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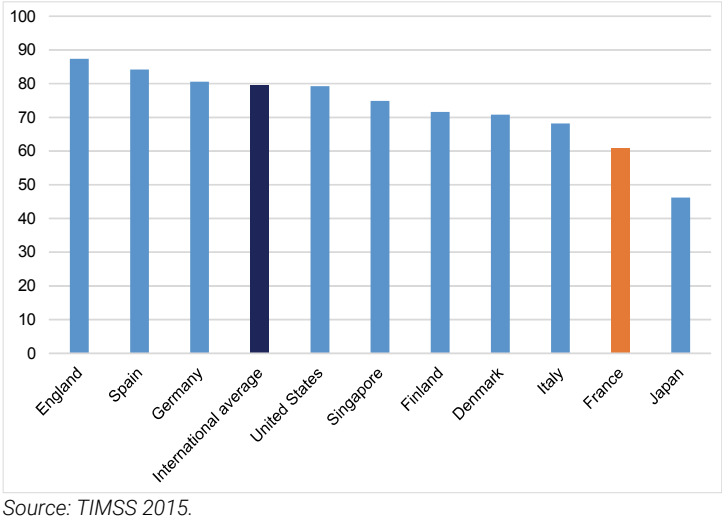
# How can government spending on education be made more efficient?

- Investment in education provides substantial long-term gains for individuals, the economy and society as a whole. However, not all government intervention in this area is equally efficient in terms of meeting the goal of educating and training citizens who are able to make a living from their work.
- Technical advances and globalisation are not only increasing demand for qualifications but also the uncertainty surrounding the abilities required in the future. Skills in science, technology, engineering and mathematics help people adjust to rapid changes but so do strong general and soft skills, such as perseverance, the ability to innovate and to cooperate.
- Education spending in France, taken as a whole and on the basis of the PISA performance indicator, is close to the OECD average in terms of efficiency but significantly trails the most efficient countries, in particular Finland. Average expenditure approaches the OECD average but it has an atypical structure at the expense of primary education. Results have been declining since the turn of the century and it is in France that social background has the greatest impact on the PISA test results.
- Empirical literature posits that teachers, and educational practices in particular, play a key role in students' academic results. By international standards, French teachers feel less well trained, especially in mathematics, and the appeal of the profession has fallen considerably.
- Beyond the reduction in class size, already rolled out in priority education areas, efforts could be made to improve the standard of teaching with an eye to boosting the efficiency of government spending, in particular for primary schools. This could involve boosting the profession's appeal and enhancing training for teachers both in their subjects and in educational practices.

**Feeling of being able to help low-performing Fourth Grade (CM1) pupils to better understand mathematics**




*Source: TIMSS 2015.*

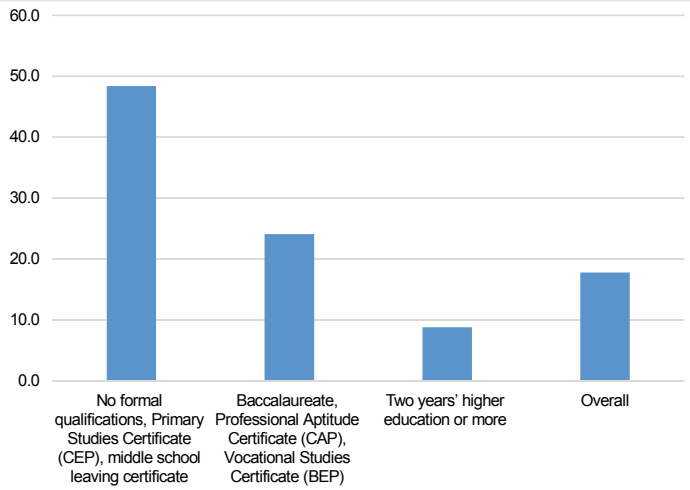
How to read this chart: 61% of French teachers claim to be able to help low-performing Fourth Grade (CM1) pupils to better understand mathematics, against an international average of 79%.

# 1. Investment in education is profitable over the medium to long term

## 1.1 Investment in education provides substantial long-term gains for individuals, public finances and the economy as a whole

For individuals, access to jobs and rates of pay are strongly correlated with education levels. The private rate of return to education can be defined as the discounted benefits derived by an individual during his/her life cycle (better pay and less risks of unemployment – see chart 1), minus costs (school fees and no salary during training periods).[1] In France, the internal rate of return to a higher education degree compared to an upper secondary diploma is, on average, 9% for women and 11% for men (as against an OECD average of 11% and 13% respectively). Furthermore, according to the "Génération 2013" survey conducted by the Céreq (Centre for Studies and Research into Qualifications), the median net wage of young unqualified workers three years after the end of their initial education is 20% lower than those with two years' higher education (Bac+2, in particular those with a higher technical certificate, BTS, or technological university degree, DUT), and is slightly over half the salary of graduates from French grandes écoles.[2]

**Chart 1: Unemployment rate (in %) of young people having left initial education less than four years ago according to qualification levels in 2017**




*Source: Insee.*

At macroeconomic level, investment in education is one of the main sources of long-term growth (or potential growth). Education boosts labour productivity, gives impetus to the innovation required to move the economy upmarket and reduces the equilibrium unemployment rate by better matching supply and demand for labour.

Higher levels of education also benefit public finances in the medium term.[3] This is due to the combined effect of higher tax revenue and social security contributions (owing to increased activity) and lower benefits due to less unemployment. For instance, the "return to public financing" – calculated from discounted tax and social security revenue, less the discounted costs for public finances (e.g. teachers' salaries) – of a higher education degree compared to an upper secondary diploma is 8%[4] in France, and this is consistent with the OECD average.

Investment in education also vehicles positive externalities that help improve social wellbeing by weighing on health issues (e.g. lessening risk behaviour such as drug use),[5] the lack of civic-mindedness[6] or criminality, the risks of which increase along with unemployment.[7] It plays a large part in ensuring social cohesion, the empowerment of citizens and the proper workings of democracy.

## 1.2 Technical advances and globalisation are increasing demand for qualifications

Higher qualifications allow workers to better confront labour reallocation due to technical advances and trade openness on the one hand, and the decline in low-skilled jobs with the dissemination of new technologies on the other. Aghion and Howitt (2006)[8] showed that, in countries like France which are closer to the technological frontier, higher education degrees play a key role in that country's relative momentum and enable it to preserve its advantage.

Furthermore, some skills heighten the ability to adjust to a rapidly-changing world: soft skills that robots and AI are not expected to acquire in the short term (for instance, the

(1) See Anne-Braun J., Lemoine K., Saillard E. and P. Taillepied (2016), "Initial and continuing education: the implications for a knowledge-based economy", *Trésor-Économics* no. 165.
(2) http://www.cereq.fr/publications/Cereq-Enquetes/Quand-l-ecole-est-finie.-Premiers-pas-dans-la-vie-active-de-la-Generation-2013
(3) See *Trésor-Économics* no. 165 – *op. cit.*
(4) See OECD (2017), "Education at a Glance", page 131.
(5) Schuller T., Preston J., Hammond C., Brassett-Grundy A., & J. Bynner (2004), "The benefits of learning: The impact of education on health, family life and social capital", Routledge.
(6) T. Dee (2004), "Are There Civic Returns To Education?" *Journal of Public Economics*.
(7) In an opinion published on 10 May 2016, France's Economic, Social and Environmental Council (CESE) posits that unemployment raises major public health issues causing between 10,000 and 14,000 deaths per year in France.
(8) Aghion P. and P. Howitt (2006), "Joseph Schumpeter Lecture - Appropriate Growth Policy: A Unifying Framework", *Journal of the European Economic Association*, vol. 4, no. 2-3.

ability to cooperate or perseverance)[9] should continue to be sought after and foster career change; skills in STEM [10]positively contribute to innovation[11] and are still lacking.[12]

Initial education is central to sustainable labour market integration and to reducing inequality, and subsequent in-service training cannot replace it. To gain from in-service training, participants have to "know how to learn" with studies showing that the most qualified benefit the most. [13]This means that bolstering skills requires efficient action to be taken as from early childhood.

### 1.3 Not all spending on education is equally efficient

Some expenditure may be effective without being efficient. The effectiveness of expenditure is assessed on the basis of a precise indicator, for instance the impact on the academic level of students or on inequality. Efficient expenditure is both effective and less costly than other initiatives that enable the same goal to be achieved.

Investment in education is very highly efficient when it targets young and underprivileged populations. The outcomes of the flagship pre-school programmes rolled out in the United States in the 1960s and 1970s (Perry Preschool, Carolina Abecedarian, Chicago Child-Parent Centers), compared to those of the programmes for older children, suggest that investment in early childhood (crèches, kindergartens and primary schools) is highly profitable from a socio-economic standpoint. Empirical research shows that young children from underprivileged backgrounds benefit greatly from reductions in class sizes.[14]Conversely, assessments conclude that grade retention is a measure that is, on average, ineffective in the medium term.[15]

## 2. France is in an atypical position and its results are average by international standards

### 2.1 An atypical structure for education expenditure

France's spending on education is consistent with the international average. In 2014, domestic expenditure on education, including higher education but excluding spending on in-service training, accounted for 5.3% of GDP, compared to an OECD average of 5.2%, with government expenditure standing at 87% (OECD average of 85%).[16] Furthermore, with Purchasing Power Parity (PPP) of $11,200 in 2014,[17] total expenditure (over all public and private teaching levels) per student and per annum is close to the OECD average ($10,800 PPP) and slightly below that of Germany ($12,060 PPP). Excluding higher education, domestic expenditure on education in France stands at 3.8% of GDP as against an OECD average of 3.6%.[18]

On the other hand, spending on the French school system has an atypical structure, at the expense of primary education. Concretely, France spends 15% less than the OECD average per student at primary level and 37%[19] more at upper secondary level (lycée in France).[20] There is an ongoing move to rectify this imbalance, however. In France, domestic expenditure on primary education per student increased from €5,670 (2015 prices) in 2005 to €6,190 in 2015 (up 9.2%) and from €9,420 to €9,700 for secondary education (up 3%).[21] The student-teacher ratio is higher in secondary education than in primary education. In primary

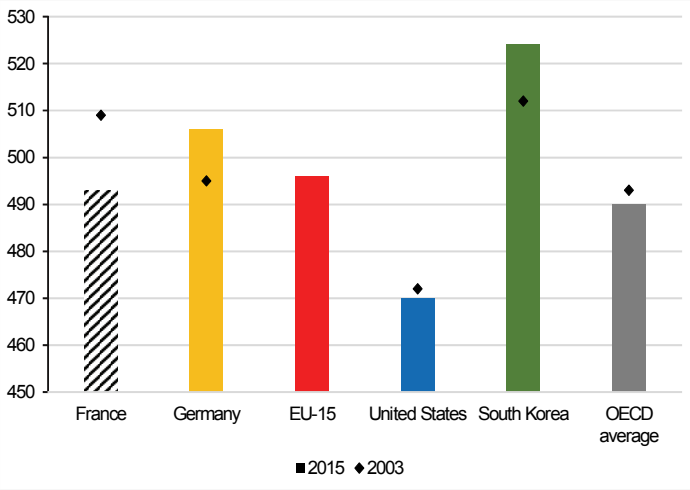
(9) Frey C. B. and M. A. Osborne (2013), "The future of employment: how susceptible are jobs to computerization", *University of Oxford*, September.
(10) Science, technology, engineering, and mathematics.
(11) John V. Winters (2014), "Foreign and Native-Born STEM Graduates and Innovation Intensity in the United States", *IZA Discussion Papers*.
(12) According to the European Commission's "Digital Inclusion and Skills in the EU 2014" report, the deficit of ICT professional skills is forecast to reach 900,000 by 2020, meaning the gap will have widened by 44% between 2015 and 2020.
(13) See *Trésor-Économics* no. 165 - *op. cit*.
(14) On French data, see Piketty T. and M. Valdenaire (2006), "L'*impact de la taille des classes sur la réussite scolaire dans les écoles, collèges et lycées français - Estimations à partir du panel primaire 1997 et du panel secondaire*", Ministry for Primary and Secondary Education, Les dossiers, no. 173, March. Also see O. Monso (2014), "*L'effet d'une réduction de la taille des classes sur la réussite scolaire en France : développements récents*", *Éducation et Formations* no. 85 – Directorate for Evaluation, Forecasting and Performance (DEPP).
(15) See Saillard E. and P. Taillepied (2017), "Overcoming student difficulties at school", *Trésor-Économics* no. 191 and Cnesco (2014), "*Le redoublement : une aide à la réussite scolaire ?*".
(16) See OECD – *op. cit*.
(17) Purchasing Power Parity (PPP) is a method for comparing the purchasing power of domestic currencies between countries.
(18) According to the OECD, in 2004, this expenditure was $7,900 per student and per annum in France and $7,100 on average in OECD countries. This represented a respective increase of 42% (33% in PPP-deflated $) as against 53% (42%). Variations in exchange rates have an impact on the scale of the increase and this reduces clarity.
(19) $13,927 compared to $10,182 - see OECD - *op. cit*.
(20) It would appear that this difference can only be very partially explained by the cost per student in the vocational education system, for which the gap with general education does not seem especially high in France (+11%) when compared to other countries (+8.4% on average in the OECD and +39% in Germany).

schools and kindergartens, this ratio tends to be less than the OECD average, including in numbers of classroom assistants (ATSEM),[22] and the number of hours of teaching is spread out over relatively few days. A recent France Stratégie study[23] analysed the amount and structure of spending on kindergarten education and flagged up an atypical situation in France (large class sizes; lack of training in educating young children; poor integration of public early childhood reception services within the remit of the Ministry for Solidarity and Health with those of the primary and secondary education system for children in kindergartens).

## 2.2 Average results in international assessments, showing social inequality

The results of Fourth Grade (CM1) students (TIMSS[24] 2015 international assessment) in mathematics and science ranked France in last place among EU nations. In the PISA[25]survey into 15-year-olds, France is in line with the OECD average, whether for mathematics, science or reading. Results in mathematics have declined compared to those for 2003 (see chart 2).

**Chart 2: Mathematics skills of 15-year-old students in 2003 and 2015**

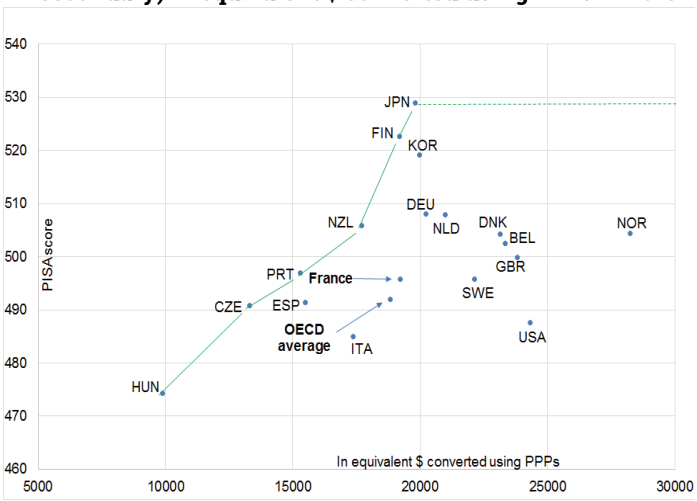



*Source: OECD, PISA 2003 and 2015 surveys.*

Although France's average score is within the average of the 35 OECD countries, this conceals broad disparities according to school career: in science, the performance levels of students in the general and technological stream of Tenth Grade (*seconde*) are comparable with those of the highest-ranking OECD countries in the PISA 2015 survey. Conversely, the results of 15-year-old students in the general stream of Ninth Grade (*troisième*) who are a year behind and those in the vocational stream of Tenth Grade are far below the OECD average.[26]

France does not appear to be sitting on an "efficiency frontier" for education expenditure (see chart 3) either. This can be approximated by linking the PISA results with total primary and secondary education expenditure. France is at the same distance from the frontier as the OECD average, and scores much lower than Finland which is one of the leading countries in the PISA ranking with education expenditure per student that is of the same order of magnitude. This approach is not comprehensive as it is difficult to summarise the standard of an education system using a single indicator and as domestic expenditure on education measured by the OECD as "expenditure on educational institutions" does not factor in all spending (for instance, households paying for private lessons) or does not do so in the same manner across all countries (for instance, institutions' spending on buildings).[27]

**Chart 3: Total PISA score and spending per student (primary + secondary) in equivalent $ converted using PPPs in 2015**




*Source: OECD, DG Trésor calculations (average scores for the three assessment domains: reading, science and mathematics).*

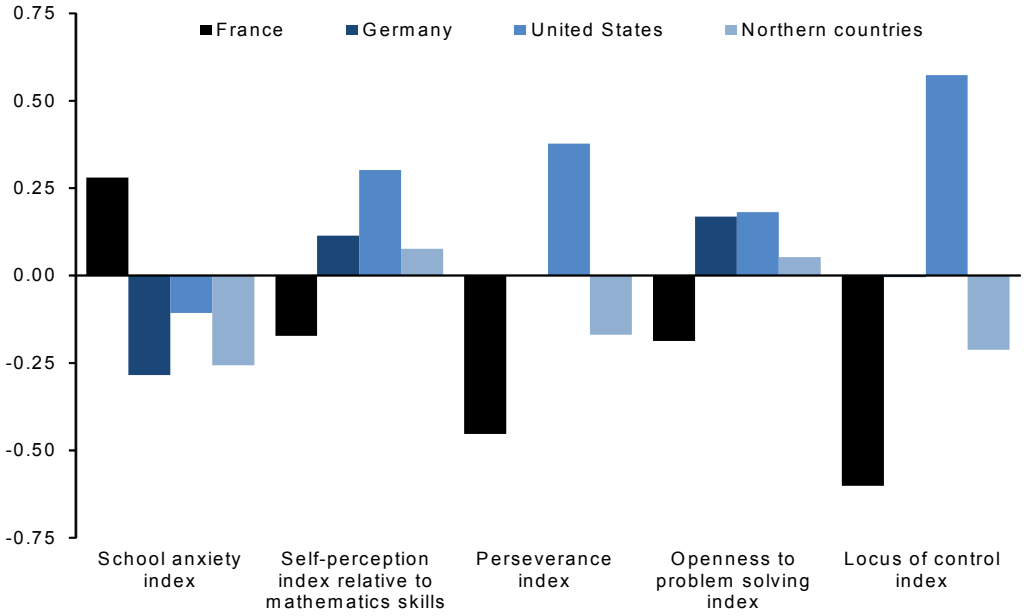
(21) Ministry for Primary and Secondary Education-Directorate for Evaluation, Forecasting and Performance (MEN-DEPP); RERS 2017 (Statistical Benchmarks and References).
(22) ATSEM staff help children with their work throughout the school day. They help teachers prepare workshops and give the children their afternoon snack.
(23) France Stratégie (2018), "*Un nouvel âge pour l'école maternelle ?*", *Note d'analyse* no. 65, March.
(24) Trends in International Mathematics and Science Study.
(25) Programme for International Student Assessment.
(26) See Directorate for Evaluation, Forecasting and Performance (DEPP) information memorandum no. 37 – December 2016.
(27) OECD – Education at a glance 2012 (see Box B6.1 p. 289).

Between 2003 and 2015, the PISA scores of French students fell from 511 to 493 in mathematics (compared to 500 to 490 on average in the OECD), from 511 to 495 in science (500 to 493 for the OECD), and rose from 496 to 499 in reading (494 to 493 for the OECD). This means that standards declined in mathematics and science in France.

With regard to mathematics, the falling levels of French students since 2003 can be related to:

- The increase in the number of low-performing students, under level 2 of the PISA scale which ranges from 1 (lowest performing) to 6. For mathematics, the rate in France jumped from 16.6% in 2003 to 23.5% in 2015 and is now at the average OECD level.
- The higher correlation between performance levels in mathematics and social background in France, whilst this connection has remained unchanged on average within the OECD: gaining one unit on the PISA index of economic, social and cultural status meant an increase in the mathematics score of 53 points in 2015 (OECD average of 37) compared to 43 points in 2003.
- The significant rise in students' anxiety regarding mathematics: socio-economically disadvantaged students are more anxious about mathematics and anxiety levels have risen dramatically in France (compared to the average of OECD countries) since 2003 among these students. In 2012, for these students, the index calculated by the OECD was 0.53 (0.33 in 2003) as against 0.18 (0.10 in 2003) for the OECD average.[28] Growing anxiety is correlated with a decline in "perseverance" indicators, with a significant impact on academic results. This is borne out by the conclusions of the French Council of Economic Analysis (CAE)[29] (see chart 4). In addition, data from successive OECD PISA surveys points to the fact that mathematics teachers are more inclined to help students who are relatively more perseverant and less anxious.

**Chart 4 : Confidence, perseverance, locus of control of students, compared to the OECD average (excerpt from CAE 2018 – *op. cit*)**




*Source: OECD, PISA, 2012.*

How to read this chart: For 15-year-old French students (PISA), the school anxiety index is +0.28 compared to −0.28 for German students which suggests that French students are more anxious. As regards other variables, France's indicator changes sign and is negative. This points to worse positioning than other countries (worsening perception of mathematics skills, less perseverance, etc.). Concerning the locus of control, people who believe that their performance levels are primarily dependent on themselves have so-called internal locus of control; those who believe that these are essentially determined by external factors have so called external locus of control.

(28) This index of mathematics anxiety is calculated on the basis of replies to a number of questions intended to assess the extent of the student's anxiety about mathematics, for instance: "I get very tense when I have to do mathematics homework". Answers are ranked on a scale of 4 ranging from "strongly agree" to "strongly disagree". See https://nces.ed.gov/surveys/pisa/idepisa/

(29) Algan Y, Huillery E and C. Prost (2018), "*Confiance, coopération et autonomie : pour une école du XXIe siècle*" – *Les notes du Conseil d'analyse économique* (no. 48).

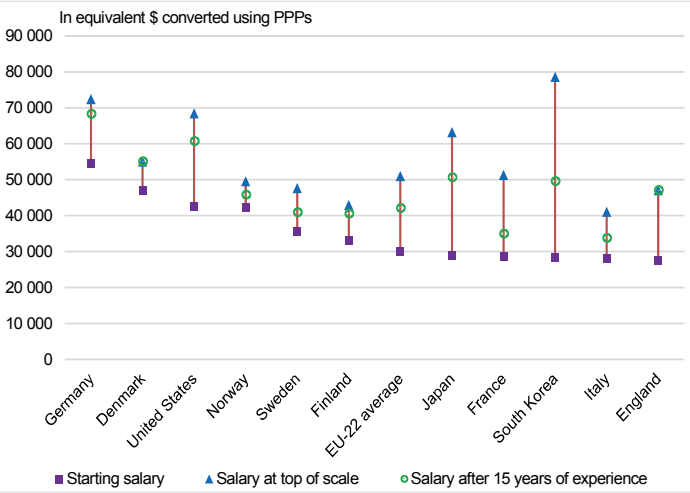
# 3. A number of factors could account for these worrying results, particularly in mathematics

## 3.1 Decline in the appeal of the profession of teacher

The appeal rate[30] of external competitive examinations for primary school teachers is low (2.6 in 2016)[31] and varies greatly according to the regional education area. This rate has declined sharply since 2004. The number of applicants for external competitive examinations for kindergarten and primary school positions plummeted from 65,600 in 2004 to 33,000 in 2016 whereas the number of vacancies remained broadly stable. For secondary education, the rate of appeal of the CAPES (aptitude certificate for secondary school teaching) tumbled from 7.9 in 2006 to 3.7 in 2016 for all subjects (excluding mathematics, English and French literature), and from 4.3 to 1.6 for mathematics.[32]

By international standards, primary school teachers' wages are relatively low at the start of their career and rise slowly (see chart 5).

**Chart 5: Annual salaries of primary school teachers at different points in their careers (2015)**



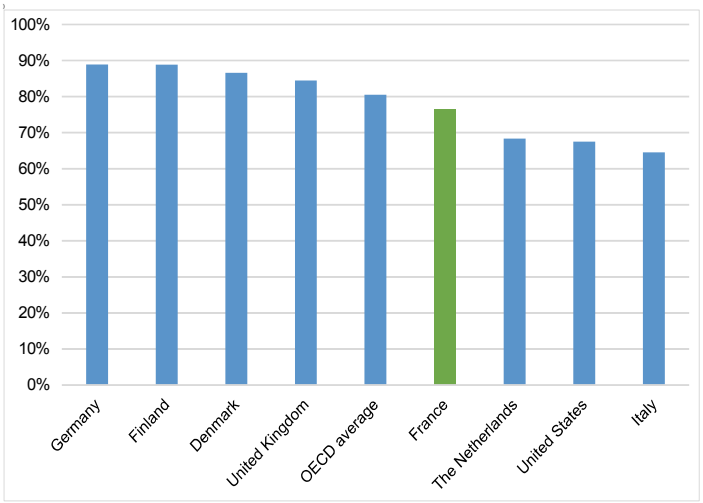

*Source: OECD - Education at a glance 2017.*

Again by international standards, the salaries of primary school teachers compared to other higher education graduates are lower than the OECD average (see chart 6). The ratio of the average pay levels for teachers in relation to workers with the same qualifications weighs on the education system's ability to recruit teachers.[33] Furthermore, teachers' statutory hourly pay (calculated on the basis of their statutory compensation and working hours - in the absence of available data for comparing actual hourly compensation – on an annual basis) is both low, especially in primary education, and falling, whereas the OECD average has risen (see chart 7).[34]

Besides compensation, the appeal of the teaching profession, particularly in priority education networks (REP),[35]appears to be dictated by many factors including career opportunities, training, mobility conditions (choice of geographic location, in particular between inside and outside priority education networks, gateways between teaching and non-teaching professions), work content (in and outside the classroom), working conditions (class size; quality of relations with the ministry), number of vacancies[36] and, more broadly, how the profession is valued by society.

(30) Applicant-to-job ratio.
(31) Ministry for Primary, Secondary and Higher Education and Research-Directorate for Evaluation, Forecasting and Performance (MENESR-DEPP); RERS 2017 (Statistical Benchmarks and References).
(32) See Cnesco (2016), "*Attractivité du métier d'enseignant – État des lieux et perspectives*"– Scientific report.
(33) See, for instance, on US data: Rickman D. S., Wang H. & J. V. Winters (2015), "Adjusted State Teacher Salaries and the Decision to Teach". *IZA Discussion Paper* No. 8984 / Also see British data: Britton J. W. & C. Propper (2016), "Teacher pay and school productivity: Exploiting wage regulation". *Journal of Public Economics*, 133, 75-89.
(34) These findings should nevertheless be seen in perspective as they predate *(i)* the rollout of the reform of civil service careers and compensation (PPCR) as from 2017 and *(ii)* the tripling of the allowance for monitoring and supporting students (ISAE) from €400 to €1,200 per year, which was allocated to these teachers in 2016.
(35) The goal of the priority education policy is to rectify the influence of social and economic inequality on academic success by bolstering pedagogical and educational initiatives in the schools and institutions of the regions which are experiencing the worst social problems. In order to identify the schools which are part of the priority education networks (REP), the Ministry for Primary and Secondary Education has created a social indicator for each school which factors in a number of criteria, including the proportion of students whose parents belong to a socio-economically disadvantaged category. The priority education map is reassessed every four years.
(36) See Directorate for Evaluation, Forecasting and Performance (DEPP), information memorandum no. 24 – June 2014.

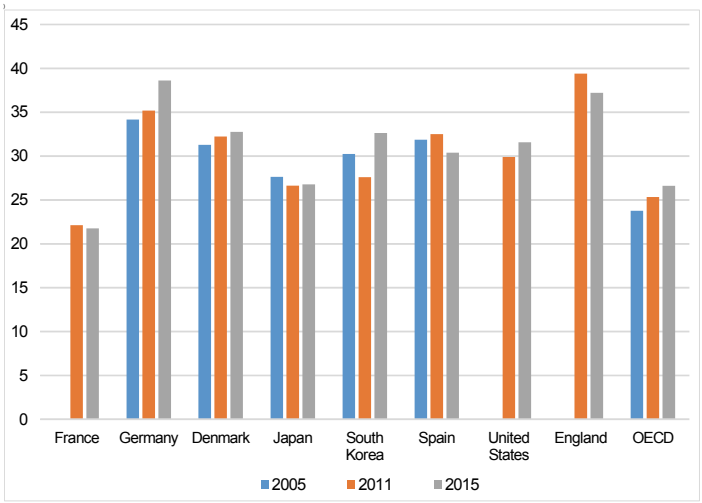
**Chart 6: Primary school teachers' actual salaries relative to earnings of tertiary-educated workers in 2014 (except France and Finland - 2013)**




*Source: OECD.*

How to read this chart: In France, a primary school teacher's salary (including bonuses and allowances) is, on average, 76% of that of a non-teaching worker with the same qualifications.

**Chart 7: Statutory hourly compensation in primary education (in PPP-deflated constant 2015-$)**




*Source: OECD.*

How to read this chart: The compensation is that received with 15 years' experience. International comparison data relating to actual working hours is not available and this means that actual hourly compensation cannot be calculated.

## 3.2 Lack of training for teachers, in particular in mathematics

Students' academic results are largely dependent on both teachers and educational practices. John Hattie's[37] research work highlights the central role of interaction with students and of structuring educational activities in rolling out effective learning strategies.

In France, according to the Teaching and Learning International Survey (TALIS) 2013,[38] relatively few teachers state that they feel well-prepared for teaching (60% against an average of 89% for the 34 participating OECD-TALIS countries) and that they devote their time to in-service training, with those who do take part in these activities spending twice as few days annually than the TALIS average (four compared to eight). These findings are consistent with the TIMSS 2015 international assessment, according to which French teachers do not feel as well prepared as their foreign counterparts for teaching mathematics (see chart on the cover page).[39] The results are also in line with those of French students in mathematics and science which seem very low by international standards. In addition, the French education system is known for stigmatising failure and this is thought to be damaging to the process of learning through research. The French system is also seen as being insufficiently inclusive[40] in that it is unable to adjust to disparate student profiles.

The advantages of additional training in mathematics for teachers were highlighted by a study on French data by Bressoux *et al.* (2009).[41] The study posits that a training course in mathematics during the probationary period prior to taking up a position[42] would increase academic mathematics knowledge for novice teachers who are literary graduates and also help improve students' scores in mathematics.

(37) The work of this New Zealand researcher has had a great impact in English-speaking countries and in Germany. However, as there are no translations, it has been poorly publicised in France. Hattie highlights the importance of time management, teachers' expectations, feedback and lesson structure (for a brief overview, see P-Y. Cusset (2011), "*Que disent les recherches sur "l'effet enseignant ?*", *La Note d'Analyse*, no. 232, Strategic Analysis Centre).
(38) The OECD Teaching and Learning International Survey (TALIS) asks teachers and school leaders in lower secondary education (middle schools (collèges) for France) about working conditions and learning environments at their schools.
(39) See Directorate for Evaluation, Forecasting and Performance (DEPP) (Nov. 2016) – information memorandum no. 33.
(40) See OECD "*Vers un système d'éducation plus inclusif en France ?*", July 2015.
(41) Bressoux P., Kramarz F. & C. Prost, (2009), "Teachers' training, class size, and students' outcomes: Learning from administrative mistakes", *Economic Journal*, vol. 119 (536), pp. 540-561.
(42) In the quoted study, the training takes place in teacher training colleges (*écoles normales*).

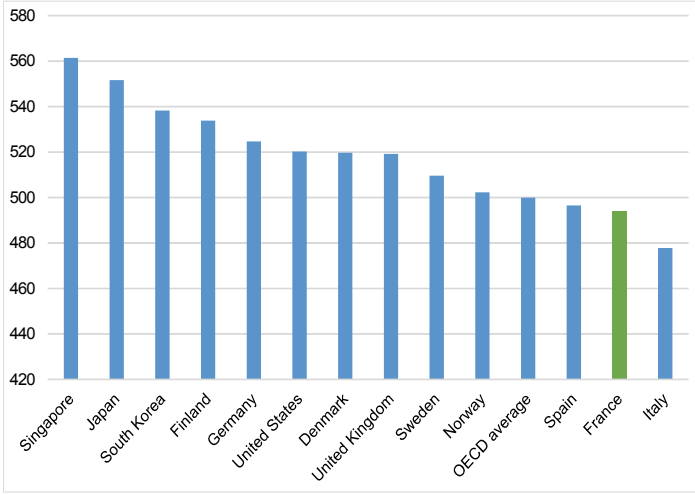
### 3.3 A lack of cooperation among teachers

The OECD considers that cooperation among teachers, which enables experience to be rapidly acquired,[43] has had successful outcomes in many education systems but is not widespread in France,[44] where over three-quarters of teachers report never observing other teachers' classes, compared to a TALIS average of 45%.

Whilst institutions could be made more accountable to bolster cooperation and improve educational practices, literature is not unanimous on the impact of autonomy.[45] Moreover, it suggests that the risk of greater academic inequality owing to autonomy should not be under-estimated. Data from other countries points to the fact that, in order to be effective, autonomy must serve a specific goal, for instance the improvement of educational methods by fostering teamwork among teachers and exchanges between the latter and researchers, and should be coupled with appraisals. It is also thought that the effectiveness of such changes is dictated by the ability to disseminate best practices among teachers (e.g.: Lesson studies, Edmodo[46]), including through international exchanges such as the Erasmus + programme. French digital resources and teacher collaboration platforms (Banque de ressources numériques éducatives, Canopé, Eduscol, Belin on-line library (Digithèque), etc.) still seem highly dispersed, poorly promoted and under-used.

PISA survey results also suggest that French students' ability to work in groups to solve problems is relatively low (see chart 8).[47] Collaborative problem solving can be learned at a young age and is a vital interpersonal skill for all workers. Moreover, major innovation projects, especially ground-breaking projects, rely on close collaboration between researchers, engineers and entrepreneurs (e.g.: home automation product design which combines cutting-edge technologies with design and ergonomics). Similarly, the ability to take up the ecological challenge will involve cross-disciplinary work and, in particular, the enabling of dialogue between human behavioural sciences (e.g.: economics, sociology, political sciences, anthropology) and sciences that study natural phenomena (e.g.: biology, ecology, meteorology, geography).

**Chart 8: PISA 2015 score for performance in collaborative problem solving**




*Source: PISA 2015.*

How to read this chart: France has a mean score of 494, as against an international average normalised at 500.

## 4. To rise up to the task, education standards should be improved, especially in primary schools

The reduction of First Grade (CP) and Second Grade (CE1) class sizes which was initiated by the government and which will be completed by the start of the 2019 academic year for priority education, as well as the increase in the REP+ bonus,[48] are geared towards reducing educational inequality. These schemes could be supplemented by further initiatives to increase effectiveness.

### 4.1 Increase the appeal of the profession of teacher

The appeal of the profession of teacher is a key issue in France, especially for primary education. Recent government measures focus on two aspects to increase

(43) See, in particular, A. Le Chapelain (2013), "*Peut-on mieux gérer les enseignants ?*", *Revue française d'économie*, 28(3), pp. 3-35.
(44) See Directorate for Evaluation, Forecasting and Performance (DEPP), "*TALIS 2013 – Enseignant en France, un métier solitaire ?*", information memorandum no. 23 (June 2014).
(45) The first charter schools (CSs) were set up in the United States in the early 1990s. These are private institutions that receive government funding depending on the number of students they take in. They are free, secular, open to everyone and have more autonomy than traditional state schools, especially as regards the curriculum and hiring teachers. CSs are not allowed to place selection criteria on student enrolment. There are numerous empirical results due to the randomisation made possible by draws but they do not converge. When one considers the diverse nature of the CSs' educational projects, this comes as no surprise.
(46) Edmodo is a website for secure messaging with people working in education. Today, it is the website that is the most frequently used by teachers worldwide, the vast majority of whom live in the United States. In 2018, it had over 88 million users (teachers, students and parents).
(47) Collaborative problem solving looks into students' ability to work in pairs or groups to attempt to solve problems.
(48) This is an increased allowance of €3,000 per year and per person for teaching staff working in reinforced priority education networks (REP+).

this appeal: on one hand, compensation (REP+ bonus) and, on the other, working conditions (smaller class sizes).

Pending sufficient insight into the impact of these initiatives, discussions could be held on primary school teachers' wages and on ways of upgrading the profession (see above), including by better matching teachers and classes. Owing to their training and experience, seasoned teachers could be further encouraged to work in priority education networks (REP) and in regions where positions are hard to fill. The proportion of teachers with "*néo-titulaire*" status (teachers in their first year of tenure after having successfully completed their probationary period) who are posted to institutions deemed to be "difficult" is higher than for other teachers and is on the rise (20% in 2011, 23.6% in 2016).

### 4.2 Improve teacher training

Improving teacher training involves searching for better educational practices that allow teaching techniques to be tailored to cater for student diversity. Such an improvement also involves heightened awareness of best practices in education sciences which can be achieved through research into these sciences,[49] experimentation, dialogue between teachers and researchers and between teachers themselves (teamwork). Knowledge gleaned from empirical research is incomplete, in particular on French data, and needs to be supplemented with feedback from the field in the shape of more qualitative analyses. In this respect, the "Schools that build confidence" Bill also contains provisions on overhauling teacher training schools (ESPE) with an eye to providing the same standard of training to the entire teaching profession "based on research work and knowledge of the most effective educational methods".[50]

Fresh experiments combined with appraisals are either ongoing or are slated to be carried out as part of the Great Investment Plan via, for instance, the "Innovative Education Regions" initiative which has been allocated €250 million (including an imminent call for projects on teacher training and research in favour of education). These experiments and appraisals could focus on the effectiveness of alternative educational methods[51] that stem from progress in cognitive sciences, in conjunction with traditional methods in a given field, and that cover one or several operational goals. The ability of these methods to reduce the stigmatisation of failure and to foster an approach that is both cross-disciplinary and more constructive to the pedagogical use of errors should be assessed. This is the cornerstone of any scientific process.[52] Such assessments could also concentrate on the ability to reduce inequality of opportunity (in particular girls' access to scientific streams[53]and self-censorship according to social background when making educational choices[54]) with an eye to bolstering the skills pool.

### 4.3 Consider developing the autonomy of teaching staff and cooperative work

As advocated by the Taddei report[55] on the development of "third places" devoted to educational innovation, an innovation laboratory (the "110 bis") was set up in June 2018 and should become part of a nationwide network of laboratories over time.

The foregoing will require more in-depth discussions on the conditions and methods (training, organisation of working hours) for improved cooperation between teaching staff, on one hand, and between teachers and researchers on the other. Training for head teachers could also be supplemented to allow them to coordinate the teaching staff (teamwork, better access to in-service training) and to involve parents who are far removed from the school to a greater extent. In this respect, the "Schools that build confidence" Bill sets out provisions to extend the experiments in schools and education institutions to encompass the organisation of teachers' working hours and student guidance.

(49) The Scientific Council for Primary and Secondary Education, which was set up in 2018, is tasked with promoting scientific research into educational practices.
(50) Schools that build confidence" Bill no. 1481, explanatory statement.
(51) These methods (e.g.: Montessori, Freinet, Steiner) may - in light of foreign experiments - be seen as a toolbox for teachers to enable them to tailor their teaching methods to the context and the diversity of students, especially in primary education. As a result, in-depth discussions need to be held on their place in initial and in-service teacher training, in particular within teacher training schools (ESPE).
(52) For instance, the "Les Savanturiers - L'école de la recherche" initiative, funded as part of the Invest for the Future Programme (PIA), builds on this approach. It is an educational programme intended to introduce scientific research methods into classrooms. The scheme draws on social and cross-disciplinary skills that are now seen as vital to children's school careers.
(53) Blanchard M. Orange S. and A. Pierrel (2016), "*Filles + Sciences = une équation insoluble ?*", Paris, Éditions Rue d'Ulm-Cepremap.
(54) Guyon N. and E. Huillery (2014), "*Choix d'orientation et origine sociale: mesurer et comprendre l'autocensure scolaire*", LIEPP Report, 3.
(55) Becchetti-Bizot C., Houzel G. and F. Taddei (2017), "Vers une société apprenante : rapport sur la recherche et développement de l'éducation tout au long de la vie", Report to the Minister for Primary, Secondary and Higher Education and Research.

### 4.4 Better match students and teachers

The expansion of profile-based positions in priority education, which was announced in August 2018, is intended to put the most experienced teachers in front of the neediest students.

Improving the match between teachers and the special requirements of institutions should be based on the clear pinpointing of the skills needed at local level, especially in "difficult" schools. This better matching between teachers and classes should generate gains whilst preserving the pool of teachers.[56] As regards secondary education, the number of hours of teaching per teacher could be increased with the number of years' experience, whether these hours benefit students or, potentially, less-experienced teachers.

### 4.5 Adopt an overall strategy

Owing to the dominant influence of social background on academic results, maximising the profitability of investments in education also involves ensuring the consistency of government policy outside the education system (e.g.: measures to combat poor housing, town planning policies, anti-poverty measures) with the goals set for the latter, in particular equality of opportunities.

### 4.6 Better document the efficiency of measures in favour of schools

To ensure better ex ante assessment of the relevance and feasibility of the measures under consideration, it seems essential to further involve teaching staff, researchers[57] and players in the field, whose expertise is apparently still under-used to support government decision-making, in these discussions.

In addition, French data should be used to develop assessments of the efficiency of measures in favour of schools, in particular ex post assessments by impact studies. For instance, in priority education, the efficiency of a move to increase compensation could be compared to that of a reduction in class sizes. Such a study would provide information, for a given fiscal cost, on which of these measures is most beneficial to academic results.

**Emmanuel Saillard**

(56) Condie S., Lefgren L. & D. Sims (2014), "Teacher Heterogeneity, Value-Added and Education Policy", *Economics of Education Review* 40(1), 76-92.
(57) The setting up of the Scientific Council for Primary and Secondary Education in January 2018 has contributed to this.

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