World Bank, 2018[101]). Similarly, in the **United States**, evaluators of the My Teaching Partner initiative (2021) found that teachers do not perceive the coaching to be additional work but rather part of their teaching lesson planning (Foster, 2021[99]). In **Victoria (Australia)**, PLCs, which have been strongly supported since 2016, are part of a wider effort that frames professional learning as a routine practice engaged in with colleagues and tightly focused on the core work of teachers: improving student outcomes (VAGO, 2019[102]). In **Australia**, evaluators concluded that the success of the Quality Teaching Rounds (2014) lies in the fact that, unlike most professional development, it is pedagogy focused as opposed to content focused (Harris et al., 2022[103]).
- The emphasis on process over content is extended further when, in some cases, the PLCs or coaching interventions are integrated into school management processes. For example, in **Victoria (Australia)** the PLCs must be embedded in school improvement planning to ensure they respond to shared institutional needs (VAGO, 2019[102]). In **Chile**, video coaching for school leadership teams (2020) was integrated into mandated approaches for schools to reopen following the COVID-19 pandemic (OECD, 2020[104]).

Secondly, some policy experiences show the value of making teaching and learning a more tangible object of analysis through using specific tools:

- In **Australia**, the Quality Teaching Model provides shared concepts and language with which participants analyse teaching practice (Harris et al., 2022[103]). Analysis of longer-standing programmes in the **United States** in ECEC also emphasise the importance of using quality standards that are well-evidenced to guide coaching interventions (Schachner et al., 2024[105]).
- Digital tools have also been useful: in particular, the use of videos of classroom practice in **Australia** and the **United States** has been reported as helping to make visible instructional processes that had previously been hidden to teachers, putting them at the forefront of discussions (Foster, 2021[99]; Harris et al., 2022[103]).

Finally, education systems are facilitating teachers' participation in structured collaborative professional learning through digital technologies:

- **Singapore**'s One Portal All Learners platform allows teachers to set up online collaboration groups, facilitating asynchronous knowledge construction that complements face-to-face interactions. Users appreciate the platform's compatibility with mobile technologies and its unified log-in with existing email systems (Lee et al., 2020[106]). By facilitating asynchronous collaboration, digital technologies also help overcome the challenge of bringing together participants with different roles and responsibilities and incompatible work schedules (OECD, 2024[47]).
- In **Chile**, teachers with advanced certification are obliged to support colleagues in their own school either through structured development activities or mentoring. Each advanced teachers receives a personalised portal which acts as a dedicated virtual space through which they can produce, create, and distribute resources with the colleagues they work with. This facilitates interactions between colleagues within the same school but also systematises knowledge sharing between advanced teachers, who together make up the Teachers for Teachers network (MINEDUC, n.d.[107])

A key challenge of these models is resourcing. For example, both Austria and England (United Kingdom) have experienced challenges in recruiting mentors for novice teachers and in minimising their turnover. In England (United Kingdom), suggested approaches to addressing this challenge include involving more

junior staff as mentors, providing mentors with buddies, increasing networking opportunities, protecting allocated time for mentors, and accrediting the mentor role in some way.

However, there is also scope for AI to play a role in addressing this resourcing challenge. AI-powered mentors, coaches and assistants that provide automated feedback on recorded lessons, have been shown to improve instructional practice although results vary by tool (Demszky et al., 2023[108]). Combined with learning analytics, AI can enhance teacher noticing and decision-making, supporting teachers to better align practices with competency frameworks. Specifically trained LLMs can provide feedback or prompt reflective discussion on lesson plans and assessment of students' work. They can support teachers' self-directed learning too, diagnosing needs, setting learning goals, designing personalised plans, and supporting reflection (Neumann et al., 2021[3]).

Despite this potential, AI's capacity to enhance teachers' professional learning does not appear to be a prominent focus in emerging AI integration policies in education. Among the 28 high-level guidance documents published by OECD education systems and analysed for this report (see Annex B), there seems to be a clear understanding of the need to support teachers to develop AI literacy and new pedagogies for AI-enhanced practice. However, there is little reference to how AI itself can support this. While 26 documents acknowledge the need for teachers to develop competencies in the use of AI technologies for teaching and learning, only 2 explore in more detail how AI can enhance teachers' professional learning more broadly.

Of the high-level documents that do recognise AI's potential to enhance professional learning, cited capabilities include: using AI to analyse teaching through algorithms that suggest moments in classroom discussions worth reviewing with a coach; tools that automate the monitoring and analysis of teaching and learning, helping teachers to turn even micro-moments in the classroom into opportunities for professional learning; and simulators that can change the faces and voices of students, allowing teaching situations to be shared and discussed anonymously among colleagues (U.S. Department of Education, Office of Educational Technology, 2023[32]; Kralj et al., 2024[109]). Another example is the potential use of AI as a professional coach to support both lesson planning and instruction (Kralj et al., 2024[109]).

Diagnosing teachers' development needs

The standards-based approach to professional learning in OECD education systems defines professional competences and ties their acquisition to career and salary trajectories, appraisal, and development. While this approach has been crucial for professionalising teaching (Guerriero, 2017[15]), it presents two major challenges: 1) it may overlook the deeply personal and non-linear nature of teacher professional identity (Suarez and McGrath, 2022[110]); and 2) it can prioritise generic, externally delivered professional development aligned with reform agendas over initiatives driven by the needs and interests of teachers and leaders (Dimmock et al., 2021[111]).

Ongoing professional development that aligns with teachers' aspirations and interests is crucial for teaching quality and job satisfaction. It can also help make teaching a more intellectually attractive profession: evidence indicates that teachers with targeted career support and development opportunities are more likely to remain in the profession across all education levels. Furthermore, when teachers experience professional growth and career progression, their efficacy and ability to improve student outcomes increase (OECD, 2020[18]).

Strengthening the diagnostic base to improve understanding of teachers' developmental needs is therefore crucial. This approach can both enhance the strategic impact of professional learning while increasing teacher engagement. First, regular formative teacher appraisal can support teachers, schools, and the education to better understand developmental needs. This appraisal usually relies on classroom observations, teachers' self-evaluation, and teaching portfolios to provide specific feedback to guide continued professional growth (OECD, 2013[112]). Typically conducted by school leadership, more impactful

appraisal models involve collaboration between school management and teachers to create individualised development plans, defining activities aimed at improving specific aspects of teaching practice (Maghnouj et al., 2020[113]).

Some education systems have been strengthening teacher self-assessment in regular formative appraisal processes, including through digital tools:

- In **Alberta (Canada),** the Teacher Growth, Supervision and Evaluation Policy (2015) established a mandated annual dialogue between teachers and school leaders regarding the professional development plans for each teacher based on their strengths and weaknesses. These are identified by the teacher and reviewed or approved by the school leader or a group of teachers appointed by school management. To facilitate self-assessment and ensure that it leads to pertinent insights, Alberta introduced the Reflection on My Professional Practice tool. Based on teachers' self-reflections, this digital, interactive platform produces a profile of strengths and considerations for professional development and includes suggested resources to support implementation (Alberta Teachers' Association, 2024[114]).
- **Japan**'s National Teacher Professional Development Platform (2023) will, among other features, enable teachers to evaluate the quality of their professional learning and its impact on their practice (see Annex A).
- In **Wales (United Kingdom)**, teachers, leaders and teaching assistants can use the digital Professional Learning Passport (2020) to self-assess their learning needs, track their development activities, and self-evaluate effectiveness. At system-level, this data can help build a picture of the extent to which professional learning is meeting needs, both in the offer and in practice, at institutional, regional, and national level. However, there is more to do to ensure that teachers across the career spectrum engage with the tool (Thomas et al., 2023[115]).

Beyond better understanding teachers' immediate professional development needs, education systems can also work to improve capacity to predict possible emerging needs through foresight activities. Some education systems are implementing collaborative foresight processes, including through scenario building and teacher personas:

- **Austria**, the **Flemish Community of Belgium** and **Wales (United Kingdom)**, have carried out foresight work with support from the OECD's New Professionalism and the Future of Teaching project. Those participating include representatives of the ministries of education, teacher unions, education research institutes and initial teacher education providers. In these collaborations, system-level actors work together with practitioners to co-create future scenarios for the profession and guide the direction of the professional learning offer, accordingly. They also use teacher personas to strengthen their future scenarios and support backcasting discussions (OECD, 2024[116]).
- In **Estonia**, the Development Monitoring Centre has produced 12 future scenarios for the teaching profession, set in 2040. This foresight work recognises the varied experiences of teachers working in different contexts with four alternative scenarios each for professionals working in schools in rural areas, in towns and in cities (Foresight Centre, 2023[117]).
- **Finland**'s Forum for Development of Early Childhood Education Professional Development (2019-2022) convened training providers and educators for ongoing dialogue on the short- and longer-term developmental needs of the profession. These efforts involved a broad coalition of stakeholders through direct inclusion in governance structures, such as steering committees and working groups (Ministry of Education and Culture, 2024[118]).
- The current term of **Finland**'s Teacher Education Forum, for teachers in primary and secondary education, aims to create future scenarios through visioning teacher education of the future.

- In **Singapore**, efforts to update the Teacher Education 21 model included the development of Five Roles of Graduands as Future-ready Teachers (e.g. Shapers of Character, Agents of Educational Change), to help student teachers see the relevance of their learning to the broader national ecosystem (National Institute of Education, n.d.[119]).

In navigating the complexities of teacher development, education systems must balance structured standards-based approaches with flexible, personalised professional learning opportunities that resonate with teachers' individual aspirations and evolving roles. Furthermore, strengthening diagnostic practices, including formative appraisals, self-assessment tools, and collaborative foresight activities, can help to make professional learning both more strategically aligned and responsive to teachers' immediate and future needs. These approaches can foster a culture where professional growth is valued, creating a supportive environment for teachers to continually refine their practice and adapt to emerging educational challenges. As OECD countries and economies look toward 2025-2030, embedding these diagnostic strategies within a coherent framework for teacher development will be essential in sustaining teaching quality, improving job satisfaction, and advancing student outcomes.

Some strategic considerations based on the views from participating education systems

Drawing from the analysis in this chapter, education policymakers may consider the following steps as they work to enhance teaching quality in the current context of technological change:

1. **Strengthening collaboration across research, education, and digital professions.** Education systems need to create explicit opportunities to increase permeability between these sectors. One effective approach is to support 'boundary-spanners' – professionals who can comfortably navigate organisational, institutional, or professional boundaries. Steps to achieving in the coming years include incentivising large scale inter-professional collaboration through investments in research-practice-industry partnerships (RPIPs) and developing guidance on good practice to facilitate such partnerships.
2. **Embedding a culture of evaluative thinking across the education system**. An evaluative mindset should extend beyond digital transformation, supporting teachers as experimenters and evaluators across all areas of practice. This mindset helps create the conditions for disciplined, ongoing innovation and can better prepare the profession to navigate unforeseen events. Policymakers can foster this culture by promoting an evaluative approach to teaching practice that builds resilience and responsiveness throughout the education system (OECD, 2021[38]).
3. **Prioritising professional learning within AI-driven educational strategies.** As education systems explore AI's potential, it is crucial not to overlook professional learning. Establishing a strategic vision for the role of AI in human resource management – including professional learning – can help ensure that these technologies support workforce development effectively. This vision should align with established principles, guidelines, and ethical standards from OECD countries and economies regarding AI integration in education and set clear priorities for workforce management, professional development, and development. Collaboration with the teaching profession is essential for developing this vision. Additionally, innovation funding could incentivise research and development that prioritises collaboration among researchers, practitioners, and developers, focusing on educational impact, feasibility, and cost-effectiveness.

Table 3.1. Overview of figures in Chapter 3

Figure	Title	Source
Figure 3.1	Adopting digital technologies to support teaching quality compared to other priorities	EPO Survey 2024
Figure 3.2	Areas of action and policy responses for enhancing quality teaching in changing contexts	Santiago (2002)
Figure 3.3	Teachers experience higher stress at work in non-teaching tasks	TALIS 2018
Figure 3.4	Most countries and economies promote an evidence-informed use of artificial intelligence in education	Annex B

StatLink https://stat.link/ztexm6

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4 Strengthening capacity in evaluation and monitoring

This chapter explores how OECD education systems can enhance policy evaluation and monitoring frameworks to meet evolving demands for teaching quality amid rapid technological change. It examines critical aspects of managing teacher supply and demand, including forecasting, data infrastructure, and capacity-building, emphasising the importance of adaptive and robust evaluation systems. By exploring evaluation and implementation challenges in areas such as teacher retention, professional learning, and instructional practices, the chapter presents strategies to strengthen data collection, integrate evidence from teachers and leaders, and leverage rapid evaluation models. Through this analysis, the chapter underscores the role of strategic, data-driven policies in building resilient education systems equipped to foster quality teaching in a dynamic future.

In Brief

Strengthening capacity in evaluation and monitoring

Education systems need both strategic and flexible approaches to address teacher shortages, grounding reforms in a clear, overarching vision. This includes becoming better at planning for the future. However, findings from the Education Policy Outlook National Survey for Comparative Policy Analysis 2024 (EPO Survey 2024) reveal that many education systems have yet to do this. Only two-thirds of education systems reported that they have developed projections on potential teacher shortages for 2025-2030 at primary and secondary education levels, and fewer than half reported the same for the other education levels.

At the same time, the survey finds that barriers faced for implementation or evaluation differ according to the area of teacher policy surveyed. Policies related to teaching practice were most often identified as presenting implementation obstacles (with 57% of systems reporting barriers), while efforts to strengthen professional learning were most often perceived as facing monitoring and evaluation obstacles. Commonly reported challenges across all areas include insufficient resources and a lack of stakeholder capacity, particularly in terms of financial resources and human capital. To enhance evaluation and monitoring capacity as part of the roadmap introduced in Chapter 1, key efforts include:

- **Developing robust data infrastructure to inform decision-making:** Education systems could follow several strategic steps for building data infrastructure, such as mapping existing data efforts, linking disparate data sources, and addressing identified gaps with a combination of qualitative and quantitative data components. Moreover, leveraging digital tools (such as advanced learning analytics and predictive modelling) to streamline data collection can enhance the efficiency of monitoring processes, allowing systems to better support adaptive policymaking.
- **Empowering teachers and leaders as evidence contributors:** There is great value in involving teachers and leaders directly in evidence generation, particularly regarding professional learning and classroom innovation. Empowering teachers as active participants in evaluation processes – especially in the context of digital transformation – provides insights from daily practice that are often difficult to capture through external evaluations alone. Teachers and leaders are ideally positioned to assess how new knowledge translates into classroom practices and, ultimately, impacts student outcomes. Incentivising teacher involvement in evaluation, through recognition and professional development, can bolster engagement and quality of feedback. Digital tools and structured methodologies can further support this process, enabling teachers to document evidence systematically. This approach not only decentralises evaluation but also fosters a culture of evaluative thinking and continuous improvement within the teaching profession.
- **Leveraging rapid and adaptive evaluation models:** To remain responsive to changing educational needs, the chapter advocates for rapid and adaptive evaluation models, which allow policymakers to assess policy impacts incrementally and make timely adjustments. Inspired by practices in public administration and healthcare, these rapid approaches use scenario-based evaluations, stress testing, and small-scale pilots to gather insights in near real time. While rapid evaluations may involve trade-offs in rigour, they provide actionable insights without the delay associated with large-scale studies, enabling education systems to adapt policies in response to early findings. The adoption of technology, such as data automation and digital reporting tools, can further streamline rapid evaluation efforts, creating feedback loops that provide timely information for decision-making. This model offers a flexible, scalable approach for monitoring key outcomes and addressing implementation barriers before they become entrenched.

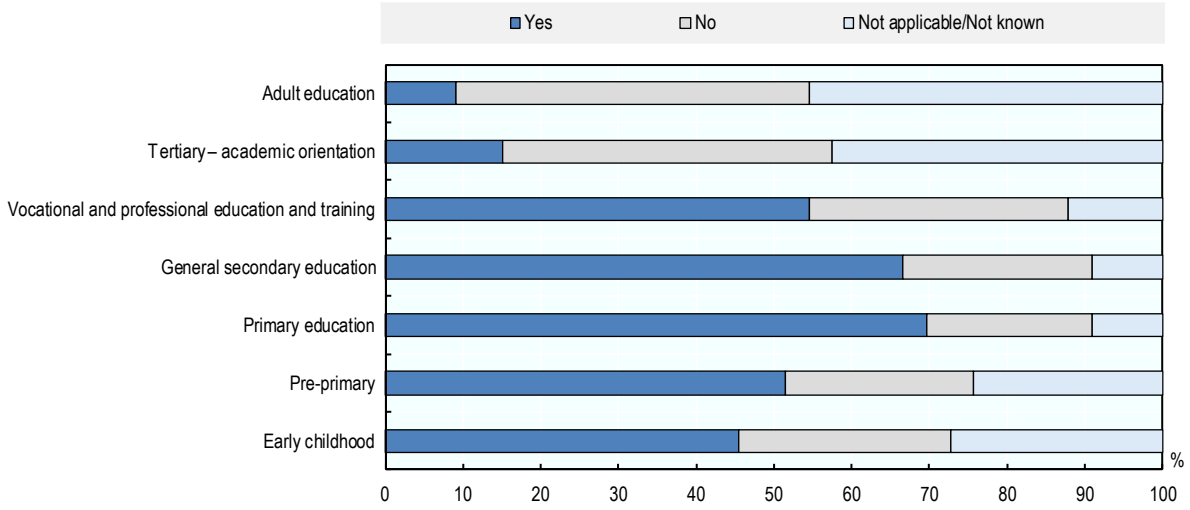
Introduction

As highlighted in previous chapters, education systems are now confronted with the urgent challenge of bridging the gap between the demand and supply of quality teachers, particularly as digitalisation, AI, and other technological innovations continue to transform educational environments. These changes, combined with demographic shifts and persistent inequities, require a more strategic and adaptive approach. As part of these efforts, modern technologies, such as AI-driven learning analytics and predictive tools, offer new opportunities for scenario planning and monitoring (Salas-Pilco, Xiao and Hu, 2022[1]). By also leveraging these innovations, education systems can enhance their capacity to track progress in real time, adapt policies proactively, and respond effectively to evolving needs.

Findings from the EPO Survey 2024 reveal that many education systems have yet to forecast workforce needs for teaching and leadership roles over the next few years. While two-thirds have developed projections for primary and secondary education, fewer than half have done so for early childhood and pre-primary levels (Figure 4.1). These gaps point to potential blind spots where targeted data and insights could better inform future workforce planning.

Figure 4.1. Forecasts regarding teacher shortage for 2025-2030 are not commonplace (2024)

Percentage of education systems reporting having conducted analysis or forecasting of projected workforce shortages for the teaching profession or institutional leadership for 2025-30 and/or beyond for any education level



Note: 33 education systems
Source: OECD (2024[2]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024, OECD, Paris.

Building monitoring, evaluation and forecast capacity is becoming critical as shortages vary across education levels, disciplines and regions. The most acute teacher shortages appear to be in specialist areas, rural and remote locations and highly disadvantaged areas, which struggle to attract and retain teachers (OECD, 2024[3]). More granular and sophisticated data would enable education systems to quantify and address shortages – current and projected – and shape policy responses as part of a targeted and coherent long-term strategy. Yet, how the needed data are identified, collected, and processed, are important policy decisions that require thoughtful reflection about the specific context, local and systemic aims, and resources to achieve this.

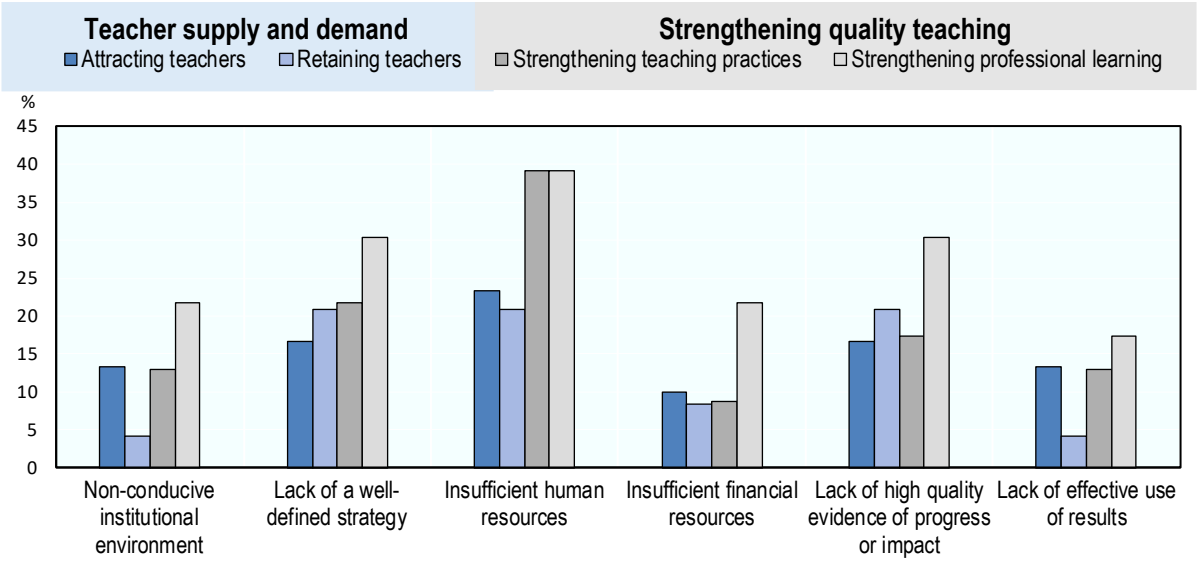
Policy context

For education systems, understanding the factors that support or hinder policy success in improving teaching quality remains critical. Such insights enable the refinement of strategies to address both current and future challenges. The EPO Survey 2024 indicates that, since January 2023, most education systems have introduced various initiatives to attract, retain, and foster high-quality teaching practices and professional learning. These initiatives vary widely in scale, focus, and maturity – from broad system-wide policies to targeted, localised efforts (OECD, 2024[2]). Many education systems also reported that additional practices are planned for the coming period, which will require resourcing and effort.

Survey responses also highlight notable barriers to policy monitoring and evaluation across different areas of teacher policy. A particularly high proportion of education systems report obstacles in evaluating policies aimed at strengthening professional learning compared to other areas. In many cases, policy evaluation efforts are constrained by limited human resources, particularly for initiatives to enhance teacher practices and professional development, as shown in Figure 4.2.

Figure 4.2. Barriers to policy monitoring and evaluation differ based on the area (2023/2024)

Percentage of education systems specifying barriers to policy monitoring and evaluation in at least one education level



Note: 1. Thirty education systems for attracting teachers, 24 education systems for retaining teachers, 23 for strengthening teaching practices, 21 for strengthening professional learning. 2. Education systems could select more than one barrier across any level of education. 3. Period covered: January 2023 to mid-2024.
Source: OECD (2024[2]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024, OECD, Paris.

The evaluation of professional learning, in particular, may be especially challenging due to the need to account for varying, complex theories of change that underpin different initiatives. Furthermore, effective evaluation of professional learning should ideally track participants' use of new knowledge and skills in their practice – often a deeply contextual process that defies standard measurement – and assess the subsequent impact on student outcomes, which can be difficult to attribute directly to professional learning (Guskey, 2000[4]). Moreover, the long timeframe needed to observe change in teaching practice and student outcomes after professional learning adds further complexity to these evaluations.

Additionally, some respondents noted that evaluating policies in non-school education settings presents particular challenges, often due to underdeveloped data infrastructure. For other education systems, the challenge lies not in infrastructure but in data availability; key data needed to understand teacher supply and demand are sometimes not collected or lack sensitivity to policy timelines, as noted by the Netherlands in the EPO Survey 2024. Another common issue reported through the survey is the limited capacity to monitor and evaluate policy outcomes effectively, which hinders systems' ability to adapt current policies or shape future decisions based on robust evidence.

These insights emphasise the critical need to strengthen foundational monitoring and evaluation systems. The following section presents approaches to help education systems address these gaps and build capacity for data-driven policy adaptation and planning.

Policy factors to consider

A robust policy monitoring and evaluation framework, aligned to strategic visions of education systems, is essential for effective implementation, continuous policy development, and progress assessment. Such a framework can help identify challenges in achieving policy objectives and provide evidence to support policy adaptation, continuation, or expansion (OECD, 2023[5]).

Furthermore, establishing a continuous and longitudinal approach to monitoring and evaluation – beyond temporary or ad hoc measures – is crucial. This approach allows for a more thorough understanding of evolving challenges, supporting the development of adaptive implementation strategies, and providing insights into what works and where. These efforts can specifically address monitoring and evaluation challenges highlighted throughout this chapter, such as:

> *In England, the early years sector is a varied and disparate one and at times it can be challenging to define the source of problems like educators leaving the workforce and apply a blanket strategy across multitudes of issues and whilst there is a range of evidence indicating why people leave the workforce, there is a lack of policy evidence to suggest what would work in better retaining staff.*

It can also offer multiple benefits. The first is aligning policy actions and resources with stated purposes, requirements and regulations. Secondly, it can facilitate learning about the ways in which policies are implemented at different levels of the system and the extent to which they have impact on outcomes. Thirdly, it can offer insight into how resources could be used more efficiently and effectively (Golden, 2020[6]). Several considerations emerge for education systems for monitoring and evaluation, as outlined below.

Some current efforts to improve monitoring and evaluation

Monitoring and evaluating the impact of teacher attraction and retention policies is a complex undertaking but is critical for informing design and implementation. Education systems are making these approaches increasingly sophisticated to understand what works:

- **England (United Kingdom)** is making efforts to understand the early indicators of impact, which over time will lead to improved ability to understand the long-term impact of initiatives and the combined impact of multiple policies. It has built in early indicators of impact into process evaluations, such as pre- and post-surveys assessing perceptions. An example of this is an evaluation of the Early Career Framework induction process. It analyses post-intervention retention rates and will use comparisons with other early career cohorts to understand changes in relative retention patterns, as well as additional cohorts to build better counterfactual groups and determine its impact. Furthermore, programme-level measures have been introduced so that the combined impact of multiple policies can be monitored.

- **Slovenia** is building specific data requirements into its ongoing data collection processes to aid monitoring educational progress and systematic planning of measures/policies. A permanent working group has been established to coordinate and guide administrators and users of data within the ministry.
- **Portugal** has set up a "proximity model" at a national level to monitor and evaluate the implementation of its Student Profile for Compulsory Education. The Ministry of Education supports the work of schools through dedicated teams to monitor and evaluate the implementation of its Student Profile for Compulsory Education in schools. The model is assisted locally by regional teams, creating communities and networks for sharing practices between schools.

Some education systems are also developing mechanisms to better forecast and address teacher supply and demand issues:

- The **Netherlands** has developed a sophisticated labour market dashboard that provides information on the teacher workforce.
- The **Flemish Community of Belgium** publishes an annual education labour market report and future forecasts (Vlaanderen is onderwijs & vorming, n.d.[7])
- **Australia** is developing a national Australian Teacher Workforce Data initiative that administers an annual teacher workforce survey and draws together teacher supply and demand data to inform the future of the teaching profession. By connecting initial teacher education data and teacher workforce data from across Australia, the initiative aims to provide nationally consistent data (Australian Institute for Teaching and School Leadership, 2024[8]).

Strengthening monitoring and evaluation

However, responses to the EPO Survey 2024 show that challenges persist across education systems to support adequate monitoring and evaluation processes related to addressing teacher shortage and teaching quality. Some aspects to keep in mind emerge below, based on the analysis conducted in previous chapters.

Defining success

To evaluate policy effectiveness, it is important to define what success looks like within specific contexts. This starts with a vision that sets out clear objectives, supported by a monitoring and evaluation framework of measurable indicators.

Considering the factors introduced in Chapter 2 of this report shaping teacher demand (e.g. class size, duration of compulsory education, or required learning time) and supply (e.g. teacher preparation and certification, working conditions, or professional prestige), key questions related to efforts for addressing teacher shortage are:

- How many teachers are needed to meet demand?
- How long should teachers reasonably be expected to stay in the profession?
- Is it realistic to assume that teaching should be a lifelong profession?

For improving teaching quality, critical questions drawing from the analysis conducted in Chapter 3 include:

- What constitutes effective teaching practice at a system-level, and in the local context?
- What benchmarks should be used to measure improvement, what student outcomes can be expected arising from these practices, and how can measures be sensitive to local context?

These questions are challenging to answer. For instance, defining success in reducing teacher shortage is complicated by trends towards more fluid career pathways and declining expectations that individuals

will stay in a single profession for life. Nonetheless, it is reasonable to expect that policy efforts should increase teacher retention, both for their economic benefits – by reducing costs associated with retraining and hiring replacements and ensuring a return on investment – and important educational outcomes brought about by improved teacher retention.

Setting clear and realistic metrics for what constitutes success is essential, not only for monitoring and evaluation purposes, but also for effective strategic planning and resourcing, which is an effort undertaken in other professions too (Box 4.1). This can be supported by a vision that sets out the system-level objectives, as well as a comprehensive monitoring and evaluation framework.

Box 4.1. What lessons can be learned from attracting new entrants into other professions?

The principles of strategic workforce planning models found in other professions may offer a useful path forward for the teaching profession. A central tenet of strategic workforce planning is to align longer-term workforce requirements with strategic objectives. It has been described as an approach to ensure that any given organisation has the right number of people with the right skills in the right place at the right time to deliver short- and long-term organisational objectives (Kroezen, Van Hoegaerden and Batenburg, 2018[9]). In the short-term, there is a direct link between workforce planning and operational decisions. In the long-term, workforce planning is linked to strategic decisions about the positioning of the organisation into the future (Huerta Melchor, 2013[10]).

Strategic workforce planning involves planning for and identifying future competencies and skills gaps to allow for more targeted recruitment (Huerta Melchor, 2013[10]). Approaches include:

- Needs-based workforce planning modelling
- Environmental scanning
- Prediction modelling
- Undertaking a whole-of-system approach rather than for single professions

For instance, in Australia, Queensland Health has outlined a strategic planning framework that considers workforce capacity, capability, sustainability, diversity, design, culture, well-being and performance (Queensland Health, 2020[11]).

Sources: Huerta Melchor (2013[10]), *The Government Workforce of the Future: Innovation in Strategic Workforce Planning in OECD Countries,* OECD Publishing, Paris, https://doi.org/10.1787/5k487727gwvb-en; Kroezen et al. (2018[9]), *The Joint Action on Health Workforce Planning and Forecasting: Results of a European programme to improve health workforce policies, Health Policy,* https://doi.org/10.1016/j.healthpol.2017.12.002; Queensland Health (2020[11]), Strategic health workforce planning framework. Available at: https://www.health.qld.gov.au/__data/assets/pdf_file/0034/986614/shwpf-guide-20200623.pdf [Accessed on 27 August 2024].

Establishing data infrastructure

A key challenge for education systems is developing the data infrastructure to collect, store, monitor and analyse the data required for policy insights. Without robust data systems, understanding the current state of teacher workforce (and teacher supply and demand), and tracking progress and impact of policy interventions, is difficult. Additionally, a lack of comprehensive longitudinal data can prevent education systems from assessing the impact of their policies and the career trajectories of teachers (OECD, 2021[12]; Golden, 2020[6]). In the EPO Survey 2024, some countries reported having insufficient data, as well as a lack of data linkage systems that would be necessary to support quality monitoring and evaluation processes. This can limit education systems' responsiveness to the issue. As noted by Slovenia:

> *When implementing monitoring and evaluation in the field of the teaching profession, we are faced with insufficient data for quality monitoring of progress. Slovenia participates in most of the major international large-scale surveys in the field of education, so the data coverage in this area is good, but quality monitoring also requires specific data, which can only be obtained with our own permanent data sources.*

Efforts to improve data infrastructure can be complex, time-consuming, and require coordination across different ministries, levels, and data custodians. However, there are several considerations for education systems to improve monitoring and evaluation processes, ensuring that the right data can be gathered. These include:

1. **Mapping existing data collection efforts** to identify coverage and gaps, situated within an overarching monitoring and evaluation framework. This mapping should align with the system-level outcomes and theories of change of the policy interventions, ensuring the relevancy of data.
2. **Linking various data sources**, such as school-level data, teacher demographics and career trajectory (characteristics of workforce supply) and student outcomes, to generate a view of how the policies are working in practice, and supporting their interoperability.
3. **Leveraging or repurposing existing monitoring and evaluation processes**, for example stakeholder surveys, to maximise their data utility and to reduce administrative or participatory burden on stakeholders over various levels.
4. **Introducing new components to address identified gaps**, utilising both qualitative and quantitative approaches. Custom data sources may be necessary for specific policies being evaluated. These should be distributed across actors, as relevant, and to ensure comprehensiveness and appropriate governance. Education systems will also need to design a sufficiently longitudinal system to track progress and attribute impact over time.

Improving data infrastructure, and leveraging these systems, also requires investment in the data analysis, reporting and dissemination of results – activities that can be resource intensive and costly. Technology-based tools can be of help, if integrated strategically in these processes, and managing potential risks that come with these technologies (See Chapters 1 and 3). AI-powered platforms can automate data collection efforts, reduce administrative burdens, and enable predictive analytics for more accurate workforce forecasting and policy adjustments. For instance, AI-driven insights can help identify trends in teacher attrition and inform targeted interventions (OECD, 2023[5]). Moreover, stakeholders need the capability and capacity to translate data into actionable insights that can inform implementation efforts and support accountability and transparency of policy decisions. This is a critical factor in effective policy implementation and should be planned for from the beginning of the implementation process (OECD, 2020[13]).

Generating the required evidence

There are concerns about the quality of evaluative evidence on the impact of strategies to attract and retain teachers and professional learning currently, and the lack of available resources and capacity within ministries to enhance it going forward. Two ways in which education systems can tackle this include placing teachers at the centre of reform implementation and evidence generation, as outlined below. As part of these processes, leveraging AI-driven analytics can enhance the quality and granularity of this evidence.

Putting teachers at the centre

By bringing teachers and leaders closer to evidence generation and empowering them as experimenters and digital innovators in their own classrooms, systems can better support them in translating knowledge into better practice – as well as supporting monitoring and evaluation efforts at various levels of the system.

This could include mobilising teachers and leaders as part of a whole-of-system effort to build a strong and rich evidence base, for example around the integration of digital technologies. As shown above, education systems indicated a lack of human resources available to generate evaluative information about which digital technologies aid learning in the classroom and which do not. But teachers and leaders who are empowered experimenters produce valuable evidence as part of their daily practice. During the COVID-19 pandemic, it was clear that, while national-level guidance was important, local and institutional

responsiveness were key, and so institutional leaders were generally encouraged to adapt regulations, recommendations and guidelines to suit their own contexts (OECD, 2020[14]). Furthermore, empowering teachers and leaders as evidence contributors can be significantly enhanced through the use of digital tools and AI-based platforms. For example, AI-driven reflective tools can help teachers systematically document evidence from their practice, offering insights that external evaluations may overlook. Such technology-enabled approaches can support a decentralised evaluation model, fostering a deeper understanding of effective methods and translating this knowledge into improved classroom practice (Phillips, Saleh and Ozogul, 2022[15]).

Education systems can take the following steps to strategically mobilise this knowledge:

1. **Motivating teachers and leaders to contribute high-quality evidence.** Recognition programmes including awards and competitions can help increase engagement in experimentation. Integrating such processes into formal career and professional development can also incentivise participation. Ensuring support from the research community or from teachers and leaders with expertise in research, as required, is also needed.
2. **Establishing guidance and tools to shape the quality of evaluative evidence produced.** This can include ethical guidance, methodological toolkits and reporting frameworks. Digital tools can facilitate the collection and analysis of data by teachers and enable more consistent approaches to reporting and analysis at system level.
3. **Exploring ways to collate, curate and synthesise evidence for insights at local, regional and national level.** The end goal of evidence generation is to support the digital transformation of the whole education system. Although decentralised approaches empower teachers and help generate evidence at scale, education systems will need to think carefully about how to bring findings together to tell a coherent, robust and evidence-informed story.

Teachers can also be placed at the centre of efforts to improve understanding of professional learning's impact. This is because teachers are best equipped to establish the links between a professional learning activity, its outcomes for practitioners and resulting changes to practice and student outcomes (OECD, 2021[16]). Decentralising professional learning evaluations can mirror wider policy trends which see systems reducing reliance on standardised student assessments and external institutional evaluation in favour of practitioner-led approaches (OECD, 2023[17]). It can also align with broader efforts to embed a system culture of evaluative thinking. This could include engaging in open and collaborative discussion with the profession, professional development providers and researchers about what can realistically be expected from systematic practitioner-led evaluation of professional development and what support would be needed to achieve it (McChesney and Aldridge, 2018[18]).

Furthermore, an area for further consideration includes facilitating practitioner-led evaluation methods that go beyond satisfaction measures, towards understanding practitioners' learning, use of new knowledge and skills, and student learning outcomes. The use of AI-based tools can enhance the effectiveness of practitioner-led assessments of professional learning, and how it translates into the classrooms. AI-driven platforms can support teachers in designing and conducting their own evaluations, offering real-time data visualisations and automated analysis. This approach can not only reduce the reliance on standardised assessments but also empower teachers to generate actionable insights tailored to their unique classroom contexts (Celik et al., 2022[19]). At the same time, while a framework and tools for evaluation can make routine evaluation more manageable and robust but teachers and leaders need to be able to easily access them (McChesney and Aldridge, 2018[18]). Advanced technologies can support this as well, as can requirements on professional development providers to supply, for example, theories of change for their intervention. This includes supporting teachers and leaders with structures, resources and guidance they require to translate this knowledge into evaluative findings and into practice.

Rapid evaluation

How can practitioners and policymakers monitor, evaluate and adapt teaching practice in as close to real time as possible? This is a common challenge across education systems, as shown by responses to the EPO Survey 2024. Ministries participating in this survey reported a lack of a responsive implementation process which collects, learns from, and responds to monitoring data, as well as follows a realistic, flexible timeframe – all of which can inhibit implementation.

For any evaluation to be effective, and its cost justifiable, it must promote learning that informs future efforts or modifies existing approaches (Golden, 2020[6]). While policy evaluations determining the impact of national reforms are often resource intensive and take considerable time, there is scope to consider ways in which smaller scale or bottom-up evaluation can support incremental progress.

In this regard, education policymakers could take inspiration from trends in rapid approaches to evaluation that are developing across public administration and health and social care. In the public sector, as part of work to support the implementation of the OECD Declaration on Public Sector Innovation, the OECD has proposed a range of rapid evaluative approaches. This includes establishing dedicated simulation or testing environments and encouraging piloting and prototyping. Another proposal is to adopt mission-oriented approaches. These focus less on whether specific policy efforts solve an identified challenge and more on whether they help move the system towards the desired transformation. Anticipatory approaches, such as visioning, scenario building and stress testing, can also play a role. These efforts encourage public sector workers to pay attention to the "little stories" of innovation, not just the "star innovators" or known heroes. This can help provide concrete and relatable examples to other public servants while simultaneously acknowledging and incentivising everyday efforts (OECD, 2022[20]).

In health care, evaluators are also reflecting on ways to speed up evaluations to meet emerging needs more quickly. A scoping review of evidence from high-income countries (see Norman et al. (2022[21])) indicates that rapid evaluation approaches typically employ qualitative or mixed methods. They mainly assess aspects of user experience and acceptability, or implementation barriers and facilitators. Other approaches include focusing on a certain moment in a standard process or narrowing the scope or depth of existing methodologies. Inevitably, rapid evaluation that remains resource efficient involves trade-offs in rigour or scope; that said, it is useful to establish when such trade-offs are legitimate or determine certain non-negotiables.

Technology also facilitates rapid evaluation through communication tools, and automation or simplification of data collection, collation and analysis. Rapid evaluation models can be further strengthened through AI and automation. AI-enabled data analytics can process real-time feedback from pilot initiatives, enabling faster adjustments and more nuanced insights. For example, automated analysis of classroom data can help identify effective teaching strategies more quickly, reducing the time required for evaluation cycles (Salas-Pilco, Xiao and Hu, 2022[1]).

"Sludge audits" are also a behavioural approach gaining traction in some OECD countries to help address similar issues. They seek to identify, quantify and reduce the excessive frictions experienced by policy audiences to increase uptake and impact. They complement existing service delivery improvements, such as reducing administrative burdens and enhancing user experience design (OECD, 2024[22]). Education systems can seek to optimise administrative tasks across the system in order to better support teachers and increase their efficiency through Artificial Intelligence (AI), as is being done for professionals in other public sectors (Box 4.2).

Box 4.2. Insights from public administration: Enhance human resource management through AI

As an area requiring predictive decision-making tasks, human resource management (HRM) is fertile ground for AI solutions. In the public sector, where HRM typically receives much less investment than in the private sector, AI holds the promise of reducing resource needs over the long term while enhancing productivity and employee satisfaction. However, this comes with related challenges (Table 4.1).

Table 4.1. Selected opportunities and challenges of AI-enhanced human resource management

	Potential opportunities	Related challenges
Onboarding	• Tailored onboarding programmes that identify unique employee needs and offer related professional development that can eventually be customised. • Chatbots to support new arrivals.	• Effective customisation requires accurate and detailed data. Employees may be wary of the type of data they provide for work-related matters.
Development	• Enhanced matching between the professional development offer and an individual's needs, capabilities and learning styles. • Tailored career insights and advice based on employees' development plans and profiles of high-performing employees in targeted positions.	• Algorithmic bias may lead to career advice that embeds pre-existing challenges to diversity, equity and inclusion.
Performance management	• Holistic picture of employee performance based on many diverse factors that can be weighted dynamically according to priorities. • Feedback and evaluation that is continuous and timely, potentially enhancing formative use.	• Real or perceived workplace surveillance. • Assessment fatigue may set in if colleagues are expected to provide very regular feedback on a given individual's performance This can foster inaccurate evaluation or gaming.

Source: Adapted from Johnson, Coggburn and Llorens (2022[23])

Some OECD public administrations are taking steps towards an AI-transformation of HRM:

- **France**'s Strategy for the use of AI in HRM in the State Civil Service (2024), implemented by the Ministry of Public Transformation and Service, establishes three guiding principles for human-centric AI and a framework for use, currently being tested by volunteer ministries. The Strategy was developed with insights from a survey of the interministerial human resources foresight network which identified three AI tools to prioritise for development: a virtual coach, a digital managerial assistant and an AI-assisted HRM tool.
- The **United States**' Federal Workforce Priorities Report (2022) identified eight workforce development priorities, four considered "primary". Agencies must work on two primary priorities and leverage others where possible. Primary priorities include fostering an agile organisation and growth mindset and leveraging technology to modernise processes, encouraging agencies to mobilise advanced technologies to transform the employee performance culture. Good practice examples include mobilising data analytics to examine employee experience and introducing intelligent matching processes to scale in-house mentoring.

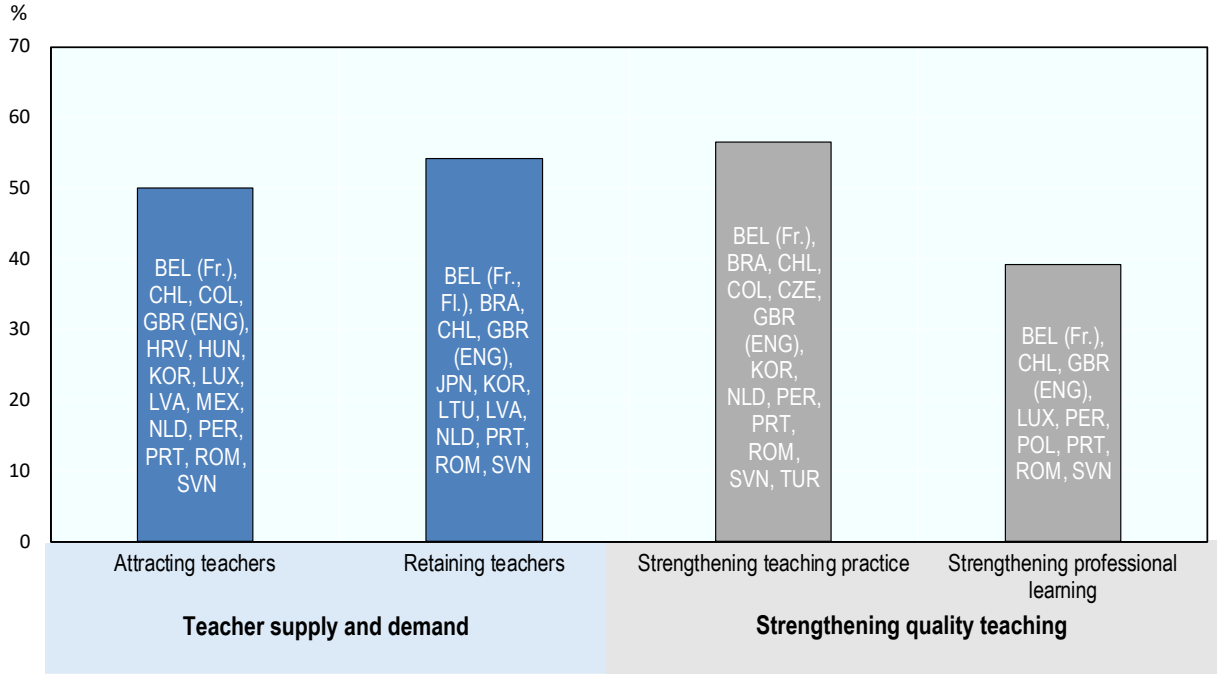
Source: Johnson, Coggburn and Llorens (2022[23]), "Artificial Intelligence and Public Human Resource Management: Questions for Research and Practice", *Public Personnel Management*, 51(4), https://doi.org/10.1177/00910260221126498; Ministère de la Transformation et de la Fonction Publiques (2024[24]), *Strategy for the use of artificial intelligence in human resources management in the State civil service*, https://www.fonction-publique.gouv.fr/files/files/Publications/Publications%20DGAFP/2024/guide-strategie-usage-intelligence-artificielle-EN.pdf; U.S. Office of Personnel Management (2022[25]), *2022 Federal Workforce Priorities Report*, https://www.opm.gov/policy-data-oversight/human-capital-management/federal-workforce-priorities-report/2022-federal-workforce-priorities-report.pdf.

Considering broader aspects that could hinder implementation success

Beyond monitoring policy progress through core measurement indicators, education systems must also consider contextual factors that may impact the success of policy implementation. Integrating these factors into monitoring and evaluation frameworks can help identify potential obstacles early and guide more effective policy adjustments. According to the EPO Survey 2024, 22 participating education systems (69% of the 32 systems implementing new policies since January 2023) reported at least one barrier to implementation across different educational levels (Figure 4.3).

Figure 4.3. Implementation obstacles across areas of teacher policy surveyed (2023/2024)

Percentage of education systems selecting an implementation obstacle across any level of education



Note: 1. Thirty education systems responded to attracting teachers, 24 education systems responded to retaining teachers, 23 education systems responded to strengthening teaching practices, and 21 education systems responded to strengthening professional learning. 2. Education systems could select more than one implementation barrier across each of the four priority areas. 3. Period covered: January 2023 to mid-2024.
Source: OECD (2024[2]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024, OECD, Paris.

Insights from the survey reveal an interesting distinction between policy implementation and evaluation challenges. While strengthening professional learning is most often cited as having at least one barrier to effective monitoring and evaluation, policies to enhance teaching practice pose greater challenges for implementation, with 57% of education systems facing barriers in this area. Approximately half of the systems also reported implementation barriers in policies aimed at attracting (50%) and retaining (54%) teachers. Challenges in implementing professional learning initiatives were noted by a slightly smaller share (39%) of education systems. As one respondent noted in the EPO Survey 2024:

> *The biggest obstacle is the systemic aspect and the scale of the reform undertaken. The sustainability of the reforms has proven to be precarious, and some projects have had to be put on hold. The concurrent nature of the ongoing reforms and the health crisis has delayed the implementation of certain changes.*

Education systems frequently encounter implementation obstacles across multiple policy areas, underscoring the challenges inherent in educational reform. These overlapping barriers risk hindering

progress on both the urgent and important priorities, which are already challenging to balance and implement simultaneously (Table 4.2).

Table 4.2. Education systems experience implementation obstacles across multiple policy areas (2023/2024)

Education systems that reported implementation barriers by policy area in at least one level of education

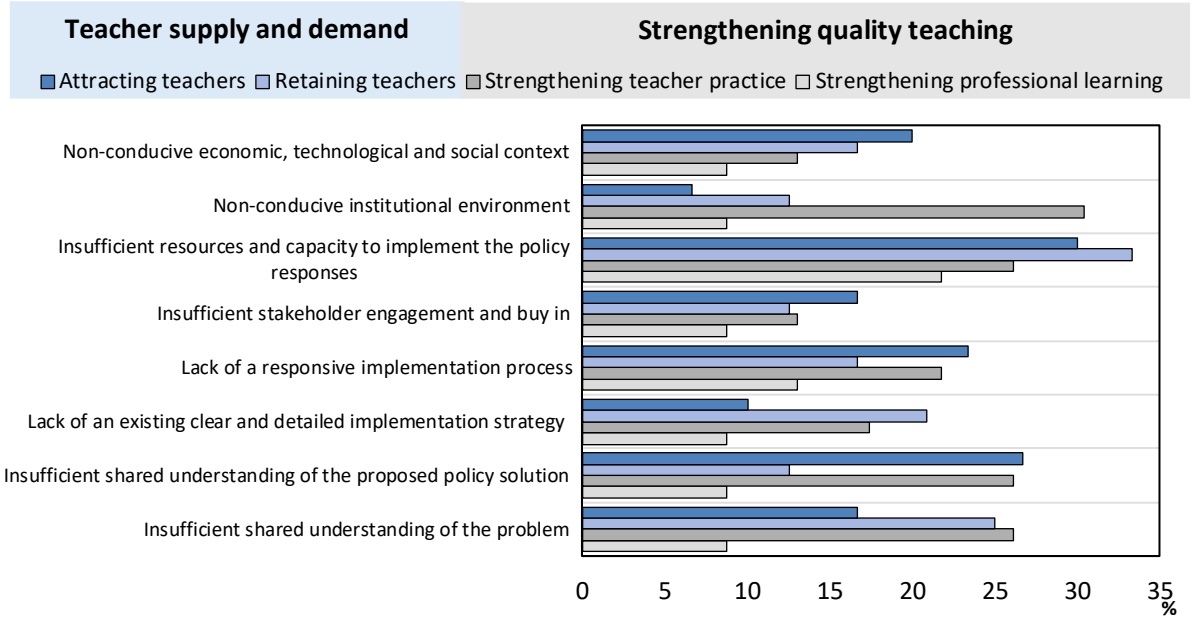
Countries	Teacher Supply and Demand		Strengthening Quality Teaching	
	Attracting Teachers	Retaining Teachers	Teaching Practice	Professional Learning
Austria			N/A	
Flemish Comm. (Belgium)		⚠		
French Comm. (Belgium)	⚠	⚠	⚠	⚠
German-speaking Comm. (Belgium)		N/A		N/A
Brazil		⚠	⚠	
Chile	⚠	⚠	⚠	⚠
Colombia	⚠	N/A	⚠	
Croatia	⚠		N/A	N/A
Czechia		N/A	⚠	N/A
Finland			N/A	N/A
France				
Germany		N/A		
Hungary	⚠		N/A	
Iceland				
Ireland	N/A	N/A		N/A
Japan		⚠	N/A	N/A
Kazakhstan			N/A	N/A
Korea	⚠	⚠	⚠	
Latvia	⚠	⚠	N/A	N/A
Lithuania		⚠		
Luxembourg	⚠	N/A	N/A	⚠
Mexico	⚠			
Netherlands	⚠	⚠	⚠	N/A
Norway				
Peru	⚠	N/A	⚠	⚠
Poland	N/A	N/A	N/A	⚠
Portugal	⚠	⚠	⚠	⚠
Romania	⚠	⚠	⚠	⚠
Slovenia	⚠	⚠	⚠	⚠
Spain				
Türkiye			⚠	
England (United Kingdom)	⚠	⚠	⚠	⚠

Note: 1. Red cells (marked with ⚠) indicate policy areas where education systems reported implementation barriers; blue cells indicate areas with no reported barriers; and grey cells (marked with N/A) indicate areas where no new policy has been implemented since January 2023 (as reported by education systems). 2. Greece is not represented, as it is not implementing any policy initiatives within the four policy areas. 3. Period covered: January 2023 to mid-2024.
Source: OECD (2024[2]),, Education Policy Outlook National Survey for Comparative Policy Analysis, OECD, Paris.

Insufficient resources and stakeholder capacity emerged as the most frequently cited obstacle, with approximately one-third of education systems reporting this challenge across all policy areas (Figure 4.4.). This resource gap highlights the need for careful planning and resourcing to ensure implementation success across diverse policy domains.

Figure 4.4. Implementation issues vary depending on the policy field (2023/2024)

Percentage of education systems



Note: 1. Thirty education systems responded to attracting teachers, 24 education systems responded to retaining teachers, 23 education systems responded to strengthening teaching practices, and 21 education systems responded to strengthening professional learning. 2. Education systems could select more than one barrier across any level of education. 3. Period covered: January 2023 to mid-2024.
Source: OECD (2024[2]), Education Policy Outlook National Survey for Comparative Policy Analysis 2024, OECD, Paris.

Beyond resource limitations, there is notable variability in implementation barriers depending on the policy area. Insufficient understanding of the proposed policy solution was reported by over a quarter of the systems attempting to strengthen teaching practices (26.1%, or 6 out of 23 systems) and attract teachers (26.7%, or 8 out of 30 systems). For strengthening teaching practices specifically, 30.4% of respondents (7 out of 23 systems) noted that institutional arrangements and policy alignment within the education system are not conducive to successful implementation, a barrier less commonly reported in other areas. These findings suggest that effective reform requires tailored approaches that reflect the unique demands of each policy area and educational level and must be accounted for in the design of monitoring and evaluation frameworks.

In addition to financial resourcing challenges, there are sometimes limitations on how resources are allocated, often influenced by institutional guidelines. For example, the French Community of Belgium noted:

> *Financial resources have been released to enable said organising authorities to deploy support policies for teachers, but institutional guidelines, particularly in terms of allocation of these resources within schools, constitute limits to the implementation of appropriate strategies.*

Recognising these barriers, Japan has collected and disseminated good practices contributing to resolve teacher shortages, and suggested some measures that can be used as reference for each local government to promote their own initiatives. These are intended to overcome the barriers associated with not having a clear and detailed implementation strategy. Furthermore, this type of system-level guidance can support consistency and coherence in implementation across local government areas, while allowing for local adaptation.

Some strategic considerations based on the views from participating education systems

Based on the findings in this chapter, policymakers may consider the following steps to address the immediate priority of teacher shortages and the longer-term goal of strengthening teaching quality:

1. **Diagnosing future needs through improved forecasting, monitoring and evaluation.** Building robust monitoring and evaluation systems provides a foundation for strategic policy planning. Through real time and forward-looking assessments, education systems can better understand current and projected workforce needs, including potential AI integration (such as in terms of learning analytics, or to enhance teacher reflection, preparation and collaboration), in the profession. Granular and sophisticated data enable education systems to identify and quantify teacher shortages and determine effective interventions, forming a coherent long-term policy strategy. Yet, how the needed data are identified, collected, and processed, are important policy decisions that require thoughtful reflection about the specific context, local and systemic aims, and resources to achieve this.
2. **Adopting a strategic approach to policy design and implementation.** While reforms should be grounded in a long-term strategic plan, education systems also need flexibility to address urgent needs. A balanced approach enables systems to address immediate demands while aligning with broader, enduring goals. An agreed-upon strategic vision can support this balance, allowing for timely responses to evolving challenges and pre-empting potential implementation barriers.
3. **Determining the resources and capability required to implement reform.** Insufficient financial resources and stakeholder capacity remain common barriers to successful reform, as indicated by EPO Survey 2024 respondents. Systems must plan for adequate resourcing from the beginning, accounting for human resources – skills, expertise, and capacity – at all levels, alongside necessary financial investments. A well-defined plan can guide efficient and effective resource allocation and increase the likelihood of successful implementation.

Table 4.3. Overview of tables and figures in Chapter 4

Figure/Table	Title	Source
Figure 4.1	Forecasts regarding teacher shortage for 2025-2030 are not commonplace	EPO Survey 2024
Figure 4.2	Barriers to policy monitoring and evaluation differ based on the area	EPO Survey 2024
Figure 4.3	Implementation obstacles across areas of teacher policy surveyed	EPO Survey 2024
Figure 4.4	Implementation issues vary depending on the policy field	EPO Survey 2024
Table 4.2	Education systems experience implementation obstacles across multiple policy areas	EPO Survey 2024

StatLink https://stat.link/b54xq8

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Annex A. Deep dives

Balancing teacher demand and supply to address shortages

Box A1.1. Increasing enrolment in initial teacher education in Iceland

Background

Like the majority of OECD education systems, Iceland is facing teacher shortages, particularly in rural areas, where recruitment and retention of qualified teachers over past decades have been challenging. This issue became more pronounced following the implementation of a five-year teacher education programme in the early 2000s (from three years), which required prospective teachers to complete a master's degree. The addition of two years of teacher education was considered by some to have exacerbated teacher shortages more significantly than had originally been anticipated, with those enrolled experiencing slow progress and numerous dropouts before the completion of the degrees.

It was in this context that the Icelandic government launched a five-year action plan in 2019 (Government of Iceland, n.d.[1]), aimed at improving the recruitment and retention of teachers. The plan sets out clear goals to increase enrolment in teacher education programmes and to raise the number of qualified teachers graduating from universities, as well as preventing early career teacher attrition. As part of this plan, a new act came into force at the beginning of 2020, which impacted the organisation of teacher education (The Act on Education, Qualifications and Employment of Teachers and School Administrators in Preschool, Primary and Secondary Schools). Iceland's approach to teacher recruitment and retention, while sharing commonalities with other countries in terms of financial incentives (United States) and mentoring programmes (Finland, Canada and Singapore), distinguishes itself through its unique flexibility in certification across school levels.

The following elements were implemented:

- **Increasing enrolment and supporting completion:** Efforts were made to boost enrolment in teacher education programmes, including the option to replace a master's thesis with coursework. This flexibility is intended to make it easier for students from various educational backgrounds to complete their degrees.
- **Strengthening in-school professional development through paid internships:** Final-year students in teaching programmes are offered a 50% paid internship at preschools or primary schools. The goal is to strengthen student teachers' readiness for the profession by aligning initial teacher education more closely with practical, on-the job-experience, support their transitions into teaching roles, and increase their likelihood of remaining in it.
- **Reducing early career attrition through mentorship support:** The plan also places a strong emphasis on mentoring. Highly qualified teachers receive financial incentives to mentor novice teachers during their first two to three years in the profession.
- **Simplifying teacher certification:** By making a Master's thesis optional (with the possibility of replacing this with coursework), Iceland has made it easier for students to qualify as teachers through the avenue that is most relevant to their individual aspirations. This has been described as a movement from "research-based to practice-oriented teacher education" (Sigurðsson, Björnsdóttir and Jóhannsdóttir, 2023[2]).

- **Adopting one license for all school levels:** The new act allows licensed teachers to move more easily between school levels, such as primary and secondary schools, and removes special positions for specific subjects like sports and arts, creating a more flexible and accessible certification system.

Implementation Process

The design and implementation of Iceland's action plan involved extensive stakeholder engagement, bringing together government ministries, teacher unions, universities and parents. This stakeholder engagement and collaboration is key to ensuring buy-in and is designed to meet the various needs of actors within the education system.

Evaluative Knowledge

The number of new teachers enrolling in, graduating from teacher education programmes, and entering the system has increased significantly since the plan's implementation. For example, the number of students graduating from teacher programmes rose from 45 in 2019 to 164 in 2021 (Sigurðsson, Björnsdóttir and Jóhannsdóttir, 2023[2]).

Despite promising signs, the long-term impact of the changes is still uncertain. The policy's full effects on teacher retention and student outcomes will only become clear over time.

Looking Ahead

A key lesson from Iceland's strategy for attracting teachers is the importance of flexibility in teacher education and certification. By reducing barriers to entry and providing practical, paid professional development experiences, Iceland has been able to significantly increase the number of teacher graduates in a short time. This approach offers a valuable next practice for other countries facing similar shortages.

However, moving forward, Iceland must continue to refine its policies to ensure equal access to internships and mentoring opportunities, particularly in rural areas. Additionally, more rigorous evaluation of the programme's long-term impacts will be critical to its success, including through longitudinal evaluation that follow new teachers over the course of their careers to better understand how the reforms affect retention, job satisfaction and teaching quality.

Another potential blindspot is the sustainability of the financial incentives provided to mentors and interns. While effective in the short term, reliance on these incentives may not be feasible in the long run without secure, consistent funding.

Sources: Government of Iceland (n.d.[1]) Let's increase the number of teachers: measures in education, https://www.stjornarradid.is/verkefni/menntamal/adgerdir-i-menntamalum/fjolgum-kennurum-adgerdir-i-menntamalum/, accessed 4 September 2024; Sigurðsson, Björnsdóttir & Jóhannsdóttir (2023[2]), Five-Year Teacher Education for Compulsory School in Iceland: Retreat from Research-Based to Practice-Oriented Teacher Education?. In: Elstad, E. (eds) Teacher Education in the Nordic Region. Evaluating Education: Normative Systems and Institutional Practices. Springer, Cham. https://doi.org/10.1007/978-3-031-26051-3_8.

Box A1.2. Integrating AI to reduce workload and augment teacher practice in Singapore

Background

Singapore is a notable example of a leading education system where teaching is highly attractive, and where top talent is retained within the profession. Singapore is well-recognised for its focus on maintaining teacher quality, through rigorous entry requirements, evidence-based preparation and ongoing professional development (Chong and Gopinathan, 2019[3]). The annual resignation rate for teachers in Singapore is low, remaining stable at around 2% since 2018 (Ministry of Education, 2024[4]).

However, Singapore is currently facing the same imperative as other education systems. This involves responding to the disrupting forces of AI and other emerging digital technologies, and to ensure that teachers are adequately prepared to harness its potential in the classroom.

In this respect, Singapore is also a leading education system for its work in outlining a long-term plan and implementing AI and digital technologies in its education settings. This is underpinned by the Singapore government's National AI Strategy, launched in 2019, which outlines a vision for integrating AI across various sectors, including education. Through this strategy, Singapore aims to provide students with a more personalised learning experience, tailored to their individual strengths and weaknesses. This also aims to reduce the amount of time teachers spend on routine assessment tasks, while providing data-driven insights (Smart Nation Singapore, 2019[5]). These objectives are built upon, and operationalised, in Singapore's "Transforming Education through Technology" Masterplan 2030" (Ministry of Education, 2023[6]).

While not explicitly tied to matters of teacher retention, many of the objectives, implementation processes and learnings are highly valuable to education systems for this purpose. This is because these actions are important for addressing drivers of poor teacher retention as outlined in Chapter 2, including supporting collaborative practices at the institutional level, and focusing on augmenting teacher practices, teacher time reduction and investment in professional development.

Implementation Process

Singapore's approach to implementing its education technology policies is through the five strategic thrusts of the Masterplan and supported by three key enablers (Ministry of Education, 2023[6]).

One aspect of the implementation process was the focus on enhancing schools' capacity to use data for informed decision-making in teaching and learning. Another key aspect was to ensure that the use of educational technology tools are appropriate and pedagogically sound. The Ministry of Education (MOE) prioritised providing professional development opportunities for educators, specifically in e-pedagogy and utilising learning data to enhance the effectiveness of teaching and learning.

Furthermore, Singapore continues to establish a robust network of strategic partnerships to support the AI-driven transformation of its education system. The MOE facilitated the creation of both local and global EdTech partnerships, engaging with other government agencies, industry players, and research centrers. This collaborative approach not only brought in expertise and resources from outside the traditional educational sphere but also helped align the AI tools and strategies being implemented to ethical principles and sound pedagogical considerations, with necessary guardrails.

The implementation process also included a focus on teacher-led innovation. The Ministry of Education encouraged the creation and sharing of teacher resources at the school level, facilitating partnerships with teacher-developers to amplify ground-up innovation. This approach towards teaching as a team sport is intended to empower educators to take an active role in shaping how AI and technology was integrated into their classrooms.

Evaluative Knowledge

While the key ingredients behind Singapore's success in attracting and retaining teachers are well-documented, there is currently a notable lack of publicly available evaluative evidence on the long-term effectiveness of its many strategies, particularly in relation to teacher retention and student outcomes. The absence of comprehensive data and studies makes it difficult to draw definitive conclusions about the impact, and counterfactual, of each initiative.

Regarding the implementation of AI tools in classrooms, the evaluation process will need to occur over a sufficiently long period to capture the full range of effects. This is because the adoption of AI in education is still in its early stages, and the impacts may only become apparent after a matter of years. For instance, while AI tools are intended to improve personalised learning and reduce administrative burdens for teachers, it is still too early to determine whether this is being realised in practice. Additionally, it is unclear what teachers are doing with their additional time and what is impactful. Importantly, it is unknown how these changes will affect long-term teacher retention and student achievement.

Looking ahead

Singapore's experience with integrating AI into education offers several important lessons for the future. One key lesson is the importance of professional development tailored to the needs of teachers at different stages of their careers, and those undertaking initial teacher education. As AI becomes increasingly embedded in the educational landscape, ongoing professional development will be crucial to ensure that teachers are leveraging these tools undergirded by sound pedagogical principles, in their practice.

An appropriately paced implementation approach is also important. For example, Singapore ensured that teachers had access to the professional development and capacity building required to benefit from, and to harness the potential of new digital technologies.

Looking ahead, Singapore plans to expand its AI initiatives further and aims to move the needle on its education outcomes and national progress on AI, while mitigating risks against potential negative impact to learning outcomes. The insights and evaluative evidence on achieved and unintended outcomes that will be gathered stand to have far-reaching utility for other education systems for matters of teacher retention and more broadly.

Sources: Ministry of Education (2024[4]) Data on resignation rates for teachers since 2018, https://www.moe.gov.sg/news/parliamentary-replies/20240702-data-on-resignation-rates-for-teachers-since-2018#:~:text=1.,2%25%20per%20year%20since%202018, accessed 9 September 2024 Ministry of Education (2023[6]), "Transforming Education through Technology" Masterplan 2030, https://www.moe.gov.sg/education-in-sg/educational-technology-journey/edtech-masterplan Accessed 2 September 2024; Smart Nation Singapore (2019[5]) National Artificial Intelligence Strategy, https://www.smartnation.gov.sg/files/publications/national-ai-strategy.pdf, Accessed 2 September 2024.

Box A1.3. Increasing teacher supply through localised approaches (United States)

Background

The "Grow Your Own" (GYO) initiatives were developed in response to several pressing issues within the education system in the United States. One of the primary challenges was the persistent shortage of qualified teachers, particularly in underserved and rural areas. This shortage disproportionately affects schools in low-income communities, where high turnover rates further exacerbate the problem. Another issue is that at times, the diversity within the teaching workforce may not reflect the student and school communities in which they serve. Such disparities can limit students' opportunities to see themselves reflected in their educators, which research shows can negatively impact student engagement and achievement.

GYO initiatives vary widely in their design and implementation approach. The single, near universal feature of GYO initiatives is that they aim to increase teacher supply by targeting individuals who work in, live in, or attend schools near a specific district. These may include school support staff, community members, local college students or high school graduates. The emphasis on recruiting from within the community is based on an underlying assumption that teachers are more likely to stay in their positions, reducing turnover and fostering stronger relationships with students and families. This has flow-on impacts on other outcome areas, including attracting teachers. Creating a more diverse workforce also gives more opportunities for students to see themselves in their teachers, but is also an inherent opportunity for attracting the next generation to the workforce.

There are two predominant types of GYOs: those that promote students' interest and awareness of a teaching career (for example, through high school clubs or courses), and those that provide a certification pathway and support by removing common barriers to entry. For the latter, this occurs through financial assistance, such as tuition reimbursement and scholarships, living stipends, as well as holistic support like mentoring and job placement services. As such, GYO programmes hold the potential to expand the pool of effective teachers, reduce teacher staffing challenges, and increase teacher retention by recruiting teachers from the surrounding community.

Implementation Process

While there is no definitive assessment of how many GYO programmes are currently operating in the United States, a systematic national collection and analysis of programmes that self-describe as "GYO" found that, at the time of collection, that there has been widespread proliferation in the past five years, with approximately 40 states and Washington D.C. operating a GYO programme (Edwards and Kraft, 2024[7]).

The implementation of GYO initiatives is highly local and, as a result, there is large variation in their design and strategy. For instance, some programmes support participants to undertake pathways that involve traditional routes and certifications, while others offer nontraditional pathways that bypass undergraduate teacher education programmes. Others do not provide support but rather focus on promoting interest in a career in teaching. This is both a strength of the initiative (for instance, where this helps to reduce localised challenges in specific contexts) as well as a potential weakness (where the effective features of the programmes are not transferrable).

A distinct feature of the GYO initiatives is that they aim to provide individualised support for candidates, and that the management and delivery of the programmes aims to be tailored to meet the specific needs of the communities they serve. This typically occurs through partnerships between school districts, community organisations, and educator preparation programmes. Each partner provides additional layers of support to programme candidates to support completion of the programme, which include paid

job-embedded learning, academic advising, flexible scheduling for courses, mentorship, tutoring, preparation and a cohort model (New America, n.d.[8]).

The cost-effectiveness of GYO programmes is another strength. Because GYO teachers are often from the communities in which they teach, the programme theory is that they are more likely to stay in their positions long-term, which further contributes to the stability of the teaching staff. By reducing teacher turnover, these programmes save costs associated with recruiting and preparing new teachers. Yet, the implementation of GYO programmes is not without challenges. While many GYO programmes combine state funding, grants and local contributions, ensuring a stable financial base can be difficult.

Evaluative Knowledge

Currently, much of the evidence supporting the success of GYO programmes is anecdotal or based on stakeholder reports or single-site case studies within their own schools or district specifically. There are indications that GYO programmes have been effective in recruiting teachers of colour, where the focus is on creating a diverse teaching workforce that reflects the student population. A review conducted by RAND on six GYO programmes revealed that these initiatives recruited a higher percentage of people of colour compared to other recruitment efforts. Specifically, 52% of teachers recruited through GYO were people of colour, compared to 43% from other recruitment efforts. A study of the rollout of the Teacher Academy of Maryland GYO (a career and technical education certificate programme across public high schools) also found that exposed students were more likely to become teachers (Blazar et al., n.d.[9]).

The increase in the local teacher supply from GYO programmes may reduce teacher shortages in those areas due to the highly localised nature of teacher staffing challenges. It has been noted that GYO programmes may also be especially effective in alleviating teacher shortages in communities that do not already produce a large supply of college graduates that go on to become teachers, such as in low-income neighbourhoods and rural areas (Wodtke, Harding and Elwert, 2011[10]).

Looking Ahead

A key lesson from the GYO initiatives is the importance of localised, place-based approaches to teacher recruitment and retention. By focusing on local needs and leveraging community resources, these programmes have the potential to create a more sustainable and responsive teaching workforce.

As these programmes continue to evolve, it will be important to evaluate the initiatives to understand what is working and where there can be adaptations for improvement. This includes conducting longitudinal studies that can track the impact of GYO teachers over time and across different contexts. Additionally, there is a need for more research into the specific elements of GYO programmes that contribute most to their success, for example the support services provided, and the extent to which these should be implemented with fidelity across varied contexts.

The programme's success depends heavily on local context, specific community needs, resource availability, and the strength of local partnerships. It has also been suggested that GYO programmes may need to shift their focus from increasing interest in the profession, to removing barriers to entry and providing support to earn certification. Prior research suggests that financial and academic supports are needed for GYO participants to enter the teaching profession (Irizarry, 2007[11]; Skinner, Garreton and Schultz, 2011[12]).

Sources: Edwards and Kraft (2024[7]) Grow Your Own: An Umbrella Term for Very Different Localized Teacher Pipeline Programmes. (EdWorkingPaper: 24-895); Annenberg Institute at Brown University, https://doi.org/10.26300/0s8x-c050; New America (n.d.[8]), Grow Your Own Teachers Findings, https://www.newamerica.org/education-policy/reports/grow-your-own-teachers/findings/, Accessed 27 July 2024 Washington State Professional Educators Standards Board (2016[13]), Grow Your Own teachers report, https://www.pesb.wa.gov/resources-and-reports/reports/grow-your-own-teachers-report, accessed 27 July 2024; Wodtke, Harding & Elwert (2011[10]), Neighborhood Effects in Temporal Perspective: The Impact of Long-Term Exposure to Concentrated Disadvantage on High School Graduation. *American Sociological Review,* https://doi.org/10.1177/0003122411420816.

Supporting teaching quality to help them navigate changing contexts

Box A1.4. Levelling up the professional learning system in Japan

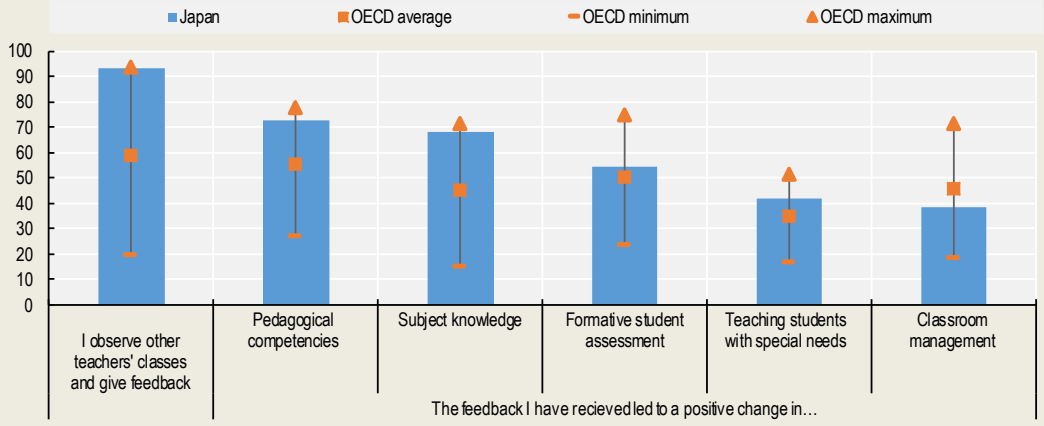
In 2019, Japan announced the start of the "Reiwa" era, redefining school education as providing individually optimised and collaborative learning that draws out the potential of all children. Reiwa-era teachers are expected to accept change positively and continue learning throughout their career, maintaining an inquisitive mind. This deep dive considers early policy efforts to realise this vision, focusing on reforms to teachers' professional learning.

Background

The Japanese school system is recognised internationally as having high-quality teachers who work collaboratively in schools to enhance practice, principally through lesson study. Data from the Teaching and Learning International Survey (TALIS 2018) show that not only is deep collaboration through peer lesson observation and feedback more common in Japan than in most OECD education systems, but larger shares of teachers perceive the feedback they receive to have a positive impact on different aspects of their teaching (Figure A1.1). Nevertheless, Japan seeks to further improve the quality of school-based collaboration and broader professional learning while resolving ongoing challenges to teacher well-being, workload and attraction.

Figure A1.1. Japan's teachers commonly collaborate to observe teaching and provide feedback

Share of lower secondary teaching agreeing with the following statements (TALIS 2018)



Source: OECD (2019[14]), *TALIS 2018 database*, https://www.oecd.org/en/data/datasets/talis-2018-database.html.

Following a major review of the status quo in 2021, Japan launched a revised system of professional learning which, among other things, seeks to tailor development activities to individual needs based on ongoing dialogue between teachers and school leaders, as well as a career-spanning development record. The revised system is notable for its efforts to be responsive to individual, school and regional needs while adhering to the national aims of the Reiwa era. It also complements a wider re-imagining of the teacher workforce which seeks to diversify specialist skills within school teams.

Implementation process

To support professional learning dialogue between school leaders and teachers, Japan developed a set of national indicators for improving teacher quality across five areas: basic ability as a teaching profession, classroom instruction, student guidance, supporting children who require special consideration and support and leveraging digital technologies. Each regional board of education must revise these indicators to take into account regional specificities, including strengths, challenges and goals for school education, and related skill needs. The indicators should account for diversity within the teacher workforce, with scope for differentiation by school type, teacher type and specialist skills. Recognising the additional demands placed by the new professional learning system on school leadership, regional authorities are also responsible for formulating indicators for leaders and their leadership teams. These should include management skills and human resource development. In 2022, Japan introduced Guidelines for encouraging teacher development based on guidance or advice from school leaders using teachers' development histories.

Knowing that these new measures have the potential to add considerable administrative burden to a staff cohort that works long hours, Japan is mobilising digital tools to develop an efficient and effective online platform to support the new process. In 2024, Japan launched the Platform for Teachers and Staff Development which includes the following:

- **Development-history recording system**, which enables teachers to evidence participation and completion and evaluates performance. This includes tests to check the acquisition of knowledge and skills or practice reports and reflective tasks that will help participants relate learning to their own practice. Teachers are required to record all professional learning activities from 2023.
- **Catalogue of development opportunities** from which teachers and leaders can select those that best respond to their own and their school's needs.
- **Library of video on-demand teacher development programme** developed by universities, boards of education, and public-interest corporations, among others. The platform also incorporates mechanisms for sharing development content, recording participation and completion and evaluating performance. These mechanisms are also available for school-based and collaborative development and lesson study.

Evaluative knowledge

The reforms are in the early stages of implementation. However, an advantage of the platform is that it can facilitate system-level monitoring and policy evaluation. By centralising the national professional learning offer, Japan can more easily ensure the quality of learning content and comprehensive coverage according to national goals. There is also scope to build strong system-level data based on teachers' learning pathways and evaluations.

Looking ahead

In the years to come, it will be important to ensure the platform is accessible to all and easily navigated. This will also help as part of efforts to ensure the platform does not add administrative burden or become just a box ticking exercise for teachers.

Source: Central Education Council (2020[15]), *Realising a "new way of learning for teachers" and promoting diverse expertise,* MEXT, https://www.mext.go.jp/content/20221219-mxt_kyoikujinzai01-1412985_00004-1.pdf; OECD (2019[14]), *TALIS 2018 database,* https://www.oecd.org/en/data/datasets/talis-2018-database.html.

Box A1.5. Nurturing technology-driven pedagogical innovation in Korea

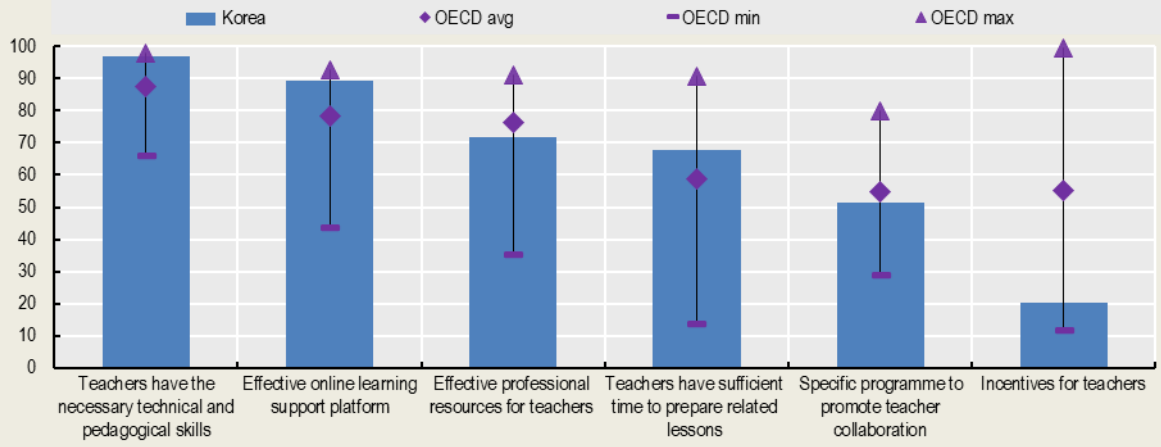
This deep dive explores very recent measures in Korea to bring together teacher-led pedagogical innovation and high-tech developments to activate a full-scale transformation of school education.

Background

Korea has been among the highest performing school systems in mathematics, reading and science since the earliest cycles of the Programme for International Student Assessment (PISA). Over the same period, governments have consistently prioritised strategic efforts to embed digital technologies in education. The COVID-19 experience evidenced Korea's preparedness for digital learning relative to many international peers (Figure A1.2).

Figure A1.2. Schools in Korea are relatively well-prepared for digitally enhanced teaching

Based on school leaders' reports in PISA 2022



Source: OECD (2023[16]), *PISA Database 2022*, https://www.oecd.org/pisa/data/2022database/.

Nevertheless, Korea has identified a growing frustration that digital education has not transformed teaching and learning to the extent it could. Although this policy challenge is not unique to Korea, the response is noteworthy. Building on recent AI leaps, Korea is now pursuing numerous policy efforts to instigate a whole-of-system paradigm shift from one-size-fits-all teaching models designed to transfer knowledge from teacher to student, to personalised learning through relationship-centred teaching that develops agency for the digital era.

Implementation process

To realise this transformation, Korea is pursuing an array of policy measures (Figure A1.3):

1. **Revising system architecture.** Korea has established a dedicated bureau within the Ministry of Education to oversee the Digital Transformation. This is supported by a Digital Education Support Centre within the Korean Educational Development Institution which will focus on related monitoring, evaluation, research and development. Three strategic plans frame Korea's

efforts each focused on digital innovation, pedagogical innovation and private-public partnership, respectively.

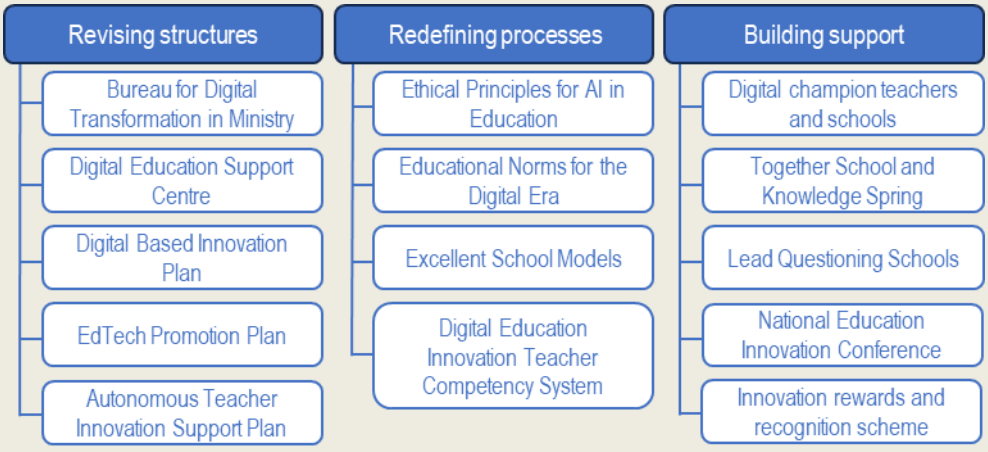
2. **Redefining system processes.** Korea is establishing guidelines, frameworks and practice models to influence the direction of innovation. In 2022, Korea announced the world's first Ethical Principles of AI in Education. Korea built on these in 2024, with a set of Educational Norms for the Digital Era. Both documents emphasise technology's position as a support mechanism for teacher-led innovation. Korea is also in the process of developing models of best practice for a range of different processes including leading innovative schools, teaching with AI textbooks and working with EdTech. Leading teachers and school leaders, as well as experts and local education authorities have been deeply involved in the development of each of these measures.

3. **Building system buy-in.** Most measures are voluntary and will require a critical mass of teachers and schools to buy into the concepts behind the classroom revolution. Korea is taking two main approaches:

    a. *Incentivising and valuing innovative teaching through rewards and recognition programmes.* Innovative teachers and schools, and/or those who support their colleagues or share high quality material, can receive national and regional awards, welfare bonuses, digital certificates and badges and professional learning abroad.

    b. *Building capacity for participation through peer learning and knowledge sharing.* This includes numerous champion teacher and school schemes but also fostering a vibrant online professional community and resource sharing platform. It also includes efforts to reactivate and/or broaden the scope of pre-existing measures such as professional learning communities, lesson study and research groups, and collaborative teaching models.

Figure A1.3. Implementation efforts to establish digital pedagogical innovation culture in Korea



Source: OECD (2023[16]), PISA Database 2022, https://www.oecd.org/pisa/data/2022database/; OECD (2023), "Korea", in *Country Digital Education Ecosystems and Governance: A Companion to Digital Education Outlook 2023*, https://doi.org/10.1787/9bc3603b-en. National Education Commission (2023[17]), *Digital-based Education Innovation Plan*, https://www.ne.go.kr/portal/bbs/B0000010/view.do?nttId=270&menuNo=200010&searchCnd=3&searchWrd=&pageIndex=3; National Education Commission (2024[18]), *Educational Norms for the Digital Era*, https://www.ne.go.kr/portal/bbs/B0000010/view.do?nttId=528&menuNo=200010&pageIndex=1;

Box A1.6. Fostering a culture of evidence-informed practice in Norway

A system-level culture that values research use is key for strengthening impact. Among OECD countries, Norway is a leading example. This deep dive examines policy efforts in recent years to strengthen that culture further, emphasising the translation of research into evidence-informed teaching and learning. It complements a previous OECD case study exploring evidence-based education policy making in Norway (see Mouthaan et al. in OECD (2023[19])).

Background

In 2018, a system evaluation determined that while the quality of education research in Norway had improved considerably in the previous decade, the connections between research, policy and practice required strengthening. This echoed research that found that teachers in Norway actively contribute to research only to a relatively small extent and that more should be done to empower the profession to build a strong professional knowledge base.

Since then, Norway has introduced major reforms to teacher education for ECEC and school practitioners, strengthening the development of future teachers' research competence and the connections between researchers, teacher educators and schools. In parallel, Norway has made efforts across the education research infrastructure from ECEC to adult education, as well as teacher policy, to enhance connections between research and practice. Among other objectives, this ecosystem approach seeks to ensure that when teachers begin their professional careers, they will be working in environments receptive to enquiry-driven practice.

Implementation process

In 2017, Norway's Ministry of Education and Research launched the National Strategy for Quality and Cooperation in Teacher Education (2017). Key aims include:

- Developing intellectually challenging and rewarding study programmes delivered by academically strong providers. This means aligning teacher education with the academic rigour of other higher education programmes and ensuring that teacher education institutions engage in more research and development in schools and ECEC settings.
- Securing knowledge-based and involved partners in ECEC settings and schools, and ensuring stable, mutually beneficial cooperation between them and teacher education institutions.

Implementation measures have included a national framework for partnerships between education settings and teacher education institutions; an increase in dual positions whereby experienced teachers lecture part-time on campus and academic faculty work part-time in schools; and the introduction of research-based Master's education for new teachers.

In 2020, a report prepared on behalf of the Ministry of Education and Research, concluded that most of Norway's teacher education institutions have established partnerships with schools, covering several different types and areas of cooperation. In particular, the practical training/study component is key in promoting collaboration between employees in teacher education and in schools and kindergartens. In 2019/2020, approximately half of the institutions included shared positions as part partnership collaborations.

However, the report also identified some areas that could enhance deep collaboration including addressing the uneven power dynamics between settings and teacher education institutions, strengthening research capacity within teacher education institutions and fully integrating a school-based practicum into research processes.

As part of efforts to overcome these challenges, Norway has also looked beyond teacher education policy to embed a culture of collaboration between research and practice more widely across the education sector. Norway's Strategy for Educational Research 2020-24 seeks to stimulate user participation in research into practice-oriented issues. This guides the main funding programme for education research (FINNUT) which has emphasised initiatives seeking to enhance the role of research in change processes in educational settings and to facilitate knowledge development based on educators' needs. More recently, FINNUT has emphasised collaborative projects that investigate the effect of measures to enhance quality. Researchers apply for funding in close collaboration with educational settings who determine which measures are to be tested.

Norway's various national and education research centres have also contributed, providing research-led professional development, knowledge dissemination and other support for research-based practice. There are dedicated centres for various levels of education as well as priority thematic areas. The National Research Centre for Teacher Education has developed an extensive PhD programme for teachers. Contrary to other disciplines, these PhD candidates are typically mid-career professionals and pursue research that is practice-oriented and in close connection with the sector.

Evaluative knowledge

The Research Council's annual report 2023 notes that efforts to strengthen the research effort in teacher professional development have been very impactful, contributing to greater cooperation with educators, enhancing the knowledge base for teacher education, and increasing research capacity in the profession. However, there is a need to further develop mechanisms through which education settings themselves, in collaboration with research environments, apply for research funding.

Qualitative data finds that students studying the new Master's programmes are generally content with the process: most understand the purpose of the thesis, feel well-prepared for it and recognise that it enhances their research literacy. However, opinions are more mixed regarding the extent to which it prepares them for enquiry-led practice. Similarly, while attitudes towards school practicum are positive, most respondents feel the follow up and integration of school-based experiences in professional development programmes could be better.

Looking ahead

As the first cohorts of teachers move through a more research-oriented initial teacher education programme and into full-time work in the profession, it will be important to consider how schools can make the most of their research skills while also supporting them to develop them further across their careers. In addition, it will be important to explore ways in which their skillset can be used to support more experienced colleagues who have not received research-oriented professional development to develop more evidence-informed and inquiry-driven practice.

Sources: Cochran-Smith et al. (2020[20]), *Transforming Norwegian Teacher Education: The Final Report of the International Advisory Panel for Primary and Lower Secondary Teacher Education,* https://khrono.no/files/2020/05/18/transforming-norwegian-teacher-education-2020.pdf; NOKUT (2024[21]), *Evaluations – quality in education*, https://www.nokut.no/en/publications/evaluations--quality-in-education/; Norwegian Ministry of Education and Research (2020[22]), *Research, knowledge brokering and use: Strategy for educational research 2020-2024*,https://www.regjeringen.no/contentassets/8b5e5ebb145540f581c9996ef164acfb/kd_strategi-for-utdanningsforskning-2020-2024.pdf; Norwegian Ministry of Education and Research (2018[23]), *Teacher Education 2025: National Strategy for Quality and Cooperation in Teacher Education*, https://www.regjeringen.no/contentassets/d0c1da83bce94e2da21d5f631bbae817/kd_teacher-education-2025_uu.pdf; OECD (2023[19]), *Who Really Cares about Using Education Research in Policy and Practice?: Developing a Culture of Research Engagement, Educational Research and Innovation,* https://doi.org/10.1787/bc641427-en; Research Council of Norway (2023[24]), *Portfolio analysis for Education and Skills*, https://www.forskningsradet.no/portefoljer/utdanning-og-kompetanse/portefoljeanalysen-for-utdanning-og-kompetanse/vurderinger-av-fornyet-innsats/; Research Council of Norway, (2017[25]), Work programme 2014–2023: Research and Innovation in the Educational Sector – FINNUT, https://www.forskningsradet.no/siteassets/publikasjoner/1254032727932.pdf.

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Annex B. High-level documents on the integration of artificial intelligence in education

The documents listed below were identified through desk-based research and exchanges with countries and economies conducted between May and October 2024. The documents were analysed for the extent to which they address key topics addressed in Chapter 3 of this report, as follows:

- Enhancing teachers'/ academic staff's ability to integrate digital technologies, including artificial intelligence, into their pedagogical toolkit (i.e. for teaching, learning and assessment).
- Enhancing their capacity to use research, data and evidence to inform pedagogical change (e.g. conducting research, analysing student performance data, applying evidence to practice).
- Enhancing institutional leaders' ability to help teachers/ academic staff to integrate digital technologies including artificial intelligence, into their pedagogical toolkit (i.e. for teaching, learning and assessment).
- Enhancing their capacity to use research, data and evidence to inform pedagogical and institutional change (e.g. conducting research, analysing student performance data, applying evidence to practice).
- Enhancing teachers'/academic staff's professional collaboration with peers and other stakeholders to promote collegial learning and better practice.
- Enhancing their professional learning through leveraging digital technologies including artificial intelligence.
- Enhancing institutional leaders' professional collaboration with peers and other stakeholders to promote collegial learning and better practice.
- Enhancing their professional learning through leveraging digital technologies, including artificial intelligence.

Education system	Month and year	Title	Author	Type of document	Education level
Australia	April 2023	Generative Artificial Intelligence Guidelines https://www.teqsa.gov.au/guides-resources/higher-education-good-practice-hub/artificial-intelligence	Working group from the Australian Academic Integrity Network	Guidelines	Higher education
Australia	November 2023	The Australian Framework for Generative AI in Schools	National AI in Schools Taskforce	Framework	School
Austria	August 2023	Dealing with AI in the education system	Federal Ministry of Education, Science and Research	Guidance	Generic
Belgium (Flemish Community)	April 2024	Responsible AI in Flemish education: A collaborative process from development to use	Digisprong Knowledge Centre and the Data and Society Knowledge Centre	Vision	Generic
Belgium (French Community)	February 2024	Focus: AI	General Administration of Education	Explainer	Generic
Bulgaria	February 2024	Guidance for AI in schools	Ministry of Education and Science	Guidelines	School
Canada (Quebec)	April 2024	Generative artificial intelligence in higher education: pedagogical challenges and ethics	Higher education council and Commission on Ethics in Science and Technology joint committee of experts	Recommendations	Higher education
Chile	May 2023	Guide for teachers on how to use chat GPT	Ministry of Education	Recommendations	Generic
Croatia	April 2024	Artificial intelligence in education: Educational manual on the application of artificial intelligence in learning and teaching for teachers, teachers and professional associates in schools	Expert working group	Guidance	School
Czechia	n.d.	Recommendations on how to work with artificial intelligence for teachers, principals, parents and student	Expert working group	Recommendations	School
Denmark	April 2024	Expert group on chat GPT and other digital tools	Expert working group	Recommendations	School and tertiary
Estonia	January 2024	AI guide for school principals, teachers and students	Expert working group	Guidance	School
European Commission	2022	Ethical Guidelines on the use of AI and data in teaching and learning for educators	European Commission with support from expert group on AI and Data in Education and Training	Guidelines	School
Germany	October 2024	Recommendations for dealing with artificial intelligence	Standing Conference of the Ministers of Education and Culture of the Länder in the Federal Republic of Germany	Recommendations	School
Japan	July 2023	Provisional guidelines for Generative AI in primary and secondary education	Ministry	Guidelines	School
Korea	August 2022	AI ethics for education	Ministry	Ethical norms/ guidelines	Generic
New Zealand	n.d.	Generative AI	Ministry	Guidance	School
Norway	2023	Advice on artificial intelligence in schools	Directorate of Education	Guidance	School
Poland	November	What AI is not good for. A guide for teachers	Ministry of Education	Guidance	School

	2023		and Science		
Poland	July 2023	Chat GPT at school opportunities and threats	Ministry of Education and Science	Guidance	School
Spain		Guide on the use of artificial intelligence in education	Ministry of Education, VET and Sports	Guidance	Generic
Sweden	June 2024	Advice on AI, Chat GPT and similar tools	National Agency for Education	Guidance	School
Türkiye	May 2024	Policy Brief for Artificial Intelligence in Education: Lessons from International Forum of Artificial Intelligence in Education	Ministry of National Education	Guidance	Generic
United States (Oregon)	2023	Generative AI in K-12 Classrooms	Oregon Department of Education	Guidance	School
United States (California)	September 2023	Artificial Intelligence: Learning with AI Learning about AI	California Department of Education	Guidance	School
United States (Washington)	July 2024	Human-Centered AI Guidance for K–12 Public Schools	Superintendent of public education	Framework	School
United States	May 2023	Artificial Intelligence and the Future of Teaching and Learning Insights and Recommendations	U.S. Department of Education	Research and recommendations	School
United Kingdom (England)	July 2023	Russell Group principles on the use of generative AI tools in education	Russell Group	Principles	Higher education
United Kingdom (England)	October 2023	Generative artificial intelligence (AI) in education	Department for education	Position paper	Generic

Education Policy Outlook 2024

RESHAPING TEACHING INTO A THRIVING PROFESSION FROM ABCS TO AI

Teacher shortages have intensified across several OECD countries, making this an urgent priority for education systems. Between 2015 and 2022, the share of students whose principals reported shortages rose from 29% to 46.7% on average across the OECD. Simultaneously, rapid technological advances, such as artificial intelligence (AI), and broader socio-economic shifts, increase the need to support teachers in delivering quality education in evolving contexts. Addressing both the number of teachers and ensuring they possess the skills to meet new educational needs is essential for student success. This report presents a policy roadmap to help education systems balance the supply and demand for quality teaching in these changing times. Drawing on responses from 33 education systems to the Education Policy Outlook National Survey for Comparative Analysis, as well as additional evidence, the report outlines current challenges and key factors in their interplay. It also explores policy responses to attract, retain, and develop teachers, enhancing their teaching practices and professional learning. In doing so, the report aims to support countries in advancing the goals set by the 2022 OECD Declaration on Building Equitable Societies Through Education. This report is part of the Education Policy Outlook series – the OECD's analytical observatory of education policy.

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