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Germany: Once Weak International Standing Prompts Strong Nationwide Reforms for Rapid Improvement

For many years, the German public and policy makers assumed that Germany had one of the world's most effective, fair and efficient school systems. It was not until 2000 that they discovered this not to be the case at all, and that in fact Germany's schools ranked below the average when compared to the PISA-participating countries. Now, ten years into the 21st century, Germany has substantially improved its position in the PISA league tables. This chapter explains how Germany could have so misjudged the relative quality of its education system, how it could have fallen so far from where it had been generations before, what it did to reverse its unfavourable position, and what other nations might learn from this experience. It identifies the main factors behind Germany's strong recovery as being the changes it has made to the structure of its secondary schools; the high quality of its teachers; the value of its dual system, which helps develop workplace skills in children before they leave school; and its development of common standards and curricula and the assessment and research capacity to monitor them.

INTRODUCTION

The education systems of many of today's leading industrial nations were shaped a century or so ago. Though they took their ideas from many sources, one stood out: Germany. It was in Germany that they saw the first model of a nation determined to provide a free public basic education to all of its people. It was Germany that first developed the modern research university. In Germany, they found in the *Gymnasium* a model for secondary schools designed to prepare students for the modern research university. And it was Germany that provided in the *Realschule* and – later in the dual system – two of the world's most compelling models for supplying a nation with highly trained workers in every field of endeavour.

It is hardly surprising in these circumstances that the German public and policy makers assumed that Germany had earned pride of place among the world's education systems for having one of the most effective, fair and efficient school systems. It was not until the close of the 20th century that they found out that that was not the case at all, and that Germany's schools ranked below the average for the PISA countries.

Now, 10 years into the 21st century, Germany has substantially improved its position in the PISA league tables. This chapter explains how Germany could have so misjudged the relative quality of its education system, how it could have fallen so far from where it had been generations before, what it did to reverse its unfavourable position, and what other nations might learn from this experience.

Table 9.1 Germany's mean scores on reading, mathematics and science scales in PISA

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading	484	491	495	497
Mathematics		503	504	513
Science			516	520

Source: OECD (2010), *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science* (Volume I), OECD Publishing.
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A HISTORICAL PERSPECTIVE

German education takes shape in the 19th and early 20th centuries

Just as the modern Japanese education system emerged from the humiliation that followed the arrival of Admiral Peary and the Black Ships (Chapter 6), the beginning of the modern German education system is thought by some historians to have begun with the defeat of Prussia and the other German states by Napoleon at Jena in 1806. The Prussians were devastated in spirit as well as materially and emerged determined to rise once again to defeat Napoleon and reassert Prussia's key place in the European world order. Over the next seven years, Stein, Hardenberg and others set about reconstructing Prussia's military and its spirit. Up until then, the officer corps had been limited to a very narrow slice of the German nobility, who had grown lazy and corrupt. The new leaders concluded that they needed to draw on a much larger base of talent. To do that, they would have to educate a larger fraction of the nobility.

This proved to be a seminal moment for German education. The new leaders brought into their government the person with whom the genesis of the modern German education system is most closely identified, Wilhelm von Humboldt. Humboldt is widely regarded as the father of the modern German *Gymnasium*. He is also one of the key figures in the emergence of the modern research university.

Humboldt's ideas were framed by his association with the leaders of the second round of the German Enlightenment: Schiller, Goethe Fichte, Herder and others. They believed that the world is not a machine operating according to preset rules over which man has no dominion, but rather that the world is what we make it, good or bad, and that man's highest responsibility is moral. They believed that the duty of the school is to help the individual realise himself, and create a civilised state which would provide freedom to all. These are the tenets of German Idealism and the Romantic school of German philosophy. Built on the foundation of the German Enlightenment, this outlook emphasises a vision of education that could be said to be anti-instrumental, in the sense that its aim is to create the ideal human being. It is a moral and aesthetic vision, going way beyond the intellect. It is the antithesis of the idea that the purpose of education is to prepare the educated person to make a living.

Humboldt crystallised these concepts in the term "*Bildung*", an enlarged conception of education. In this conception, education, or *Bildung*, is a process of personal development that depends on an education in the humanities. It is centred on the individual and the organic, holistic formation of the individual from the inside. The study of history plays a special role in this development. Humboldt saw the study of history as a way for the individual to define himself in relation to the events and ideas of the past, in particular the classical past.

Humboldt's particular contribution was not philosophical but practical. In only one year in office, 1809-1810, he launched the process that would ultimately turn these ideas into a national system of education. The ideas just briefly described were moulded into a design for a new *Gymnasium*, a secondary school for the middle-upper classes which grounded students in the humanities and prepared them to take the state *Abitur* examination. This model of the *Gymnasium* was implemented in Prussia in 1812 and throughout Germany in 1871. In time, no-one could go to university in Prussia without passing the *Abitur* examinations; neither could one enter the civil service or enter learned professions, such as law, without having passed the *Abitur*.

The only institutions at which one could earn the *Abitur* were the rebuilt *Gymnasien* (plural in German for the singular *Gymnasium*). The curriculum was laid down in detail by the state. The only people who could teach in the *Gymnasien* were people who had themselves passed the *Abitur* and attended university. Indeed, the legislation provided that future *Gymnasium* teachers had to distinguish themselves in their studies of the core subjects in the university curriculum. The *Abitur* was established in this way as one of the world's most famous and most admired examinations.

The laws establishing this system made it quite clear that the purpose of education was a state purpose. The schools, including private and religious schools, were controlled in detail by the state and by detailed legislation.

The next key figure in the development of the German education system was the educator Georg Kerschensteiner, whose career spanned the last half of the 19th century and the first half of the 20th century. Born into genteel poverty and identifying all his life with the working class, Kerschensteiner focused his energies on the education of working people. A patriot, he believed that the best education prepared young people to contribute to the state through their work. The best way to prepare them for that work was to create an education system that would fuse schooling and apprenticeship in the workplace.

Earlier, in the 1870s, the German government had abolished regulations giving German craftspeople special status and protection in the German economy. Kerschensteiner played an important role in reversing that policy, re-establishing the special position of German craftspeople, and creating a new system of vocational education that would ultimately play a key – perhaps decisive – role in Germany's march to technological and manufacturing excellence. Germany is renowned the world over for its craftsmanship in manufacturing. It is not just the apprenticeship system that makes Germany an economic winner, but that the system emphasises first-class craftsmanship. This point is returned to later.

Among Kerschnsteiner's voluminous writings, the following passage stands out:

> The value of our education, insofar as the greatest mass of the people will benefit from it, resides basically not so much in the development of an intellectual horizon, as in consistent instruction in conscientious, thorough, neat work, in the regular habits of absolute obedience and the faithful performance of duty. (Hahn, 1998, p. 3)

It is hard to imagine words that could contrast more vividly with Humboldt's elitist vision of schooling for the sons and daughters of the nobility.

German mass education in the 20th century

As the 19th century came to a close and the 20th was opening, Germany had uniform elementary schooling with compulsory elementary education for all children aged 6 through 10, providing four years of basic education. This demonstrated Germany's commitment to a state-run system of basic education. Following completion of elementary school, students were streamed into one of three types of school:

- *Volksschule* – The students thought to be of low ability (the majority), were streamed into the *Volksschule* (People's School, later call the Main School or *Hauptschule*) where they would get a few more years of education, and receive a qualification entitling them to apply for training leading to working-class jobs in Germany.

- *Realschule* – Students thought to be of higher ability were streamed into the *Realschule*, where they would prepare for a qualification entitling them to apply for more training that would lead to more prestigious jobs such as clerks, technicians and lower-level civil servants.
- *Gymnasium* – Those thought to be of the highest ability were streamed into the *Gymnasium*, where they would be given a broad preparation in the humanities and prepared to take examinations for the *Abitur*, which was the sole gateway to the professions, teaching and the upper levels of the civil service.

These school divisions corresponded rather neatly to the social divisions that characterised feudal Germany. The *Gymnasium* was for the sons and daughters of the nobility and the upper middle class – the class born during the first industrial revolution and composed of business people, high and middle state officials, artists and so on. The *Realschule* was for the sons and daughters of the lower middle class burghers. And the *Volksschule*, later the *Hauptschule*, was for the German working class – the people. In effect, beyond a few years of basic school for everyone, each social class had its own schools, though these secondary schools were not compulsory until 1918. Something similar happened in other northern European countries too, but, as we shall see, they subsequently abandoned this system, while Germany retained it.

Except under Hitler's Third Reich, the individual German states were responsible for the design and operation of their own education systems. Another system, managed though not run by the federal government, had developed to regulate the occupations and professions. Virtually all professions and occupations were subject to regulation by the state. Each had a set of entrance criteria to be satisfied by passing a written and practical exam. Those occupations could not, by law, be practised by people who had not met the criteria and passed the exams.

Up to 1918 the guilds, large industry employers' associations and chambers of commerce had managed and ran the system of in-company training, set up the rules and regulated the occupations on a legal basis. In the years following the First World War, the national government set the standards and regulated the occupations that had been drafted by the employers. The government introduced an obligatory day in school for apprentices. Unions were not involved, with some exceptions.

Since 1969, the criteria and standards for the occupations have been set by federal government in close co-operation with employers and trade unions, meeting together under the watchful eye of the national government, which ratify and publish them when agreement is reached. The place for negotiating standards between federal government, employers and unions is the federal institute for vocational education and training (BIBB), which also co-ordinates the curriculum for the school portion of the dual system with the federal states.

What Georg Kerschensteiner did was put these two quite separate systems – the schools on the one hand and the occupations on the other– together in an ingenious partnership. Later this came to be known as the "dual system" (Box 9.1). The idea was a simple extension of the ancient idea of the guild-based apprenticeship, in which students seeking jobs in the workplace would first apprentice themselves to masters of their chosen trades, work for them as apprentices at a reduced wage (sometimes just for room and board), in exchange for instruction in the trades. At the end of the training, there would be an examination and the young worker would be declared a "journeyman", with the right to work in that trade at prevailing wage levels. But the journeyman could not employ others without first becoming a master, which entailed passing another, much more demanding, exam.

Kerschensteiner updated the whole apprenticeship idea and married it to the highly evolved and very stratified German education system. Students who complete a secondary education in Germany are invited to become apprentices by firms, with their wages determined at a national level in a process managed by the government. The time spent on the job as an apprentice is augmented by time spent in a "continuation school", a special vocational school designed to provide the apprentice with the theory underlying the practical work, and, at the same time, continue his or her broader education, though at a level far below that provided by the *Gymnasium*.

The national legislation authorising and regulating this dual system of education does not require the student to have come into the system from any particular type of secondary school. But the student does not get into the dual system unless an employer who chooses to be part of the system offers that student an apprenticeship. Until quite recently, most employers looked to the *Hauptschule* as the primary source of their apprentices. Some employers, mainly those looking for white collar employees below the professional level, sourced their apprentices mainly from the *Realschule*. Very few came from the *Gymnasium*, whose *raison d'être* was to supply the universities with candidates.

Box 9.1 **Germany's "dual system"**

Germany's dual education system is called "dual" because it combines apprenticeships in a company and vocational education at a vocational school in one programme. In the company, the apprentice receives practical training which is supplemented by theoretical instruction in the vocational school. Around 60% of all young people learn a trade within the dual system of vocational education and training in Germany (UNESCO, 2010). There are around 350 state-recognised training occupations, such as carpentry, car mechanics and roofing. The period of training is usually two to three years and is concluded by a state examination. During this time, the apprentice is financially remunerated. Access to this training is not formally linked to a specific school certificate.

While the public education system is directed and operated by the *Länder*, the dual system is operated under the aegis of the federal government, working with the economic departments of the *Länder*, and the local chambers of commerce.

"For young people", according to Reinhold Weiss, "the dual system is attractive because it is an excellent entrance into the employment system. In Germany, without a formal qualification, your chances of entering a good paying job are low. While you are not guaranteed a career, you are guaranteed training in school and on the job. More short-term apprenticeships are now available that combine work experience with university degrees and financial support. Also, students who finish *Gymnasium* are going into an apprenticeship and then on to university."

German employers realise the value of the system and offer apprenticeships based on shrewd calculations of the economic benefits to be gained, not on outmoded cultural factors. For example, regular employees in Germany, as in many other countries, are hard to dismiss once they are formally employed. In the dual system, however, the employer has no obligation to hire the apprentice at the end of the apprenticeship. This gives the employer time to decide whether or not they will be suitable. And under German law, employers are allowed to pay their apprentices substantially less than the market rates for their labour. Analysts have found that the wage difference between apprentice wages and regular wages makes engaging apprentices a good economic deal for the employers. The value they get in work performed typically exceeds the cost of employing them as apprentices. These economic benefits to employers could be reproduced in other industrial countries relatively easily with the appropriate economic policies.

And it is not just the employers who benefit. For many students of all abilities, the approach to learning taken in most schools is dull and uninteresting. Learning only becomes engaging when put to use. In fact, learning becomes necessary in order to solve the problems these students find engaging. Problem-driven learning is the kind of learning most of us do when we leave school behind and enter the adult world. It is in this sense that the dual system is very much a part of the education system. Though students are accepting wages below the market level, they are gaining access to the possibility of employment with companies who might not otherwise be interested in looking at them. They are gaining important skills at the employer's expense. For students going to *Gymnasium* and hoping to go to university, doing a stint in the dual system first is a very important insurance policy in case their university application fails. Many employers are increasingly willing to send promising young people who come in through the dual system to university later at their own expense.

Germans are themselves divided on the value of the system. While many see it as a major source of Germany's industrial strength, some see it as an anachronism, a holdover from a bygone age that will eventually slow Germany's growth and leave it uncompetitive. This group points to the rapidly changing face of the job market and thinks that rather than training young Germans for specific jobs, they should be trained for a world in which jobs are constantly shifting and evolving as a function of new technology and new forms of work organisation. They see the swiftly rising corps of mostly immigrant students who do not succeed in getting into the dual system as a national tragedy that also threatens the viability of the German economy and undermines the legitimacy of the dual system.

Defenders of the dual system point out that whereas it used to take as much as 10 years to create a new occupation, the process of creating new occupations can now be accomplished in as little as 18 months. Of the 350 separate occupations, many are new occupations, reflecting the swiftly changing needs of business. They point to the greatly increased permeability of the system – the many pathways now available to students for moving in and out of the dual system from different kinds of secondary schools and into different kinds of employment and further education opportunities, including university. This reveals how the dual system is making the necessary adaptations to play as constructive a role in the future as it has in the past. And they point to the continued interest of employers in offering apprenticeships to students as further evidence that the system works. It is still the case that 60% of the age cohort go through the dual system.

Even so, in the decades immediately following the Second World War, it was not uncommon for the Chief Executive Officers and Board Chairman of global companies based in Germany to have come up from the *Hauptschule* and the dual system, rather than from the *Gymnasium* and university. Throughout the first half of the 20th century, the dual system was being continuously improved. Companies that had taken in smart, enterprising youth through the *Hauptschule* and dual system intake door had kept investing in them as they promoted them through the system. New technological universities had been created alongside the traditional universities and the system had been changed to create routes that would enable graduates of *Realschule* and even *Hauptschule* to attend them.

When interviewed for this report, Karl Ulrich Mayer, a sociology professor at Yale University, noted that a typical apprentice who successfully completed his training and became a master was the backbone of the German workforce and its competitive advantage. A former apprentice armed with this technical know-how and workplace experience, he said, could make a sales call, sell the equipment and repair it. There is just not the division between technical and sales staff that you find in other countries. In Germany, in contrast to France and Great Britain, the expansion of general education did not diminish the role of the apprenticeship at all.

These themes will appear again below in more detail, but the point here is that the twin impulses underlying the German education system, one driven by the Romantic, Idealist philosophers towards a very humanistic non-instrumental image of education, and the other just the opposite, a vision of education that put education for vocation and occupation at the centre, were both very much alive, each balancing the other.

The tripartite system of secondary schools was not unique to Germany at the opening of the 20th century. This system of separate secondary schools based on class and caste was widely used in Northern Europe. The system of dual education was used in some form in Denmark, Germany, Switzerland and Austria. But, in the first half of the 20th century, most of the other countries of Northern Europe abandoned the idea of separating 10-year olds into different kinds of secondary schools. They no longer thought it was a good idea to decide for such young children what class of job and place in society they would have for the rest of their lives. These other countries had also had feudal systems that allocated opportunity by clear divisions in the social class structure, but, as they developed as true political democracies and understood more clearly the demands of advanced industrial societies, they came to the view that they needed more of their population to have better education and skills than before.

The Germans might well have done the same, but for their reaction to the events leading up to the Second World War and their response to their loss in the war. There was great resistance to changes in the structure of the schools. And a governance structure that essentially required consensus reinforced the tendency to resist changes of this sort.

The tripartite system is transformed: The 1960s and 1970s

In the 1960s and 70s, when the German economy was booming, Germany developed major labour shortages. It solved its problem by inviting people from lower income countries to come and work in Germany, mainly in jobs that native Germans did not want. Many of these people came from Turkey and other countries with relatively low levels of education compared to Germany. At first, the presumption was that these "guest workers" would stay for a short time and then leave. But some came and recruited others. They settled in Germany and raised families there. Their children grew, married and raised children. Those children have now had children themselves. Their German was typically very poor.

At this time, demand was steadily increasing for workers with high skills, and decreasing for workers with low skills. That created increased demand for entry into the *Gymnasium*. It had always been true that students who went to the lower status secondary schools and then directly into the labour market through the dual system made more money initially than students to who went to *Gymnasium* and then to university. That fact was a prime attraction of the dual system.

As more students went to *Gymnasium*, and passed the *Abitur*, more decided to then enter the dual system and get a qualification, as a form of insurance against unemployment, before proceeding to university. More students who would formerly have gone to the *Hauptschule* put in the extra effort needed to get into the *Realschule*, which improved their chance of getting an apprenticeship from a good employer. But employers offering the best apprenticeships, who had earlier taken students only from *Realschule*, began to see a steady stream of *Gymnasium* students, some of whom already had an *Abitur*, knocking on their doors. Others who had formerly recruited only from the *Hauptschule*, found that they could get better candidates from the *Realschule*. Increasingly, the *Hauptschule* became a giant storage locker for the students who had no future, a road to nowhere for those students. As the public saw this

happening, the children of the lower middle class and some in the working class abandoned the *Hauptschule* and headed for the *Realschule* and even the *Gymnasien* instead.

In this way the old tripartite system was quietly transformed. In the past, most of the graduates of the *Hauptschule* went on to apprenticeships and had a good shot at a decent job and a good career. When the transition was complete, the *Hauptschule* had become, in some schools and in some parts of the country, a dumping ground for students who would find it hard to get a qualification of any kind – these included immigrants and native Germans from lower class families alike.

Indeed the PISA data show that the most important predictor of failure to get a qualification was the socio-economic background of the student. The second most influential predictor was language. Regardless of whether you were an immigrant or a native German, if your German was poor when you were very young, you had little support from any institution to learn fluent German, and without fluent German, you were likely to flounder in school. The third most important predictor was immigrant status (though this generality masks large differences; for example, the majority of Greek immigrant children attend *Gymnasium*, but only a small minority of Turkish immigrant children do so).

When the German economy slowed, some native Germans who were short of work resented the competition from the immigrants for jobs. German elementary schools were ill equipped to deal with students who were not proficient German speakers. The immigrant population grew faster in the northern German cities and towns than in the south. Nationally, the immigrants grew to nearly 10% of the adult population and more than 25% of the population of the schools. But, in some northern German cities, the immigrant population accounted for half or more of the students in elementary schools.

The Germans had another chance to abandon their tripartite secondary school structure when the Berlin Wall dividing East and West Germany came down and reunification of the two previously divided parts of Germany began.

There was much wrong with the German Democratic Republic (GDR), but their education system was not one of them. When the GDR was created and became a satellite of the USSR, the GDR leaders abolished the distinctions among secondary schools and all secondary schools in the GDR became comprehensive secondary schools.

Most education experts now agree that the education system on the other side of the Berlin Wall dividing the two Germanys was a justifiable source of pride for the East Germans.[1] But when the wall came down in 1989, the former East Germans were eager to adopt everything Western and to abandon everything Eastern as soon as possible. And West German conservatives had no interest in adopting anything associated with the former Communist government.

According to Andreas Schleicher, Head of PISA Studies at the OECD, "The West German system was implemented in the East. Lost to East Germany was their more equitable, de-tracked education system along with their excellent early childhood system."

Former Head of the BIBB, Hermann Schmidt, was a member of one of the Reunification Commissions for education. He recalls arguing futilely with the education ministers of the former East German states that they should not abandon their upper secondary school programme which led to a combined qualification of *Abitur* and journeyman certificate. Only later did some of those education ministers tell Schmidt that they now realised they had made a terrible mistake. However, some states did collapse the tripartite system into two parts, one of them the familiar *Gymnasium* and the other a combination of the *Hauptschule* and the *Realschule*. Those former East German states that did maintain some of the former education structures outperformed most of the former West German states in the early years of the new millennium, according to the experts interviewed for this report (Hermann Schmidt and Rheinhold Weiss).

According to Schmidt, Germans on both sides of the Iron Curtain believed, as did the rest of the world, that West Germany had one of the world's best-performing educational systems. This was despite the fact that they had no way of knowing how well they were doing relative to other nations. The highest status parts of the system, the parts that spoke for the system as a whole, were the *Gymnasium* and the professional educators who staffed them, as well as the key education officials in the German states. All were still very much in accord with the vision of education defined in the term *Bildung* as first set forth by Humboldt. According to this vision, what is most important about education – the aesthetic ends, the search for freedom and truth, the ennobling exposure to history and so on – is simply not measurable. And so it was not measured. The national government had no legal authority to measure student achievement or progress, the teachers were opposed and the states had no interest in measuring these things.

THE GERMAN EDUCATION REFORMS

The first warning bell that all was not as it should be in German education came when Germany took part in the first TIMSS survey of mathematics and science in 1995 and scored poorly. However, according to a leading German journalist, Thomas Kerstan of *Die Zeit*, the German press took very little notice.

Nevertheless, some members of the federal government and the *Länder* had been worried for some time that German education might be less effective than widely thought. In 1997, the Standing Conference of the ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany* – known henceforth in this volume as the Council of ministers – moved to make Germany an active participant in future international comparative studies of student achievement. They began to prepare the ground for the new PISA assessments.

The first PISA assessments, administered in 2000, focused on language literacy (Table 9.1). The results shocked the German nation. According to Kerstan, "No one expected that one quarter of German 15-year-olds could not read fluently. And worse yet, the PISA results showed that German at-risk students' performance was among the worst in the world." Germany came well below the average overall for all the countries tested. A substantial fraction of German students tested below Mexico. Germany did no better in mathematics and science than it did in language. And it turned out that student performance was more closely tied to the socio-economic background of the students than was the case for many other OECD countries.

Whilst the TIMSS results had hardly been reported, major newspapers ran four, five and six-page special sections on the PISA results. The news and discussions of the results were all over the radio and television. The news about Germany's poor results got far more coverage in Germany than the surprise news that Finland had topped the PISA league tables got in Finland.

Suddenly, educators could no longer make the case that what was most important about education could not be measured. If Germany was far behind in every important area of the curriculum, if Germany's education standards generally lagged those in the rest of the developed world and if Germans could no longer maintain, as they had for so long, that Germany had one of the most equitable education systems in the world, then, clearly, something had to be done.

The parties on the left of the political spectrum dusted off proposals they had been making to no avail for a long time. Edelgard Bulmahn, who was the German minister for Education at the time, had long thought that "the tripartite system of secondary schools was a mirror image of the feudal system, a system that only needed a small number with high qualification, a few with the middle range of education and the rest with only a basic education." In her view, "a modern knowledge-based economy would mostly need a work force with a very high level of education across the board."

She and others had been making this case for years. They had actually succeeded in getting a start on their agenda in a few German states in the 1970s. Among the items on their agenda were promoting better child care and more effective Kindergarten education. They wanted to abandon the time-honoured practice of sending their children home from school for lunch and ending the school day right there. And they wanted to end the tripartite division of the secondary schools and provide a more equal chance for students from poor and immigrant families. After unification, they had started to get some of the former East German states to combine at least two of the three secondary school types to create a fairer system, but they had not got very far.

Although they had made progress in some states on some parts of their agenda in the 1970s and 80s, there had been a conservative backlash. The progress on these and other elements of their agenda was undone and overall funding for the schools reduced substantially. Andreas Schleicher notes that in an export-driven economy where the demand from the rest of the world for German goods and services remained high, the system was not forced to change. German cars continued to be in high demand, and besides, if German business leaders could not find the skills they needed in Germany, they could find those skills elsewhere.

Now, however, that agenda was on the table as never before. The states had all the cards. The states had always played a strong role in Germany, but when the Allies took the reins after the war, they insisted on rewriting the German constitution so that a strong central government could never again take over education in Germany. Under the new constitution, there was even less room for a federal role in education than in the United States.

* The German translation for the English term Council of ministers is: Die Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (Kurzform: Kultusministerkonferenz).

Fortunately, the *Länder*, acting through the Council of ministers, had already set the stage with their own first national report on education. This meant the reformers in the federal government and the *Länder* could join forces. Minister Buhlman proposed investing EUR 4 billion in an all day school programme. She also proposed developing national education standards, and creating a new national report on education. Agreement on this agenda did not come easily, but a compromise was reached on the all day school programme in 2003 and on national education standards in 2004. And the *Länder* agreed as well to a new national report on education.

Agreement on the overall reform agenda was possible because the politics were different this time. The PISA results had to be dealt with and could not be swept under the carpet. The left's agenda was for national standards, beefed up Kindergartens, more money for special language training for children and families that could not speak German fluently, a lot more money to pay for extending the school day well into the afternoon, more money for teacher training and fundamental reform of the old feudal structure of the schools. The right wanted to hold the educators accountable for their performance and they wanted the schools managed according to modern management theory, so that, in exchange for being more accountable for their performance, the school staff would be given more autonomy by the state bureaucrats. This part of the agenda, as it turned out, was also enthusiastically embraced by the left as well.

Each side had been effectively blocked by the other for years, producing gridlock on educational policy change. But the "PISA shock" changed all that. Now, for the first time in years real change was possible on a surprisingly large scale. The uproar in the press reflected a very strong reaction to the PISA results from the public. Politicians who ignored it risked their careers.

In the end, the states took the lead operating mainly through the Council of ministers, though the federal government took some initiatives in the limited domain available to it. The agendas of the right and left were fused together, something that could never have happened earlier, but which made it possible to forge a more-or-less common agenda through all the states, irrespective of political party. This led to a number of specific responses to the perceived problems behind Germany's poor performance, described below.

Changing the school structure to reduce the influence of socio-economic background on student achievement

Germany has a higher correlation between family socio-economic status and student achievement than any other OECD country. Many German education experts had been deeply concerned about this problem for decades and attributed it mainly to the tripartite structure of German secondary education.

As Schleicher points out, the data showed that even when students were matched on actual achievement, elementary school children whose parents had attended *Gymnasium* were three times as likely to be sent to a *Gymnasium* than children whose parents had graduated from a *Hauptschule*.

This undermines the assumption by German educators that the choice of secondary school is based solely on achievement in elementary school. The fact that this was not the case showed that the system is manifestly unfair. For a number of reasons, it systematically denies opportunity to those whose parents are from the lower classes. Another contributing factor is the fact that decisions to send students to a specific secondary school are made so early, for children aged only 10.

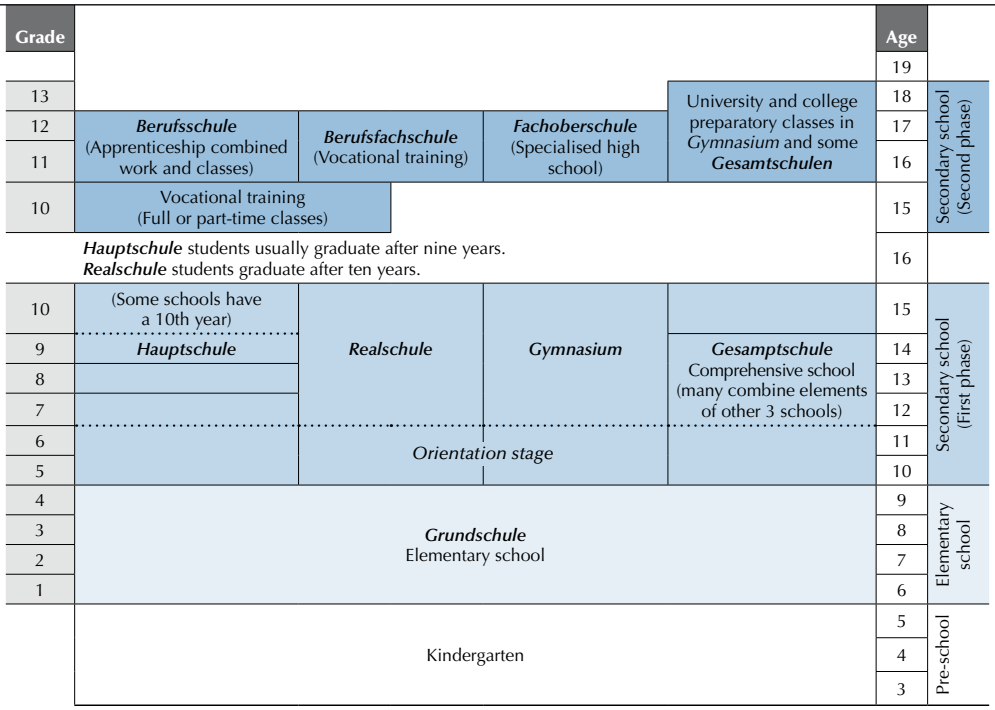
Different states have responded to these issues in different ways:

- A few states delayed the assignment of students to the tripartite system until they were 12 rather than 10 years old.
- More states chose to combine the *Realschule* and the *Hauptschule* into one school.
- Some states allowed students in any of the three types of lower secondary school to go to any type of upper secondary school. This greatly reduced, though did not entirely eliminate, the tracking system, because many secondary schools had their own streaming systems to differentiate students according to ability.
- Some states introduced or reintroduced comprehensive secondary schools which any child can attend and which offer the whole range of qualifications. However, this option is not offered throughout the country, and only in parallel with some or all of the options just listed. One obstacle to this was the bad reputation of these schools caused by their poor introduction in the 1970s.
- Some states decided to allow several of these options to coexist side by side.

By the end of the 2008/09 school year, there were 4 283 *Hauptschulen*, 2 625 *Realschulen*, 3 070 *Gymnasien* and 1 363 schools offering both *Hauptschule* and *Realschule* courses. There were also 705 comprehensive high schools (*Integrierte Gesamtschulen*) – see Figure 9.1. Some informed observers believe that within 10 years there will no longer be any separate *Realschule* and *Hauptschule*.

■ Figure 9.1 ■

Germany's education system organisation



Addressing the language problems

Data showed a very high correlation between children's command of German on entering elementary school and their subsequent performance (Werning, *et al.*, 2008). Because services for preschool children and Kindergarten are not part of the school system, the federal government is permitted by the German constitution to intervene in this arena. The federal government has introduced programmes, supervised by the states and run by municipalities or charities, to significantly increase the level of organised, high quality, affordable language training for children whose families do not speak Germany fluently at home. This language training is offered to Kindergarten-level students so that by the time they arrive in elementary school they are ideally as fluent as native Germans.

The data also showed that the children of poor, minority and immigrant parents were among the least likely to be in preschool, even though they needed these services more than the children who did attend. Preschool services were more likely to be offered as child care than as serious educational services and their child care workers were poorly trained. Because the mothers of poor, minority and immigrant children were more likely to be working out of the home than other mothers, the lack of access to affordable, quality child care and preschool services were contributing heavily to these children's lack of essential skills when they arrived at school at the age of six. Kindergarten is the traditional form of preschool in Germany. In a series of legislative actions, Germany created a right to a place in Kindergarten for every child from the age of three until they begin elementary school. Other legislation expanded the availability of preschool for children under the age of three. Further, the *Länder*, acting together, tried to beef up the educational content of the preschool programmes to include language, writing, communication, mathematics, natural sciences, information technology, fine arts and other subjects. However, these initiatives have not been extensively implemented.

Addressing the lack of transparency and accountability in the system

For many observers, the problem revealed by the "PISA shock" was first and foremost the lack of transparency and accountability in the German education system.

While standards were assumed to be high across Germany, the PISA data and analyses showed that standards were in fact low and highly variable. Though many people had called for uniform, high and transparent standards for years, they had always been successfully rebuffed. As pointed out above, Germans had a real aversion to formal measures of student achievement based exclusively on examination performance. Thus standards varied from qualification to qualification, school to school, teacher to teacher and state to state. And so did measures, if there were any at all. In many states, individual high schools set their own *Abitur* exams. Some higher education institutions and employers, for example, gave more credits to students who passed a Bavarian *Abitur* than they did to students whose *Abitur* came from other states.

The whole German education system also had a real aversion to the use of empirical evidence and rigorous analysis of data as the basis of educational decision making. Policy was based on values, not on data. Several solutions have been proposed as part of the reform:

Common standards

In 2003 and 2004, the Council of ministers decided to develop national educational standards for Grade 4 in primary school in German and mathematics; and standards for German, mathematics, a first foreign language (English or French), and science (biology, chemistry and physics) for Grade 9/Grade 10 in lower secondary school.

In 2007, the Council of ministers announced additional standards at the end of upper secondary school in seven subjects: mathematics, German, French, English, biology, chemistry and physics.

These performance standards describe in some detail subject-specific competencies that students are expected to meet throughout Germany. There had never been national standards of this sort before in Germany. They are mandatory for all 16 German states, by common agreement among the states and are benchmarked against international standards. They emphasise the kind of skills and competencies measured by the PISA assessments where appropriate.

New assessments based on the standards

In 2006, the Council of ministers agreed to develop common assessments for comparing the performance of the 16 German states using common national scales, for 3rd graders in elementary school, 8th graders in certain secondary schools and 9th graders in others (Figure 9.1). These new assessments are based on a representative sample of students in each state, and do not have high stakes associated with them either for students or teachers.

In addition, each state undertook to develop state-wide testing systems set to the new standards. In many cases, states joined forces to develop these assessments. These assessments are conducted every spring and test entire student populations in grade 3 and, in some states, grade 6.

Participation in comparative international assessments

Germany also committed itself to participating in three major international programmes of comparative national student testing: PISA at the secondary school level, and TIMSS and PIRLS Progress in International Reading Literacy Study) at the elementary school level. It also announced it would publish the results of these assessments.

A new organisation to monitor the system

In order to implement these far-reaching changes in policy, the Germans created a new institution in 2004 – the Institute for Educational Progress based at the Humboldt University in Berlin – to provide the infrastructure and scientific capacity needed to support the development of the standards and assessments the new monitoring system would need, and to gather, analyse and disseminate the resulting information.

A new reporting framework

The federal government and the *Länder* agreed to publish an indicator-based system of reports, *Education in Germany*, to be based on a continuous, data-based, problem-centred examination of the German education system.

These reports are published every two years and present data based on a permanent core of indicators to guarantee consistent reporting. The first report, which focused on education and condition of migrants, came out in 2006. The second, produced in 2008, focused on transitions from early childhood education into and through the various stages of schooling and vocational education and from there into further education and work.[2]

Greater capacity for gathering and analysing performance data

As the Germans did not place a high value on the use of empirical data and its analysis in the education policy-making process, Germany had not invested much in educational research. While things had begun to improve from 1965, the PISA shock greatly accelerated the process. Now the government is making systemic investments in the capacity of the educational research establishment to do the kind of research that is needed to base school policy on empirical data on system performance. For example, in 2007 the Federal ministry of Education announced a Framework Programme for the Promotion of Empirical Education Research. The framework lays out topics and methods for research that the government is particularly interested in pursuing. The ministry is collaborating with the *Länder* on the design of this research programme, thereby increasing the chance that the research will actually inform policy and practice.

Increasing school hours

The 2000 PISA results highlighted that German students spent much less time in school than students from other countries. Previously, students only attended school in the morning. Now, students in many schools do not leave school until 4:00 pm or later. However, schools do not have to participate in this scheme and schools that do participate are required to remain open in the afternoon for only three days a week.

Increasing autonomy for school heads

The German reformers were heavily influenced by the modern management model, which holds that competent management sets clear goals and clear measures of those goals, provides positive incentives to line mangers to accomplish those goals, and then gives them a lot of discretion over how to achieve those goals. But, traditionally in Germany, school heads had very little discretion. Following the PISA shock, however, the states generally found ways to give German school heads and faculties more authority over school budget, staffing decisions and programmes.

Ludger Woessmann, Economics Professor at the University of Munich, described the change as follows, "Until recently, schools in Germany had no autonomy. For example, schools were assigned teachers. In some states, schools can now choose their own teachers. Research shows that there is increased performance when you have central exams and strong school accountability. Let the schools figure out how to get to high performance on central exams."

Some of the changes described above were very expensive. However, even while the German schools budget increased, German education spending, at 4.5% of GDP, is still below the OECD average of 5.2%. Much of this increase can be explained by the enormous jump in the time students were required to spend in school. And more money was also needed, outside the education budget, on expanding early childhood education. Some of the increase in the education budget was offset by reducing by a year the time students were required to spend in *Gymnasium*.

Improving teacher quality

It is possible that Germany's teachers were a major source of the problems revealed by the PISA data. For example, Karl Ulrich Mayer suspects that, "one reason for the weakness of the education system after the eighties was a severe over-aging of the teacher population. Many were hired as a response to the baby boom in the sixties and early seventies and formed an age-homogeneous teaching staff who were burned out and unmotivated, and especially ill-equipped to deal with students from an immigrant background. I would not be surprised if some of the effects of the improvement in performance after PISA were due to the recent hiring of younger teachers."

One cannot become a teacher in Germany without an *Abitur*. Kaija Landsberg, Director of Teach First, the German version of Teach for America, explains further:

> After leaving *Gymnasium* with an *Abitur*, future teachers went to university, where they would have had to major in two subjects in which they had a special interest and study those subjects at the same level of challenge as other university students majoring in those subjects, thus producing an unusually high level of subject matter knowledge in these future teachers. Following their university education in the subjects they planned to teach

and in the pedagogy of those subjects, these candidate teachers still had to take another two-year programme of combined supervised teaching and related course work before they could enter the workforce, and, even then, had at least an additional year of mentoring and close supervision, as well as another examination, before they were allowed to assume the role of a full professional teacher. Thus we are looking at people selected in the first instance from the top third of the distribution who were then given a demanding education in the subjects they were going to teach followed literally by years of professional education in teaching, which included a multi-year apprenticeship.

When the PISA shock hit Germany, many people assumed that the teachers' unions would stonewall the reforms. Instead, the teachers' unions actually played an important role in supporting the reforms and paving the way for their passage. No doubt that role was made easier by the government's agreement that the new data on student performance would not be used in accountability systems with high stakes, or any stakes at all, for teachers. The teachers made sure that the new exams would use a sampling procedure that would by itself make it impossible to use student performance data to set teachers' compensation or affect the promotion of retention of individual teachers. But the teachers agreed to the extended school day without a comparable increase in pay. The result was a continued high standing for teachers among the German public and the right to an important place at the table as education policy is made.

One might ask why, if teacher quality was good before the shock and after the shock, what has changed? In other countries, when unexpectedly poor education results have been announced, the teachers are often the first to be blamed. The German teachers and their unions knew that and they knew how important it was for them to get out in front of the reform process if they were not to be steamrollered by it. And then there is the matter of professional pride. It would simply be human for capable people whose professional standing had been jeopardised by poor results to do their utmost to produce better results. That process would have been made easier by the reforms that devolved more authority to the schools than they had had before.

UNDERSTANDING THE IMPACT OF THE GERMAN EDUCATION REFORMS

There are several challenges involved in trying to link the reforms to the improvements in Germany's educational performance. For example:

- These policy changes were not made or implemented all at once, but were spread out over several years and were often implemented differently by different states. Some are only now being implemented at scale.
- There has not been enough time yet for the important improvements made to German preschool education and in the literacy of very young children from non-German speaking homes to show up in the performance of the 15-year-old students tested by PISA in 2009.
- Though the new standards have stimulated a great deal of discussion among German teachers, it is not clear that there has been enough time since their release in 2004 for them to have a strong impact on the performance of 15-year-old students. The results of the first national assessments of German students in grade 4 against the new national standards are only coming out in 2010, one year after the last PISA assessments were administered to German students.
- Though there has been some movement towards restructuring the famous German tripartite structure of secondary schooling in some states, the total number of restructured schools as a proportion of all German secondary schools is still fairly small, so one can not attribute a great deal of the gain in German students' performance on PISA to the school restructuring programme.
- It was not so easy in the past to measure performance. Germany's much improved research establishment should now be able to track implementation closely and soon more and higher quality data will be available to education practitioners and policy makers.

All these points can be interpreted as good news. There has been substantial improvement in performance since the PISA 2000 assessments, despite the fact that the reforms have been only partially implemented so far and have not yet had time to affect the performance of students who were 15 in 2009. We would therefore expect the performance of German students to continue to accelerate in the years to come, as a greater proportion of students are exposed to the reforms.

And because the PISA shock enabled Germany to combine the education agendas of both right and left, there should be more continuity in policy than is often found in most countries with a strong party system of politics.

According to Rheinhold Weiss, Director of Research at the BIBB, "It is not realistic to expect quick results. Germany is on the right track because there are increasing numbers of full-day schools, more support for early childhood education, and more data on the performance of the students and the system."

Most German observers are very tentative in making any judgements about which of the various policy initiatives are most responsible for the gains that have been made so far. Most suggest that it was the PISA shock itself that jolted German educators into action – that once teachers knew how poorly their students were performing, their sense of professionalism was enough to motivate them to improve the situation. Others think that the new standards give teachers a clear picture, for the first time, of what their students are supposed to accomplish. Others have suggested that the innate sense of competition among the *Länder*, combined with the strategy of producing publicly available data comparing the *Länder* on common measures, did the trick.

Below we list some of the factors that our research suggests are most likely to be important in this improved performance.

LESSONS FROM GERMANY

▪ Good quality teachers

Germany selects its teachers from the top third of its high school graduates. The preparation of most teachers in university is more extensive than it is for teachers in most other countries and for most other professions in Germany. All candidates for university degrees in teaching, including elementary school teachers, must undertake extensive work in the subjects they will teach. The recent reforms require the teacher education programmes to provide candidate teachers with skills enabling them to diagnose and address the specific problems faced by struggling students. All states require that teachers participate in an extended period of supervising and mentoring by master teachers before they can take up their duties and become regular full-time teachers. The high quality of Germany's teachers appears to have provided the reserve capacity Germany needed when PISA shock struck, enabling it to improve the achievement of Germany's students even before the new reforms had a chance to take effect.

▪ The value of the dual system

One cannot consider the effectiveness of the German education system without considering the workings of the dual system, which plays a very important function in Germany's education and training. All over the world, the demands of advanced industrial nations mean that to get ahead, school leavers need a new set of skills, such as the ability to set work goals, create a plan for achieving them and then working in a disciplined way to execute that plan; being an effective member or leader of a team; working independently; drawing on experience and theory to solve a wide variety of actual problems; and the ability to think analytically and creatively. Employees who cannot do these things are a serious problem, and a strong drag on competitiveness. The dual system is an efficient way of building these skills, as pointed out by a recent OECD vocational education and training (VET) policy review (Hoeckel and Schwartz, 2010).

Is the dual system applicable outside Germany? Many countries have dismissed it as irrelevant because they think it only suits cultural factors unique to Germany and perhaps a handful of other similar European countries. However, countries that do not have a dual system are now being forced to task their schools with developing these skills in their students, even though schools are not the best settings for developing these skills (Box 9.1). In the workplace, students quickly discover that their jobs are threatened if they do not show up on time or come prepared to put in a good day's work. The workplace teaches one how to be an effective team member and a good leader. It is the ideal place to figure out how to bring what one has learned in school to bear on the kinds of problems likely to be encountered at work, and elsewhere (Field, *et al.*, 2010). The strong involvement of social partners, a characteristic of dual systems, helps to ensure that VET systems are responsive to the needs of the labour market and teach relevant skills. This, in turn, helps young people to find employment.

Germany's flexible combination of formal schooling with the dual system represents a very powerful approach to providing students with skills, knowledge and motivation that could prove decisive on a national scale in international competition. It is possible that Germany's current resurgence on the global economic scene is due in some measure to this combination of formal schooling and apprenticeship.

- **International benchmarking and accountability**

In a way, the entire German story is a story about accountability. Prior to the PISA shock, Germany had no interest in what other countries were doing to bring their education systems up to world class status. But, after the PISA 2000 results, Germany became an avid, determined international benchmarker. Not only did Germany send teams all over the world to learn from other nations, but it quite deliberately built into its own national testing regimes participation in some of the international comparative testing regimes, so that it would never again be surprised by its own standing in relation to that of other countries and so that it could continue to benefit from the experience of other countries. The PISA shock also drove the ambitious reform programme, including whole new national systems of standards and tests. Germany chose not, however, to create a test-driven accountability system with high stakes for students or teachers. In part, this was the result of a desire to keep their teachers on board and enthusiastic about the whole reform package.

- **Common standards and curricula**

Germany thought it had strong standards and sound curriculum and discovered to its dismay that its standards differed wildly from school to school and state to state. It responded by developing common curriculum frameworks and common performance standards.

- **The use of incentives, especially for students**

German students work hard in school because they know that their opportunities in life are a function of the formal qualifications they earn, and the qualifications they earn are a function of how well they do in school. This is just as true of the bricklayer and auto mechanic in Germany as it is of the brain surgeon. The German case is one of the strongest examples of the use of qualifications systems to generate incentives for students to take tough courses and work hard in school.

However, the road ahead is full of challenges. Only last summer there were student and teacher strikes in Germany rooted in controversy over the reforms. *Gymnasium* students feel that there is much more pressure on them than formerly, as they find themselves forced to work against more demanding standards in many states, with far more requirements and one year less in school to meet those requirements than the students who went before them.

In Hamburg, in the summer of 2010, politicians from a Conservative-Green coalition asked whether the common elementary school should be extended to age 12 for students instead of the prevailing age 10. Both parties had agreed to this change, as had the school professionals. But, to the surprise of both political leaders and professional educators, the public, led by an aroused middle class, voted a resounding no.

WHERE IS GERMANY ON THE EDUCATIONAL CONTINUUM?

Germany is one of the world's great industrial powers, often referred to as Europe's economic engine. Wages and benefits in Germany are high relative to those in the rest of the world. Its economy is based not on the sale of commodities, but on the global sale of high-value-added manufactured products. Its success in this arena rests on the quality, creativity and skill of its workforce. By all these measures, one would have to say that Germany is at the far right end of the economic development dimension line described in the introduction to this report (Chapter 1).

With respect to the teacher quality dimension line, Germany made a very important decision when it decided many years ago to require that all teachers hold an *Abitur*. Other measures to assure high teacher quality followed. Most experts would place Germany at the right end of the teacher quality dimension line, though not all experts in Germany would agree. By some measures, other countries recruit from a more elite segment of their population.

When PISA shock descended on Germany, policy makers not only set national curriculum standards, but also required that they be benchmarked to international standards. That meant that they emphasised complex skills and the ability to apply high level skills to problems of the sort to be expected in high wage, heavily industrialised countries. The centuries-old German commitment to the arts and to literature, as well as to mathematics and science, assured that the new curriculum standards would not short change the development of students' creative abilities. However, some Germans continue to be concerned that standards will by their very nature endanger both creativity and the arts. Here, too, the Germans are clearly on the right end of the relevant dimension line.

Prior to the PISA shock, German schools had very little discretion. A great deal of control over the school was exercised by higher level authorities in the system. After PISA shock, the country moved towards awarding greater discretion to the school heads and faculty. But German schools still appear to have less discretion and control over the way they deliver services to students than is the case in other leading countries.

Again, prior to PISA shock, there was remarkably little accountability of any kind in the German education system. There are now two national tests, but neither is used to provide direct test-based accountability of the administrative kind that would place Germany on the left side of the accountability dimension line. Instead, Germany opted for professional and familial accountability, placing it on the right side of that dimension line.

Germany has progressed from the left side of the student inclusion dimension line to somewhere in the middle. It is breaking down the rigid distinctions between school types based on the class origins of its students, but it is not abandoning those distinctions.

Thus the picture is mixed, but generally tending strongly towards the right hand side of the developmental progression described in Figure 9.1.

■ Figure 9.2 ■

Germany: Profile data

Language(s)	German[3]
Population	82 772 160[4] (2008)
Youth population	13.8%[5] (OECD average 18.7%)
Elderly population	20.1% [6] (OECD average 14.4%)
Growth rate	-0.16% (OECD 0.68%)[7]
Foreign-born population	12.9%[8] (OECD average 12.9%)
GDP per capita	USD 35 432[9] (2008) (OECD average 33 732)[10]
Economy-Origin of GDP	Automobiles, machinery, metals and chemical goods. Services: 72%; Industry: 25%; Agriculture: 2%
Unemployment	7.3% (2008)[11] (OECD average 6.1%)[12]
Youth unemployment	10.4% (2008) (OECD average 13.8%)[13]
Expenditure on education	4.5% of GDP; (OECD average 5.2%) 2.9% on primary, secondary and post-secondary non-tertiary 1.1% on tertiary[14] education[15] (OECD average 3.5%; 1.2% respectively) 10.3% of total government expenditure (OECD average 13.3%) 6.6% on primary, secondary and post-secondary non-tertiary 2.6% on tertiary education[16] (OECD average 9%; 3.1% respectively)
Enrolment ratio, early childhood education	101.5%[17] (OECD average 71.5%)[18]
Enrolment ratio, primary education	99.3%[19] (OECD average 98.8%)[20]
Enrolment ratio, secondary education	88.7%[21] (OECD average 81.5%)[22]
Enrolment ratio, tertiary education	28.4%[23] (OECD average 24.9%)[24]
Students in primary education, by type of institution or mode of enrolment[25]	Public: 96.4% (OECD average 89.6%) Government-dependent private: 3.6% (OECD average 8.1%) Independent, private (included in "government-dependent private" figure) (OECD average 2.9%)
Students in lower secondary education, by type of institution or mode of enrolment[26]	Public 91.5% (OECD average 83.2%) Government-dependent private: 8.5% (OECD average 10.9%) Independent, private (included in "government-dependent private" figure) (OECD average 3.5%)
Students in upper secondary education, by type of institution or mode of enrolment[27]	Public: 91.1% (OECD average 82%) Government-dependent private: 8.9% (OECD average 13.6%) Independent, private (included in "government-dependent private" figure) (OECD average 5.5%)
Students in tertiary education, by type of institution or mode of enrolment[28]	Tertiary type B education: Public: 62.2%[29] Government-dependent private: included in "public" figure Independent-private: included in "public" figure (OECD average Public: 61.8% Government-dependent private : 19.2% Independent-private: 16.6%) Tertiary type A education: Public: 95% Government-dependent private: missing data Independent-private: missing data (OECD average Public: 77.1% Government-dependent private : 9.6% Independent-private: 15%)
Teachers' salaries	Average annual starting salary in lower secondary education: USD 48 004 (OECD average USD 30 750)[30] Ratio of salary in lower secondary education after 15 years of experience to GDP per capita: 1.69 (OECD average: 1.22)
Upper secondary graduation rates	97% (OECD average 80%)[31]

StatLink http://dx.doi.org/10.1787/888932366769

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Notes

1. A point made, for example, in interviews with Herman Schmidt and Reinhold Weiss.

2. These reports are called *Education in Germany 2006* and *Education in Germany 2008* and were prepared on behalf of the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* in the Federal Republic of Germany and the Federal Minsitry of Education and Research (Bertelsman Verlag GmbH).

3. OECD (2010), *OECD Economic Surveys: Germany 2010*, OECD Publishing.

4. OECD.Stat, *http://stats.oecd.org* Germany's population is predicted to shrink to 65-70 million by 2060.

5. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Ratio of population aged less than 15 to the total population (data from 2008).

6. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Ratio of population aged 65 and older to the total population (data from 2008).

7. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Annual population growth in percentage, OECD total (year of reference – 2007).

8. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Foreign-born population as a percentage of the total population (data from 2007).

9. OECD.Stat, *http://stats.oecd.org*.

10. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Current prices and PPPs (data from 2008).

11. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Total unemployment rates as percentage of total labour force (data from 2008).

12. OECD (2010), *OECD Factbook 2010*, OECD Publishing. Total unemployment rates as percentage of total labour force (data from 2008).

13. OECD (2010), *Employment Outlook*, OECD Publishing. Unemployed as a percentage of the labour force in the age group: youth aged 15-24.

14. The OECD follows standard international conventions in using the term "tertiary education" to refer to all post-secondary programmes at ISCED levels 5B, 5A and 6, regardless of the institutions in which they are offered. OECD (2008), *Tertiary Education for the Knowledge Society: Volume 1*, OECD Publishing.

15. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions (data from 2006).

16. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions (data from 2006).

17. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Net enrolment rates of ages 4 and under as a percentage of the population aged 3 to 4 (data from 2008). The rates "4 and under as a percentage of the population aged 3 to 4" are overestimated. A significant number of students are younger than 3 years old. The net rates between 3 and 5 are around 100%.

18. OECD (2010), *Education at a Glance 2010*, OECD Publishing. OECD average net enrolment rates of ages 4 and under as a percentage of the population aged 3 to 4 (year of reference – 2008).

19. Gross enrolment ratio, Data from 2007 *http://data.worldbank.org/country.*

20. OECD (2010), *Education at a Glance 2010*, OECD Publishing. OECD average net enrolment rates of ages 5 to 14 as a percentage of the population aged 5 to 14 (year of reference – 2008).

21. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Net enrolment rates of ages 15 to 19 as a percentage of the population aged 15 to 19 (data from 2007).

22. OECD (2010), *Education at a Glance 2010*, OECD Publishing. OECD average net enrolment rates of ages 15 to 19 as a percentage of the population aged 15 to 19 (year of reference – 2008).

23. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29 (data from 2007). This figure includes includes all 20-29 year olds, including those in employment, etc. The Gross Enrolment Ratio (GER), measured by the UN as the number of actual students enrolled / number of potential students enrolled, is generally higher. The GER for tertiary education in Germany in 2002 is 46.3% (UNESCO) compared to the regional avg of 70% (UIS 2010).

24. OECD (2010), *Education at a Glance 2010*, OECD Publishing. OECD average net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29 (year of reference – 2008).

25. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Data from 2008.

26. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Data from 2008.

27. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Data from 2008.

28. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Data from 2008.

29. Excludes advanced research programmes.

30. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Starting salary/minimum training in USD adjusted for PPP (data from 2008).

31. OECD (2010), *Education at a Glance 2010*, OECD Publishing. Sum of upper secondary graduation rates for a single year of age in 2007 (year of reference for OECD average – 2008).