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IQB Trends in Student Achievement 2015

The Second National Assessment of Language Proficiency at the End of the Ninth Grade

Summary

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IQB Trends in Student Achievement 2015

In 2003 and 2004, the Standing Conference of the Ministers of Education and Cultural Affairs of the States in the Federal Republic of Germany (KMK) introduced educational standards for the primary level and for secondary level I detailing which competencies students are expected to have attained by the time they reach specific points in their school career. The focus of these standards was on the subjects of German and mathematics (primary level, secondary level I), the foreign languages of English and French (secondary level I), and the natural sciences (secondary level I) (KMK, 2004a-c, 2005a-h). In accordance with the Standing Conference's (KMK, 2006, 2015) long-term strategy for educational monitoring in Germany, the 16 federal states (*Länder*) also decided to implement regular studies assessing the extent to which educational standards are being met at the state level. The Institute for Educational Quality Improvement (IQB) at the Humboldt-Universität zu Berlin is responsible for conducting these assessments. The first cycle of surveys in the IQB's standards-based national assessments was completed with studies of 2009 (secondary level I: German, English, French), 2011 (primary level: German, mathematics), and 2012 (secondary level I: mathematics, biology, chemistry, and physics) (Köller, Knigge & Tesch, 2010; Stanat, Pant, Böhme & Richter, 2012; Pant, Stanat, Schroeders, Roppelt, Siegle & Pöhlmann, 2013). The study conducted in 2015, whose results are summarized in the following, marks the beginning of the second cycle. The findings reported here now make it possible, for the first time, to analyze changes in the attainment of educational standards over time. To underscore the importance of trend analysis in educational monitoring, all IQB studies from 2015 on will be called "IQB Trends in Student Achievement" (*IQB-Bildungstrend*).

With the 2015 IQB trend report, student proficiency in German, English, and—in six states—in French was measured for the second time based on the national educational standards set by the Standing Conference for the end of secondary level I. This provides the basis, first, to describe student proficiency levels at the end of the ninth grade in 2015. Second, it allows us to analyze changes over time in the domains tested since the first IQB National Assessment Study in 2009. Repeated measurement of these competencies at six-year intervals has significantly broadened the range of analyses possible with the IQB data, and has thus also considerably expanded the informational content of the results relative to past IQB National Assessment Studies.

The test items used in the 2015 IQB Trends in Student Achievement were developed by teachers in close consultation with experts in subject didactics. Their work was based on the educational standards of the Standing Conference and was conducted under the oversight of the IQB. The 2015 IQB study surveyed students' proficiency levels in German in the domains of *reading*, *listening*, and

orthography, and in the subjects of English and French in the domains of *reading comprehension* and *listening comprehension*.

To assist in interpreting students' results in the proficiency tests, the IQB worked closely with experts in subject didactics to develop proficiency level models based on the Standing Conference's educational standards. For the subjects of German and English, these are integrated models of proficiency levels that include all students in the respective subject. For the subject of French, the proficiency level models cover only those students who are working toward at least the MSA (*Mittlerer Schulabschluss*) or intermediate school-leaving certificate. These proficiency level models enable us to describe the demands that students with a specific test score will generally be capable of meeting. They also allow us to determine the extent to which students in the various states are meeting the Standing Conference's educational standards in the subject and domain at hand, and whether they have met the respective "minimum", "normative", or "optimal" standards.

Comparative perspectives in IQB Trends in Student Achievement 2015

In IQB Trends in Student Achievement 2015, we report findings on student competencies from three comparative perspectives:

From a *criterial* comparative perspective, we explore the question of how the ninth-graders in the various states were distributed across the various levels of the proficiency models in 2015. We look in particular at what percentage of students achieved at least the normative standards, and what percentage failed to meet the minimum standards. Beyond that, we look at the extent to which students in academically oriented upper secondary school (*Gymnasium*) achieved the optimal standards.

From an *ipsative* or *temporal* comparative perspective, we are also able to describe changes over time (trend estimates). By linking the temporal and criterial perspectives, we can draw conclusions about the extent to which the distributions of students across proficiency levels in the various states changed between 2009 and 2015—for instance, whether the percentage of young people who fail to meet the minimum standards has declined over time, and whether the percentage who meet at least the normative standards has increased.

Third, we analyze the results from a *social* comparative perspective. This allows us to see, for instance, which states have higher percentages of students meeting the normative standards, and which states have lower percentages of students meeting these standards. We also use this perspective to compare students' mean proficiency levels across states.

IQB Trends in Student Achievement 2015 also focuses on an aspect of educational equality, namely on the question of whether differences in proficiency are associated with particular student background characteristics. Here, we studied differences in proficiency between girls and boys (gender disparities), differences associated with students' social backgrounds (social disparities), and differences in proficiency between students from immigrant and non-immigrant families (immigration-related disparities). Even if the educational system cannot realistically be expected to level the playing field completely and eradicate all inequalities among students from different social backgrounds, educational policy aims to re-

duce these disparities as much as possible. IQB Trends in Student Achievement 2015 assesses the extent to which this has been achieved at the state level both 2015 and over time.

By looking at all four focal points of the analysis together—the assessment of student achievement of educational standards, the examination of changes over time, the comparison of state-level results, and the differentiated analysis of specific sub-groups of students—educational policy makers and administrators can get a broad picture of the strengths and weaknesses of Germany's 16 educational systems at secondary level I. The trend estimates, which will be crucially important for educational monitoring, also provide indicators of the extent to which quality control measures implemented in educational systems at the state level over the last six years have been successful, and where there is still room for improvement.

After briefly describing important aspects of the population definition, sample, and reporting metrics used in IQB Trends in Student Achievement 2015, we summarize key results of our analyses in the subjects of German and English.[1] This, of course, requires us to reduce the complexity of the highly differentiated picture obtained for each individual state to a certain extent. To draw robust conclusions from the results reported in IQB Trends in Student Achievement 2015, researchers should examine the pattern of findings in each state in more detail within the context of that state's educational system.

Population definition, sample, and reporting metrics

In 2015, a total of 33,110 ninth-grade students from all 16 German states participated in our assessment of the achievement of educational standards in the subjects of German and English. The randomly selected, representative sample provides the basis for inferences about the population at the state level. The sample tested in the subject of German represents the population of all ninth-grade students in each of Germany's states and in Germany as a whole. The population for the subject of English is part of the larger population of students tested in German and only includes those students who took English every year from the fifth grade on. This is true of the majority of ninth-graders in Germany.

The study population for the analyses reported in IQB Trends in Student Achievement 2015 in the subjects of both German and English includes students with special educational needs in the domains of learning, language, and emotional and social development (*Förderschwerpunkte Lernen, Sprache, emotionale und soziale Entwicklung*). The 2015 IQB trend report was also conducted with adolescents at special needs schools.

In order to represent the student population for whom the educational standards have been developed in the analysis of educational monitoring as accurately as possible, the metrics used in the IQB Trends in Student Achievement 2015 (see below) are based on the test results of *all* ninth-graders in the target population in the subjects of German and English. We therefore included data on students with special needs at both regular schools and at special needs schools

1 We refrain from presenting results for the subject of French, since language proficiency in this subject was only surveyed in six states. Due to the significant differences between the respective populations, a comparison by state does not provide useful results (Stanat, Böhme, Schipolowski & Haag, 2016, Chapter 5).

in the analyses.[2] The first IQB National Assessment 2009, in contrast, was conducted only at regular schools, meaning that the 2009 and 2015 assessments differ with regard to the inclusion of students from special needs schools. The only way to overcome this discrepancy was by excluding special needs students from our analysis of trends over time.[3] Our conclusions about changes in the distribution of competencies between 2009 and 2015 thus apply exclusively to students without special needs. This limitation will only affect the analysis of trends over time in the 2015 IQB trend report. Trend estimates in future IQB studies will apply to the total population of ninth-graders including students with special needs.

Since an analysis of changes over time requires that we present the results of the various surveys on a unified scale ("metric"), the data from the IQB National Assessment 2009 were integrated into the reporting metric used in IQB Trends in Student Achievement 2015, and all results are presented using the metric from the 2015 Analysis. The values from 2009 that were reported in the IQB National Assessment 2009 and the corresponding values presented in this IQB Trends in Student Achievement 2015 are therefore not directly comparable. The new metric for the various domains was designed such that the distribution of values across the overall population of students in 2015 has a mean value of $M = 500$ points and a standard deviation of $SD = 100$ points.

Participation in the proficiency tests administered as part of IQB Trends in Student Achievement 2015 was mandatory at most public schools, both for the schools and the students. The overall sample of 33,110 ninth-grade students corresponds to a weighted participation rate of 93 percent of the student population. This is the same rate as in PISA 2012 (93%; Heine, Sälzer, Borchert, Sibberns & Mang, 2013) and is only slightly lower than in the IQB National Assessment 2009 (95%; Böhme et al., 2010). In the individual states, too, the rate of participation in the proficiency tests was high overall at 90 to 96 percent.

Along with the rate of participation in the proficiency tests, the participation rate in the student questionnaires needs to be considered. The student questionnaires used in the study serve, among other things, to collect data on student background characteristics for the analysis of social and immigration-related disparities. At an overall rate of 85 percent, the participation rate was lower for the student questionnaires than for the proficiency tests. In addition, the rate of participation in the student questionnaires differed considerably between states, which is due to the fact that only some states mandated questionnaire completion whereas others required parental consent. The information needed to analyze social and immigration-related disparities is therefore lacking for more than 20 percent of the students in three states (Berlin, Hamburg, and Saarland). Since estimates from available data are likely biased, our findings from the analysis of the aforementioned disparities in these three states should be interpreted with caution and are identified accordingly in the discussion of results below.

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2 We only excluded special needs students who follow an alternative curriculum that does not lead to a regular school certificate (*zieldifferente Unterrichtung*) from our analyses of the achievement of educational standards. Since there are specific demands associated with the use of alternative curricula in teaching children and adolescents with special needs, it would be inappropriate to use the Standing Conference's educational standards to measure their achievement. The percentage of students who follow an alternative curriculum ranges from 1 to 3 percent across the states, and is thus small overall.

3 Due to the very different ratios of inclusion across states, which also changed between 2009 and 2015, all students with special needs had to be excluded from the analysis of changes over time, no matter what type of school they attended, to guarantee comparability of populations across states.

Comparing proficiency level distributions by state

The educational standards for secondary level I were defined by the Standing Conference in relation to the final qualification at the end of specific educational tracks. For the subjects of German, English, and French, the Standing Conference formulated normative standards (*Regelstandards*) for the HSA (*Hauptschulabschluss*) or lower secondary school-leaving certificate, and for the MSA (*Mittlerer Schulabschluss*) or intermediate secondary school-leaving certificate. Based on these targets, the IQB developed proficiency level models that not only describe student achievement at the level of the normative standards, but also cover the entire range of proficiencies and divide this range into meaningfully interpretable segments. The proficiency level models also define the levels at which students achieve the minimum standard (*Minimalstandard*), the normative standard, normative standard plus (*Regelstandard plus*), and the optimal standard (*Optimalstandard*) for the HSA certificate and the MSA certificate (for French, only for the latter). In the following summary, we report proficiency level distributions only for the standards defined for the MSA certificate. The focus is, first, on the question of what percentage of ninth-graders in each state have achieved the normative standards for the MSA certificate overall, and second, on what percentage of students have not achieved the minimum standards for the MSA certificate.

Proficiency level distributions in German in 2015

In the subject of German, a good 48 percent of ninth-graders across Germany met or exceeded normative standards for the MSA certificate in the domain of *reading* in 2015. This was true of 62 percent of students in the domain of *listening* and around 66 percent in the domain of *orthography*. The percentage of students who failed to meet the minimum standard for the MSA certificate in these proficiency domains was around 23 percent in *reading*, almost 19 percent in *listening*, and around 14 percent in *orthography* across Germany as a whole. Yet as Figures 1-3 show, the percentages vary widely between states.

In the domain of *reading*, approximately 24 percentage points separate the states with the highest and lowest percentages of students achieving at least the normative standard (59 percent in Saxony vs. 35 percent in Bremen). The top and bottom-scoring states were separated by almost 19 percentage points in the domain of *listening* (70 percent in Schleswig-Holstein vs. 51 percent in Bremen) and by around 22 percentage points in the domain of *orthography* (75 percent in Bavaria vs. 53 percent in Bremen).

The states of Bavaria, Saxony, and Schleswig-Holstein had significantly higher percentages of students who achieved at least the normative standard, both in *reading* and in *listening*, compared to the national average. Moreover, Bavaria was the only state in which the percentage of ninth-graders who achieved or exceeded the normative standard in the domain of *orthography* was significantly higher than the national average. Other states with particularly strong achievement with respect to the normative standards were, in *reading*, Brandenburg and Thuringia, and in *listening*, Lower Saxony. The percentage of students who achieved at least the normative standard was significantly lower than the national average in all three domains in Berlin and Bremen, in the domain of *listening* in Baden-Wuerttemberg, and in the domain of *orthography* in Hamburg and North Rhine-Westphalia.

With respect to the percentages of students who failed to achieve the minimum standards in German, results also vary widely by state. States with the highest and lowest percentages were separated by almost 23 percentage points in *reading* (37 percent in Bremen vs. 14 percent in Saxony), around 15 percentage points in *listening* (27 percent in Berlin vs. 12 percent in Schleswig-Holstein), and approximately 15 percentage points in *orthography* (23 percent in Bremen vs. 8 percent in Bavaria).

When comparing the state data to the national averages, the results for the minimum standards present a similar picture to those for the normative standards. Again, Bavaria and Saxony had a smaller percentage of students who performed below the minimum standard compared to Germany as a whole. The same was true in the domain of *reading* in Saxony-Anhalt, Schleswig-Holstein, and Thuringia, and in the domain of *listening* in Lower Saxony and Schleswig-Holstein. Outcomes were particularly poor relative to the national average in Berlin and Bremen across the board, and in specific domains in Baden-Wuerttemberg (*listening*), Hamburg, and North Rhine-Westphalia (*orthography*).

Figure 1: Percentage of Ninth-Graders in Each State Who Meet or Exceed Normative Standards or Fail to Meet Minimum Standards for the MSA Certificate in the Domain of *Reading* in German

State	Meet Normative Standard (MSA) %	(*SE*)	Fail to Meet Minimum Standard (MSA) %	(*SE*)
Saxony	58.5	(1.6)	14.1	(1.3)
Schleswig-Holstein	54.0	(1.8)	17.7	(1.4)
Bavaria	53.9	(1.9)	19.8	(1.7)
Thuringia	53.4	(1.7)	19.4	(1.5)
Brandenburg	52.7	(1.8)	20.1	(1.9)
Mecklenburg-Western Pomerania	51.1	(1.8)	21.6	(1.5)
Saxony-Anhalt	50.5	(1.5)	20.2	(1.3)
Hamburg	48.7	(1.5)	25.8	(1.7)
Germany	48.4	(0.7)	23.4	(0.6)
Saarland	47.0	(2.8)	24.5	(3.2)
Rhineland-Palatinate	46.7	(1.7)	24.3	(1.9)
Hesse	46.4	(1.9)	25.9	(1.6)
Baden-Wuerttemberg	46.0	(1.8)	25.7	(1.7)
North Rhine-Westphalia	45.5	(1.7)	25.8	(1.7)
Lower Saxony	45.4	(1.8)	23.3	(1.7)
Berlin	42.7	(1.9)	30.8	(2.3)
Bremen	34.6	(2.8)	36.9	(2.6)

Notes: MSA = intermediate school-leaving certificate (*Mittlerer Schulabschluss*); SE = standard error

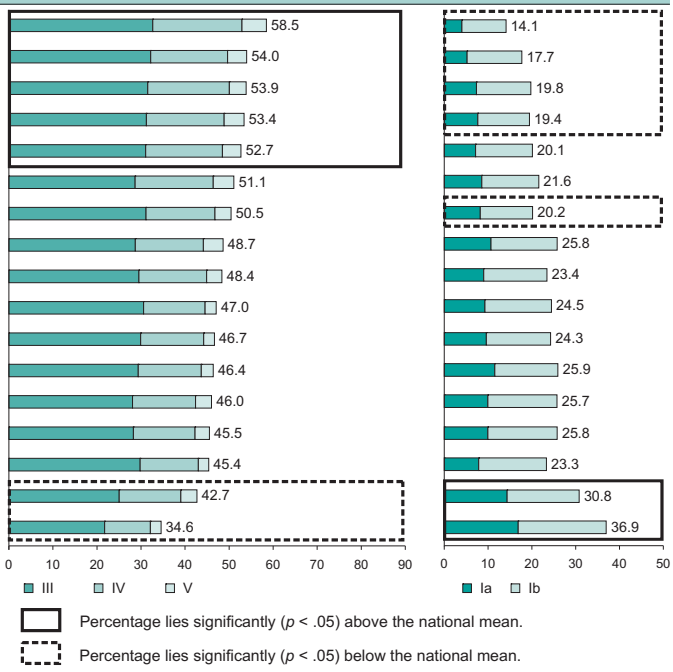


Figure 2: Percentage of Ninth-Graders in Each State Who Meet or Exceed Normative Standards or Fail to Meet Minimum Standards for the MSA Certificate in the Domain of *Listening* in German

State	Meet Normative Standard (MSA) %	(*SE*)	Fail to Meet Minimum Standard (MSA) %	(*SE*)
Schleswig-Holstein	69.6	(1.7)	11.9	(1.4)
Sachsen	67.6	(1.8)	13.2	(1.4)
Bavaria	67.4	(2.0)	14.4	(1.6)
Lower Saxony	66.4	(2.1)	13.8	(1.6)
Brandenburg	64.6	(1.6)	16.6	(1.7)
Thuringia	63.4	(1.6)	16.3	(1.3)
Germany	61.9	(0.7)	18.5	(0.6)
Mecklenburg-Western Pomerania	61.3	(1.8)	17.3	(1.4)
Hamburg	61.1	(2.0)	21.0	(1.9)
Rhineland-Palatinate	61.0	(2.0)	18.7	(1.9)
Hesse	59.6	(1.7)	20.9	(1.4)
Saxony-Anhalt	59.4	(1.6)	18.9	(1.5)
Saarland	58.9	(3.8)	20.9	(3.2)
North Rhine-Westphalia	58.7	(1.7)	20.3	(1.5)
Baden-Wuerttemberg	57.9	(1.6)	23.3	(1.6)
Berlin	53.4	(2.1)	27.2	(2.2)
Bremen	50.9	(2.5)	26.6	(2.2)

Notes: MSA = intermediate school-leaving certificate (*Mittlerer Schulabschluss*); SE = standard error

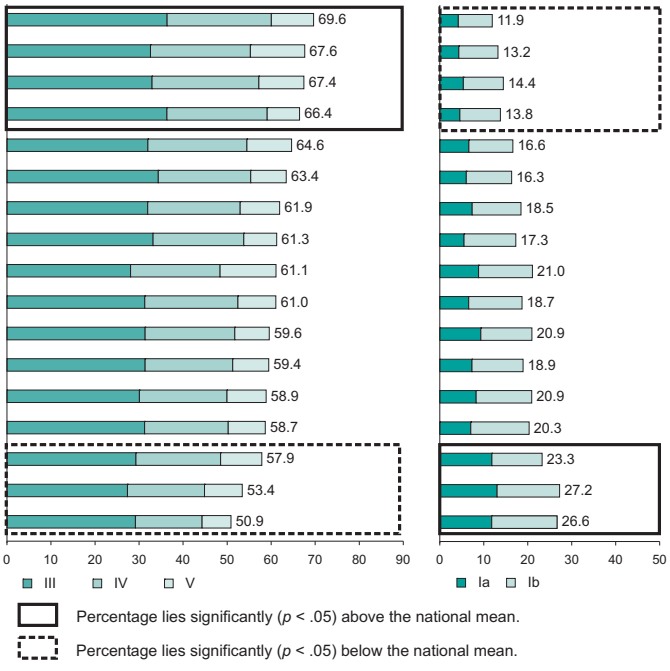
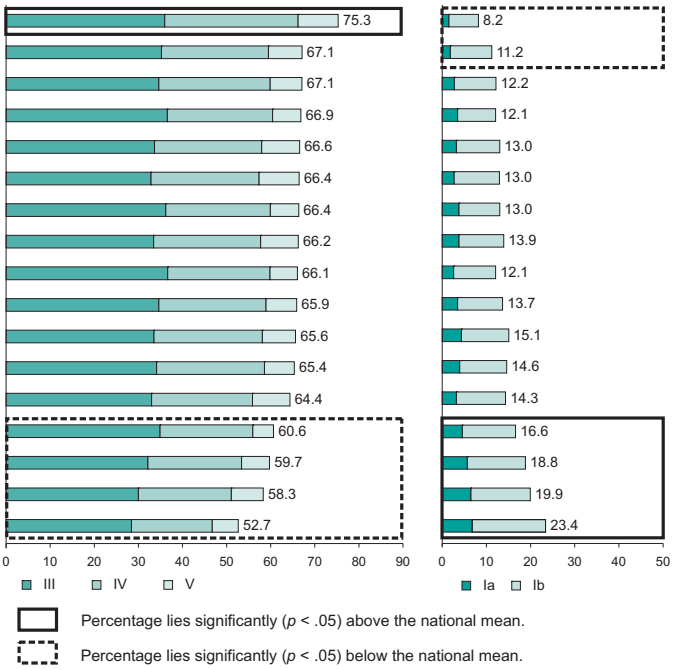


Figure 3: Percentage of Ninth-Graders in Each State Who Meet or Exceed Normative Standards or Fail to Meet Minimum Standards for the MSA Certificate in the Domain of *Orthography* in German

State	Meet Normative Standard (MSA) %	*(SE)*	Fail to Meet Minimum Standard (MSA) %	*(SE)*
Bavaria	75.3	(1.7)	8.2	(1.0)
Saxony	67.1	(1.7)	11.2	(1.1)
Rhineland-Palatinate	67.1	(2.0)	12.2	(1.4)
Mecklenburg-Western Pomerania	66.9	(1.6)	12.1	(1.1)
Saarland	66.6	(2.9)	13.0	(2.1)
Schleswig-Holstein	66.4	(1.8)	13.0	(1.5)
Thuringia	66.4	(1.4)	13.0	(0.9)
Brandenburg	66.2	(1.9)	13.9	(1.6)
Lower Saxony	66.1	(1.7)	12.1	(1.6)
Germany	65.9	(0.6)	13.7	(0.5)
Baden-Wuerttemberg	65.6	(1.6)	15.1	(1.3)
Hesse	65.4	(1.5)	14.6	(1.2)
Saxony-Anhalt	64.4	(1.5)	14.3	(1.3)
North Rhine-Westphalia	60.6	(1.7)	16.6	(1.4)
Hamburg	59.7	(1.7)	18.8	(1.6)
Berlin	58.3	(1.6)	19.9	(1.3)
Bremen	52.7	(2.6)	23.4	(2.1)

Notes: MSA = intermediate school-leaving certificate (*Mittlerer Schulabschluss*); SE = standard error



Proficiency level distributions in English in 2015

Looking at proficiency levels in the subject of English in 2015, almost 41 percent of ninth-graders met or exceeded the Standing Conference's normative standards for the MSA certificate in *reading comprehension*, and a good 44 percent did so in the domain of *listening comprehension*. In *reading comprehension*, around 27 percent fell below the minimum standard for the MSA certificate in *reading comprehension* and almost 17 percent did so in listening comprehension.

In English, percentages varied widely between states (See Figures 4 and 5). Seventeen percentage points separate the states with the lowest and highest percentages of students who met the normative standard in the domain of *reading comprehension* (49 percent in Bavaria vs. 32 percent in Bremen) and 23 percentage points separated the states at the top and bottom in the domain of *listening comprehension* (52 percent in Bavaria vs. 29 percent in Saxony-Anhalt).

The percentage of ninth-graders who met or exceeded the normative standard is significantly higher than the German average in both *reading comprehension* and *listening comprehension* in Bavaria, and in *listening comprehension* in Hamburg and Schleswig-Holstein. The percentage of students who met at least the normative standard is significantly lower than the national average in *reading comprehension* in the states of Bremen, Lower Saxony, and Saxony-Anhalt, and in *listening comprehension* in all of the Eastern German states except Berlin, as well as in Saarland.

Looking at the percentages of students who performed below the minimum standard in the subject of English, results again vary widely by state. The distance between the states with the largest and smallest shares of students with

Figure 4: Percentage of Ninth-Graders in Each State Who Meet or Exceed Normative Standards or Fail to Meet Minimum Standards for the MSA Certificate in the Domain of *Reading Comprehension* in English

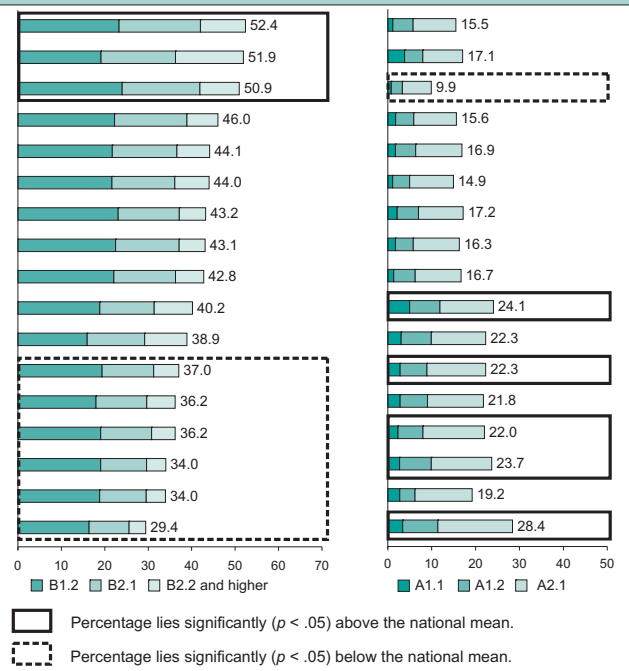
State	Meet Normative Standard (MSA) %	(*SE*)	Fail to Meet Minimum Standard (MSA) %	(*SE*)
Bavaria	49.3	(1.8)	22.0	(1.6)
Hamburg	43.6	(1.5)	28.4	(1.5)
Schleswig-Holstein	43.5	(1.8)	22.3	(1.9)
Germany	40.9	(0.5)	26.7	(0.5)
Hesse	40.7	(1.7)	26.0	(1.5)
North Rhine-Westphalia	40.4	(1.5)	27.7	(1.3)
Saxony	39.3	(1.7)	25.0	(1.6)
Baden-Wuerttemberg	39.2	(1.5)	27.4	(1.4)
Rhineland-Palatinate	39.2	(2.0)	26.6	(2.2)
Mecklenburg-Western Pomerania	39.0	(1.6)	26.8	(1.5)
Thuringia	38.5	(1.4)	27.4	(1.4)
Brandenburg	38.3	(1.8)	29.3	(1.8)
Berlin	37.3	(1.8)	33.7	(2.6)
Lower Saxony	36.7	(1.5)	27.7	(1.9)
Saxony-Anhalt	35.0	(1.4)	32.5	(1.3)
Saarland	34.9	(3.1)	33.9	(3.6)
Bremen	32.3	(2.8)	37.6	(3.1)

Notes: MSA = intermediate school-leaving certificate (*Mittlerer Schulabschluss*); SE = standard error

Figure 5: Percentage of Ninth-Graders in Each State Who Meet or Exceed Normative Standards or Fail to Meet Minimum Standards for the MSA Certificate in the Domain of *Listening Comprehension* in English

State	Meet Normative Standard (MSA) %	(*SE*)	Fail to Meet Minimum Standard (MSA) %	(*SE*)
Bavaria	52.4	(2.0)	15.5	(1.7)
Hamburg	51.9	(1.9)	17.1	(2.1)
Schleswig-Holstein	50.9	(2.0)	9.9	(1.4)
Hesse	46.0	(1.7)	15.6	(1.5)
Germany	44.1	(0.6)	16.9	(0.5)
North Rhine-Westphalia	44.0	(1.7)	14.9	(1.1)
Lower Saxony	43.2	(2.0)	17.2	(1.7)
Rhineland-Palatinate	43.1	(2.6)	16.3	(1.8)
Baden-Wuerttemberg	42.8	(1.5)	16.7	(1.3)
Berlin	40.2	(1.9)	24.1	(2.4)
Bremen	38.9	(3.1)	22.3	(2.8)
Mecklenburg-Western Pomerania	37.0	(2.1)	22.3	(1.7)
Saarland	36.2	(2.8)	21.8	(3.8)
Brandenburg	36.2	(1.8)	22.0	(2.0)
Thuringia	34.0	(1.6)	23.7	(1.8)
Saxony	34.0	(1.6)	19.2	(1.6)
Saxony-Anhalt	29.4	(1.6)	28.4	(1.3)

Notes: MSA = intermediate school-leaving certificate (*Mittlerer Schulabschluss*); SE = standard error



below-minimum proficiency scores was 16 percentage points in the domain of *reading comprehension* (38 percent in Bremen vs. 22 percent in Bavaria) and 18 percentage points in the domain of *listening comprehension* (28 percent in Saxony-Anhalt vs. 10 percent in Schleswig-Holstein). The results show that students in Schleswig-Holstein are particularly successful in meeting the minimum standards in both domains, and that the percentage of students in Bavaria who fall below the minimum standard in the domain of *reading comprehension* is significantly below the national average. In contrast, high percentages of students in Berlin performed below the minimum standard in both domains. The same was true of students in Bremen, Saarland, and Saxony-Anhalt in the domain of *reading comprehension* and in the Eastern German states except Saxony in *listening comprehension*.

Comparing proficiency level distributions in German and English between 2009 and 2015

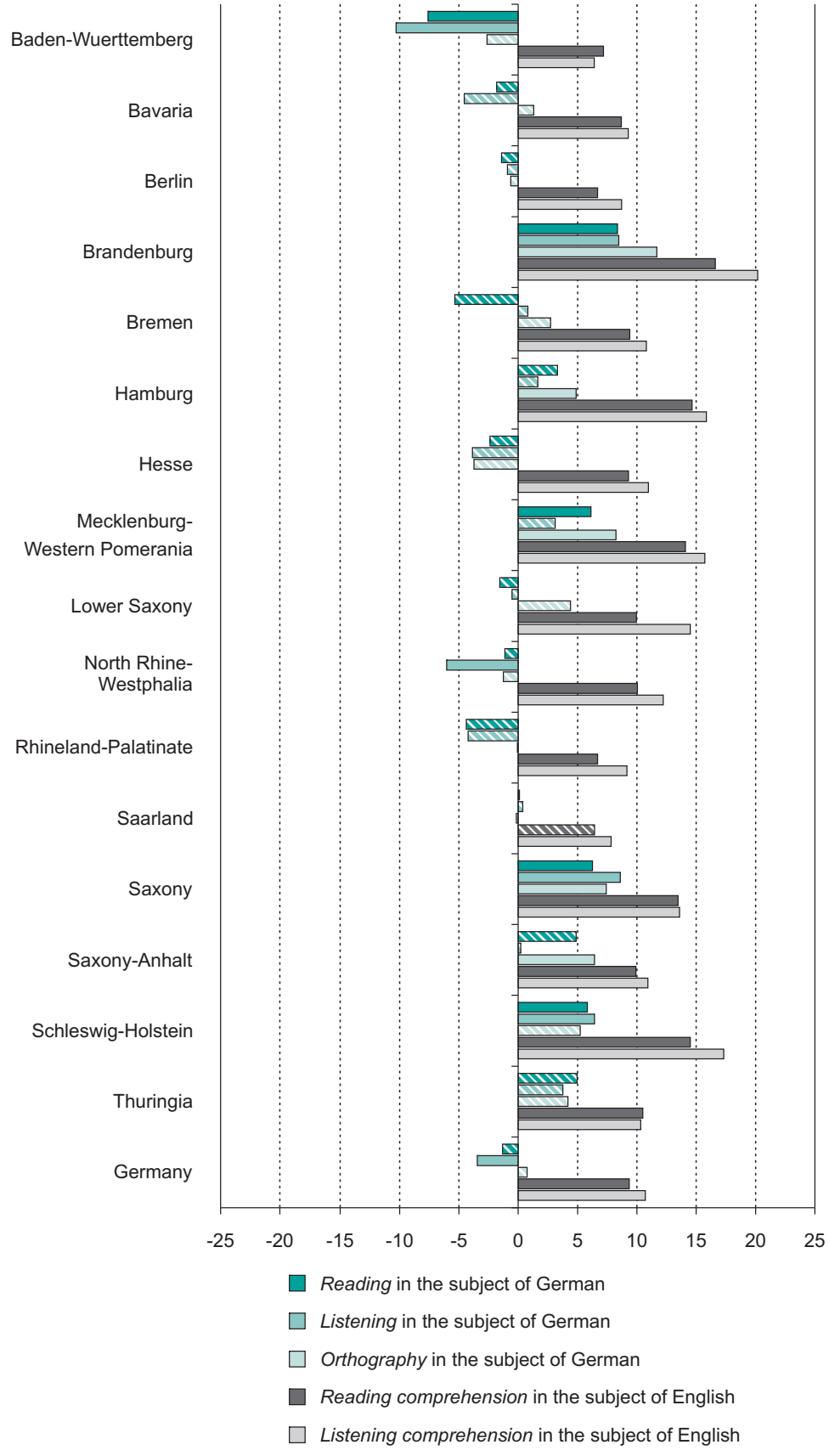
Comparing the proficiency level distributions from 2015 with those from the first IQB National Assessment Study 2009 presents a differentiated picture of student proficiency in the subjects of German and English across Germany's 16 states.

As seen in the results for German in Figures 6 and 7, no substantial changes took place at the national level between 2009 and 2015. Only in the domain of *listening* did the percentage of students who met the normative standard decline slightly over the period and the percentage who failed to meet the minimum standard increase slightly. At around 3 percentage points, however, these changes were small.

In some states, much larger and statistically significant changes took place in the subject of German. Positive developments occurred in Brandenburg and Saxony, where a significantly higher percentage of ninth-graders met the normative standards in all three domains in 2015 than in 2009, and a significantly lower percentage fell below the minimum standards. Schleswig-Holstein also showed positive trends in almost all domains, except for the normative standards in the domain of *orthography,* where student outcomes did not improve significantly. In Mecklenburg-Western Pomerania, the percentage of students who met the normative standards in the domains of *reading* and *orthography* increased significantly, and the percentage who fell below the minimum standards declined significantly. In the subject of German, positive changes with respect to standards in certain domains occurred in Hamburg (normative standards in the domain of *orthography*), in Lower Saxony (minimum standards in the domain of *orthography*), and in Saxony-Anhalt (minimum standards in the domain of *reading* and normative and minimum standards in the domain of *orthography*).

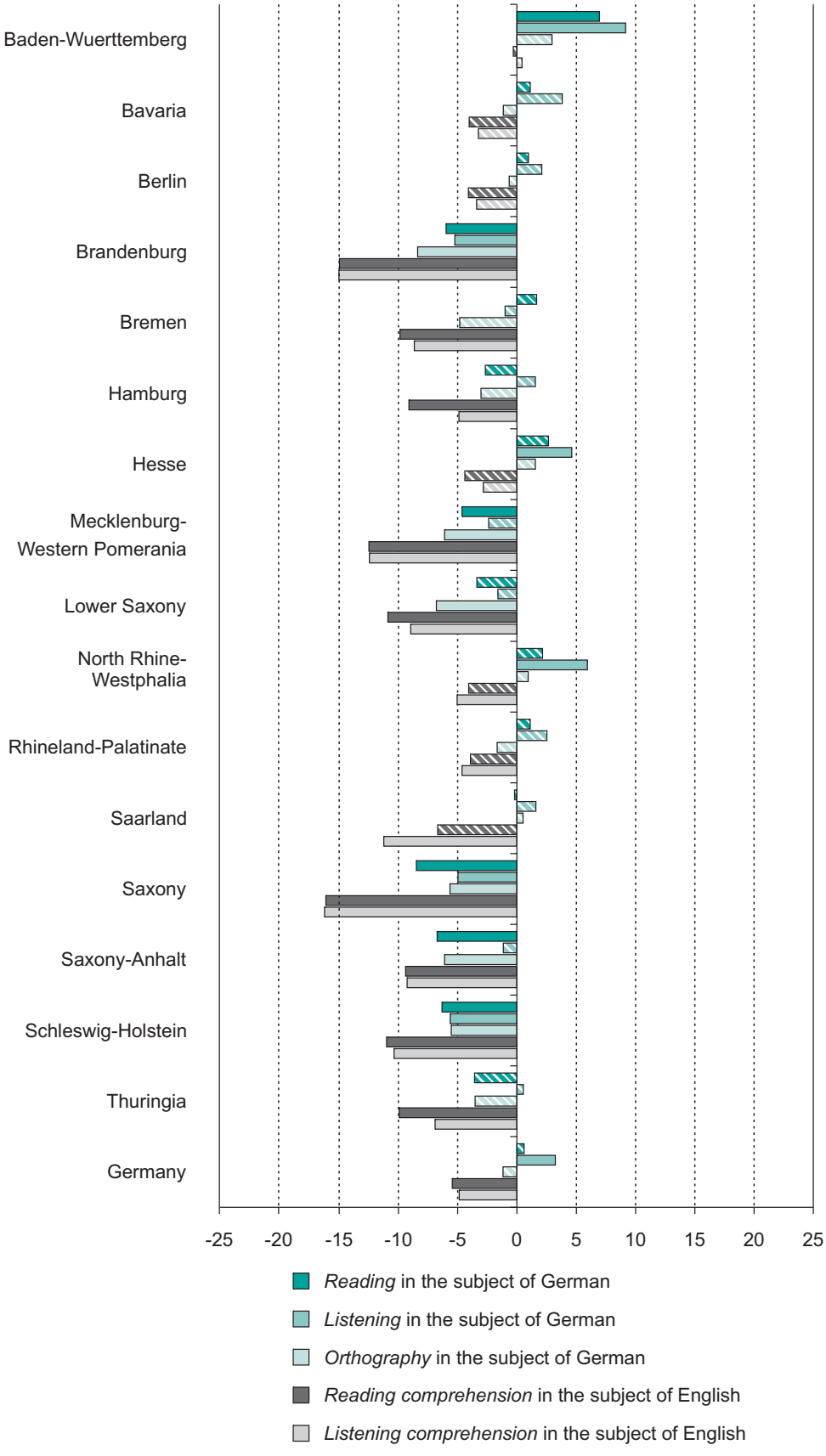
Unfavorable changes in the subject of German were seen in Baden-Wuerttemberg, where in the domains of both *reading* and *listening*, the percentage of ninth-graders who met or exceeded the normative standard declined significantly between 2009 and 2015 and the percentage who fell below the minimum standard increased significantly. The only other negative developments in the subject of German occurred in the domain of *listening* in the states of North Rhine-Westphalia and Hesse, with the only significant change being in Hesse with regard to the minimum standards.

Figure 6: Changes in the Percentage of Ninth-Graders Without Special Needs Who Meet or Exceed Normative Standards Between 2009 and 2015 (in Percentage Points)



Note: Hatched bars indicate statistically non-significant differences.

Figure 7: Changes in the Percentage of Ninth-Graders Without Special Needs Who Fail to Meet Minimum Standards Between 2009 and 2015 (in Percentage Points)



Note: Hatched bars indicate statistically non-significant differences.

In the subject of English, in contrast, changes were positive virtually across the board. At the national level, the percentage of students who met at least the normative standards rose by over 9 percentage points in the domain of *reading comprehension* and by almost 11 percentage points in the domain of *listening comprehension*. At the same time, the percentage of young people who failed to meet the minimum standards fell by almost 6 percentage points in *reading comprehension* and by around 5 percentage points in *listening comprehension*. The same pattern can be seen to varying degrees in almost all of the states between 2009 and 2015: the percentage of students who met at least the normative standards in English increased in all states, and in many states, the percentage who fell below the minimum standards declined substantially as well.

The IQB data not only allow us to answer the question of whether significant changes took place at the national level in Germany and in the individual states; they also allow us to compare changes at the state level to those at the national level (See Figures 5.1 to 5.4 in the supplementary material on the IQB website). Our analysis shows that in Brandenburg, strikingly positive changes occurred across the board in both subjects. Changes in both subjects were—in some cases significantly—more positive in Mecklenburg-Western Pomerania, Saxony, and Schleswig-Holstein than for Germany as a whole. In some domains, significantly more positive changes occurred in Saxony-Anhalt (normative and minimum standards for *reading* in German), in Thuringia (normative standards for *reading* and *listening* in German), in Lower Saxony (minimum standards for *orthography* in German), and in Hamburg (normative standards for *reading comprehension* in English) relative to the national average. The only state-level changes that were significantly below changes at the national level occurred in Baden-Wuerttemberg, mainly in the subject of German.

Comparing mean proficiency levels at the state level

In addition to studying the distributions of students at the different proficiency levels, IQB Trends in Student Achievement 2015 also compared mean proficiency levels attained in the different German states. As mentioned above, the scales in all of the different domains for the total population of students in Germany in 2015 were standardized to have a mean of $M = 500$ and a standard deviation of $SD = 100$. Figure 8 provides an overview of the extent to which mean proficiency levels in the individual states deviated from the national average in 2015.

Mean proficiency levels in German in 2015

The states with the lowest and highest mean proficiency levels in the subject of German lay 70 points apart in the domain of *reading*, 49 points apart in the domain of *listening*, and 58 points apart in the domain of *orthography*. Looking at how these differences compare to rough estimates of the increase in proficiency that is to be expected by the end of secondary level I, they correspond to a difference of more than three school years of learning time in all three domains.

In the subject of German, performance was again particularly strong on average in all three domains in Bavaria and Saxony, and in two domains (*reading* and *listening*) in Schleswig-Holstein. Significantly higher mean proficiency

levels than for Germany as a whole were found in the domain of *reading* in Brandenburg and Thuringia and in the domain of *listening* in Lower Saxony. At the other end of the spectrum, state-level proficiency scores in German in all three domains were significantly lower than the national mean in Berlin and Bremen. Students in several states also scored below the national mean in some domains: North Rhine-Westphalia (*reading* and *orthography*), Baden-Wuerttemberg (*listening*), and Hamburg (*orthography*).

Mean proficiency levels in English in 2015

In the subject of English, the states with the lowest and highest mean scores were separated by 46 points in the domain of *reading comprehension* and by 55 points in the domain of *listening comprehension*. The expected proficiency increase by the end of secondary level I is greater in the subject of English than in the subject of German; therefore the differences in English correspond to around one school year of learning time.[4]

In the subject of English, only two states have mean proficiency levels significantly above the national average: Bavaria in both *reading comprehension* and *listening comprehension* and Schleswig-Holstein in *listening comprehension*. The number of states with significant deviations below the national average is much greater, particularly in the domain of *listening comprehension*. Ninth-graders in Berlin and Bremen as well as Saxony-Anhalt achieve significantly lower mean proficiency levels in English in both domains than the national average. In the four Eastern German states of Brandenburg, Mecklenburg-Western Pomerania, Saxony, and Thuringia, only *listening comprehension* in English appeared to pose a challenge, whereas proficiency scores in *reading comprehension* were on par with the national average. In Saarland, proficiency scores in English in the domain of *listening comprehension* were significantly below the national average.

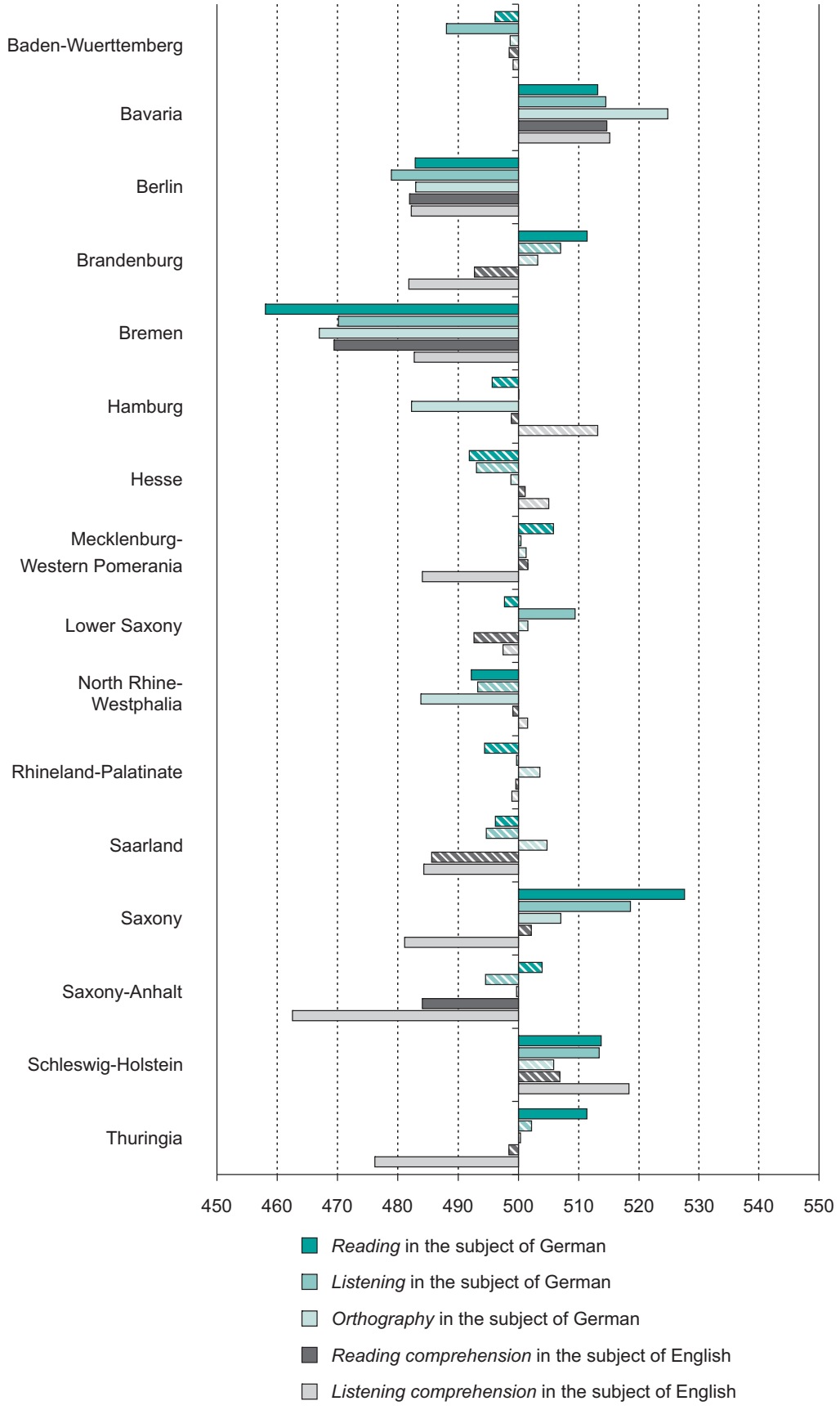
Comparing mean proficiency levels in German and English in 2009 and 2015

Our estimation of changes in mean proficiency levels at the state level between 2009 and 2015 (see Fig. 9) largely replicate our trend estimates of changes in the achievement of educational standards. In the subject of German, mean proficiency levels for Germany as a whole in the domain of *reading* were 6 points lower in 2015 than in 2009, and 8 points lower in the domain of *listening*. In the domain of *orthography*, no significant change occurred over time.

At the state level, significantly positive changes were found in all three domains in Brandenburg and Schleswig-Holstein, in two domains in Mecklenburg-Western Pomerania (*reading* and *orthography*) and Saxony (*listening* and *orthography*), and in one domain (*orthography*) in Hamburg, Lower Saxony, and Saxony-Anhalt. Significant changes in the opposite direction occurred in two domains (*reading* and *listening*) in Baden-Wuerttemberg, in the domain of *read-*

4 The estimates of the expected increases in proficiency levels in the subject of English are based on an IQB norming study from the year 2008. Since foreign language education now begins much earlier in many states, the data at hand could lead to underestimation of learning gains expected by the end of secondary level I.

Figure 8: Deviations of Ninth-Graders' Mean Proficiency Scores in Each State From the German National Mean



Note: Hatched bars indicate statistically non-significant differences.

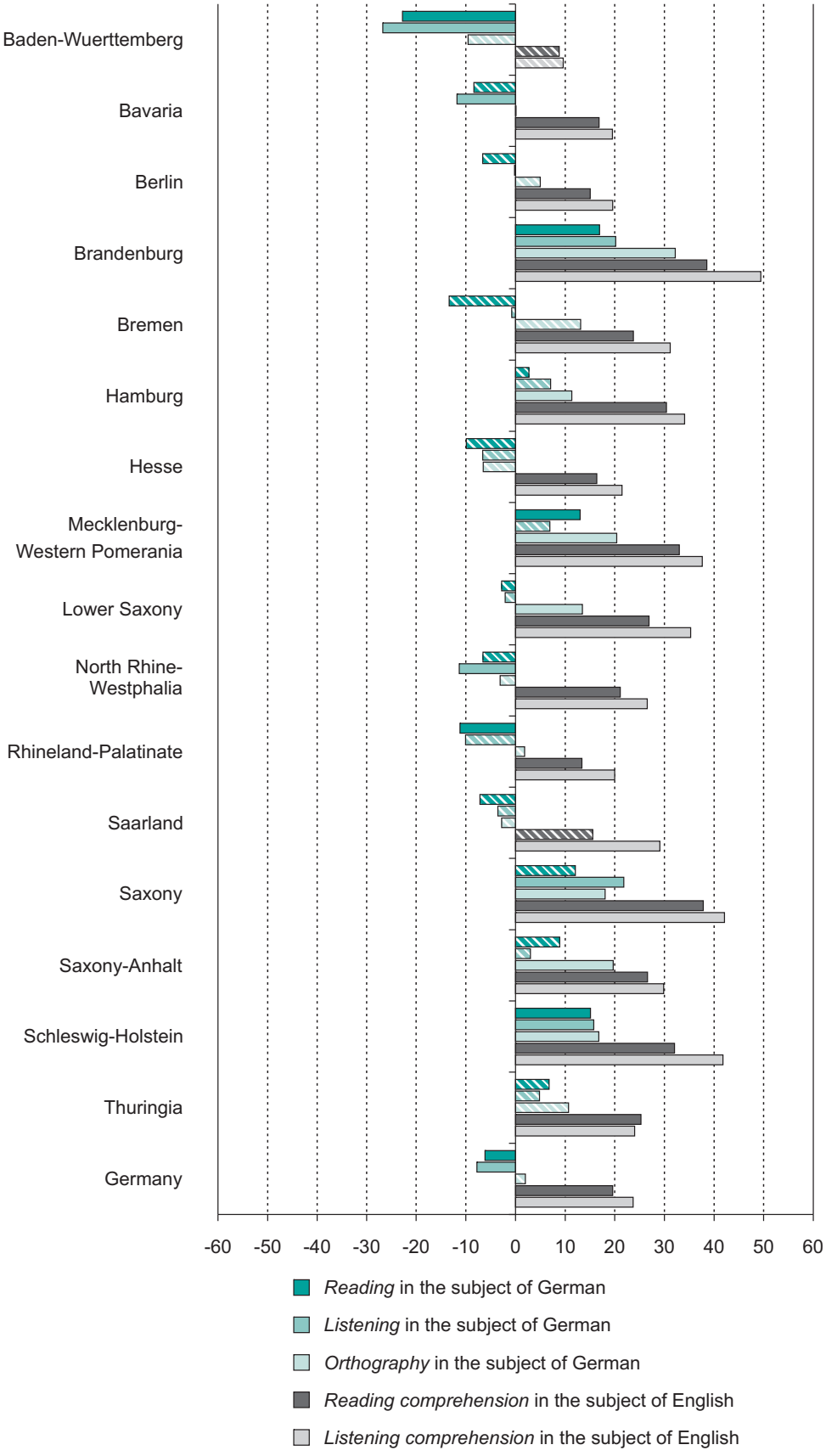
ing in Rhineland-Palatinate, and in the domain of *listening* in Bavaria and North Rhine-Westphalia.

In the subject of English, positive changes were found virtually across the board when comparing mean values for 2009 and 2015, again reflecting the findings reported above for the proficiency levels. For Germany as a whole, mean proficiency levels in English increased by 20 points in *reading comprehension* and by 24 points in *listening comprehension*. In most states, students also reached higher mean proficiency levels in English in 2015 than in 2009. The only states without significant positive changes in English were Baden-Wuerttemberg in both domains and Saarland in the domain of *reading comprehension*.

Mean proficiency levels of students in upper secondary school (*Gymnasium*) and the percentage of students in this school track

In IQB Trends in Student Achievement 2015, the proficiency level distributions and average levels of achieved proficiencies were also analyzed separately for students attending academically oriented upper secondary school (*Gymnasium*). To keep this summary within reasonable limits, we refrain from a detailed discussion of these results here. Furthermore, between-state comparisons of the deviations of the results for ninth-graders at upper secondary schools from the results for the entire population of ninth-graders within each state are problematic since the status of upper secondary schools within the structure of the educational system differs significantly between states. One general finding is worth noting, however: the differing percentages of students attending upper secondary school in the different states in 2015 is only weakly correlated with the mean normative proficiency levels achieved by students in a state's upper secondary schools. The difference (explained variance) in mean proficiency levels between states explained by the percentage of students attending upper secondary schools is, in the subject of German, 5 percent in *reading* and 23 percent in *orthography*. In *listening*, the percentage of students attending upper secondary school does not explain any of the variance. In the subject of English, the percentage of explained variance is somewhat higher, at 21 percent in *reading comprehension* and 31 percent in *listening comprehension*. This is partially due to the Eastern German states (except Berlin), where the percentage of students attending upper secondary school is relatively high, and where students have relatively low proficiency levels in the domain of *listening comprehension* in English in general (at both upper secondary and other schools). On the whole, these results—like those reported in the IQB National Assessment Study 2012 for mathematics and the natural sciences (Roppelt, Penk, Pöhlmann & Pietsch, 2013; Schroeders et al., 2013)—suggest that high proficiency levels can be achieved at upper secondary schools, even when there are high percentages of students attending this school type.

Figure 9: Changes in Mean Proficiency Levels of Ninth-Graders Without Special Needs Between 2009 and 2015



Note: Hatched bars indicate statistically non-significant differences.

Gender disparities

Large national and international school achievement studies over the last 15 years have consistently found higher language proficiency among girls than among boys. Findings along this line have been reported in the subjects of both German and English at both the primary level and at secondary level I. Results also indicate that the gender disparity in favor of girls is greater in productive than in receptive written language skills.

In IQB Trends in Student Achievement 2015, we also found gender disparities favoring girls in the language domains under examination, with somewhat greater disparities in German than in English. The differences in language proficiency between girls and boys are presented in Figure 10.

In 2015, girls across Germany had a 27-point advantage over boys in the subject of German in *reading*, a 25-point advantage in *listening*, and a 46-point advantage in *orthography*. In the subject of English, girls scored 21 points higher than boys in *reading comprehension* and 13 points higher in *listening comprehension*. Thus, boys appeared to have a particularly acute need for additional support in the domain of *orthography* in German.

Along with gender disparities in language competencies, we also studied gender disparities in subject interest and subject-specific self-concept in IQB Trends in Student Achievement 2015. The gender disparities in these motivational characteristics run largely parallel to those in achieved proficiency levels. In the subject of German, both subject-specific self-concept and subject interest were higher among girls than among boys; in the subject of English, the only substantial gender disparity appeared in subject interest. Despite the fact that girls showed higher levels of proficiency in English than boys, they did not report higher perceptions of their own skills in this subject than boys did.

The proficiency level distributions show that in 2015, the percentage of girls and boys in the group of young people who achieved at least the normative standards for the MSA certificate was close to equal in both subjects and in all of the domains under examination. The group of ninth-graders who did not achieve the minimum standards for the MSA contained a larger percentage of boys, at around 60 percent. A particularly wide gender disparity to the disadvantage of boys was found in German in the domain orthography, at 70 percent.

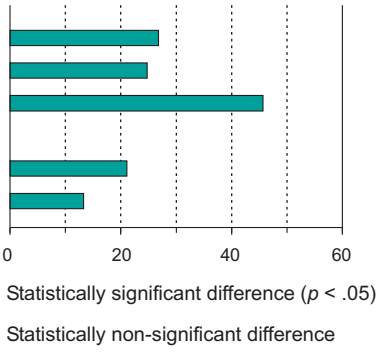
Also within states, girls performed better than boys in German and English in all of the domains covered in IQB Trends in Student Achievement 2015. In *listening comprehension* in English, however, the gender disparities were not significant in several states. In North Rhine-Westphalia, the differences in proficiency between girls and boys in both German and English were consistently the lowest among all German states in all of the domains under examination. It appears that schools in this state are particularly successful in fostering language learning equally in girls and boys.

Social Disparities

Since the publication of the first PISA study, there has been intense public discussion on the question of how proficiency development is linked to students' social backgrounds, and how well educational systems are succeeding in reducing this link. IQB Trends in Student Achievement 2015 therefore examined so-

Figure 10: Differences in Proficiency Levels Between Girls and Boys in the Language Subjects

	Girls		Boys		Difference Girls – Boys			Advantage of Girls
	M	(*SE*)	*M*	(*SE*)	Δ *M*	(*SE*)	*d*	
German								
Reading	514	(1.6)	487	(2.0)	**27**	(2.5)	**0.27**	
Listening	513	(1.6)	488	(1.9)	**25**	(2.5)	**0.25**	
Orthography	524	(1.5)	478	(1.5)	**46**	(2.1)	**0.47**	
Englisch								
Reading comprehension	511	(1.3)	490	(1.6)	**21**	(2.1)	**0.21**	
Listening comprehension	507	(1.5)	494	(1.8)	**13**	(2.3)	**0.13**	



Notes: The values in the table are rounded. As a result, the difference in mean values may deviate from the difference presented Δ*M*.
M = mean; *SE* = standard error; Δ*M* = mean difference; *d* = effect size Cohen's *d*.
Differences printed in bold type are statistically significant ($p < .05$).

cial disparities in the language subjects and analyzed how these disparities have changed since 2009.

Like past studies, IQB Trends in Student Achievement 2015 shows that the socioeconomic backgrounds of students differ little on average between states, but that they are somewhat more heterogeneous within the city states (Berlin, Hamburg, Bremen). When comparing the years 2009 and 2015, the socioeconomic status of students increased on average in several states, which is also reflected in a significant increase in the mean for Germany as a whole.

We use the social gradient as an indicator of the connection between family social background and student proficiency levels. The strength of the social gradient (*b*) indicates the number of points by which student proficiency increases with an increase of one standard deviation in family socioeconomic status. The social gradients and changes therein over time are presented in Figure 11 for the domain of *reading* in German and in Figure 12 for the domain of *reading comprehension* in English.

The findings from IQB Trends in Student Achievement 2015 show a strong link between young people's social backgrounds and their educational outcomes: in all of the states, higher socioeconomic status was associated with higher levels of proficiency in all of the domains under examination. The associations between socioeconomic status and proficiency levels were similarly strong in German and English, which suggests that family social background characteristics are equally relevant to student proficiency development in both subjects.

Looking at changes over time, only social disparities in the domain of *reading* in German declined significantly across Germany as a whole since the first IQB National Assessment Study 2009. Social disparities remained virtually unchanged in all other domains in German and English.

At the state level, only a few significant changes occurred over time. In Lower Saxony and Mecklenburg-Western Pomerania, social disparities declined in the domains of *reading* and *orthography* in German, whereas in Brandenburg, social disparities increased in *reading comprehension* in English.

Immigration-related disparities

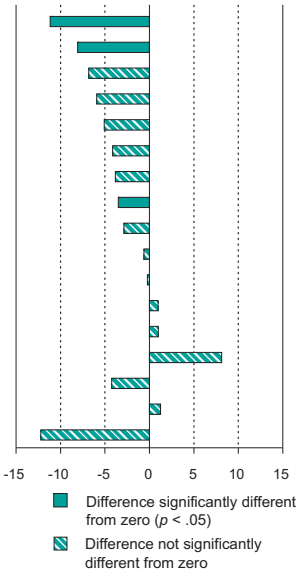
Another question addressed regularly in the IQB National Assessment Studies is the extent to which immigration-related disparities affect student proficiency development. This was also analyzed in IQB Trends in Student Achievement 2015. The results show that the percentage of ninth-graders with an immigration background in Germany as a whole increased from 2009 to 2015 by almost 3 percentage points, reaching 29 percent in 2015. An increase was only observable in certain states, due primarily to the increased percentage of young people with one parent born outside Germany and the increased percentage of second-generation immigrants (children born in Germany to parents who had immigrated to Germany). The percentage of young people who themselves had immigrated to Germany (first-generation immigrants) declined moderately or significantly between 2009 and 2015 in all states.

Figures 13 and 14 present the mean proficiency levels achieved at the state level in the domain of *reading* in German and *reading comprehension* in English. In the subject of German, young people from immigrant families were at a significant disadvantage in 2015 in all domains under examination—the largest in the domain of *listening* and the smallest in the domain of *orthography*. Young people with both parents born abroad were at a disadvantage in almost all states, and those with only one parent born abroad were at a statistically significant disadvantage in only a few states. The size of the disparities also varied substantially between states (see Fig. 13).

Immigration-related disparities were significantly smaller in the subject of English than in German, and in most states, the disparities were only significant among young people whose parents were both born abroad (see Fig. 14). In

Figure 11: Comparison of Social Gradients in the Domain of *Reading* in German in 2009 and 2015

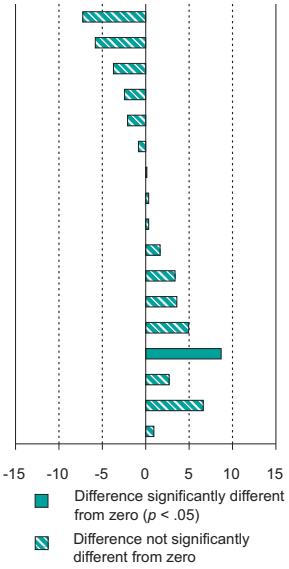
	2009			2015			Difference 2015–2009	
	Strength of social gradients		Explained variance (percentage)	Strength of social gradients		Explained variance (percentage)		
State	*b*	*(SE)*	R^2	*b*	*(SE)*	R^2	Δb	*(SE)*
Lower Saxony	35	(3.5)	12.5	24	(3.1)	7.7	**-11**	(4.7)
Mecklenburg-Western Pomerania	32	(2.6)	12.8	24	(3.1)	6.8	**-8**	(4.1)
Bavaria	35	(2.6)	14.8	29	(3.2)	10.4	-7	(4.1)
Rhineland-Palatinate	31	(3.6)	10.4	25	(3.2)	7.2	-6	(4.8)
Bremen	43	(4.5)	16.3	37	(4.2)	12.9	-5	(6.2)
Saxony	31	(4.4)	9.5	27	(3.1)	9.5	-4	(5.4)
Saxony-Anhalt	31	(4.2)	10.1	27	(2.8)	9.7	-4	(5.0)
Germany	34	(1.3)	12.2	31	(1.1)	10.3	**-3**	(1.7)
Baden-Wuerttemberg	36	(3.3)	16.0	33	(2.7)	12.5	-3	(4.3)
Schleswig-Holstein	29	(5.9)	8.8	28	(2.8)	9.8	-1	(6.6)
North Rhine-Westphalia	33	(3.4)	12.6	33	(2.7)	10.8	0	(4.3)
Hesse	32	(2.7)	11.0	33	(2.5)	13.3	1	(3.7)
Thuringia	26	(4.4)	8.3	27	(3.1)	8.5	1	(5.3)
Brandenburg	27	(2.9)	8.9	35	(3.6)	14.4	8	(4.6)
Berlin[1]	44	(3.6)	16.5	40	(4.0)	16.0	-4	(5.4)
Hamburg[1]	39	(3.0)	14.8	40	(3.3)	15.2	1	(4.5)
Saarland[1]	38	(4.3)	15.1	25	(4.6)	6.9	-12	(6.3)



Notes: The values in the table are rounded. As a result, the difference in the regression coefficients may deviate minimally from the difference presented in Δb. *a* = intercept; *b* = unstandardized regression coefficient;
SE = standard error; R^2 = determination coefficient.
[1] The findings should be interpreted with caution due to the large percentage of missing data (> 20%).
The strength of the social gradients is statistically significantly different from 0 ($p < .05$) for every state in Germany and for Germany as a whole. Differences printed in bold type are statistically significantly different from 0 ($p < .05$).

Figure 12: Comparison of Social Gradients in the Domain of *Reading Comprehension* in the Subject of English in 2009 and 2015

State	2009 Strength of social gradients *b*	*(SE)*	2009 Explained variance (percentage) R^2	2015 Strength of social gradients *b*	*(SE)*	2015 Explained variance (percentage) R^2	Difference 2015–2009 Δb	*(SE)*
Lower Saxony	30	(3.0)	12.1	23	(3.2)	6.1	-7	(4.4)
Mecklenburg-Western Pomerania	30	(2.7)	13.0	24	(2.6)	6.8	-6	(3.7)
Bavaria	33	(2.7)	14.7	29	(2.9)	10.4	-4	(4.0)
Rhineland-Palatinate	27	(3.2)	9.9	24	(3.0)	6.9	-2	(4.4)
North Rhine-Westphalia	29	(3.5)	12.2	27	(3.0)	7.3	-2	(4.6)
Germany	29	(1.2)	11.4	28	(1.1)	8.7	-1	(1.6)
Thuringia	25	(4.1)	9.0	25	(2.9)	7.0	0	(5.0)
Saxony-Anhalt	30	(3.8)	10.7	30	(2.9)	10.4	0	(4.8)
Bremen	33	(4.6)	12.9	34	(4.0)	10.3	0	(6.1)
Saxony	25	(4.0)	8.9	27	(2.7)	8.4	2	(4.8)
Hesse	26	(2.4)	9.7	30	(2.0)	11.7	3	(3.1)
Baden-Wuerttemberg	27	(2.8)	12.8	30	(2.1)	10.6	4	(3.5)
Schleswig-Holstein	24	(4.0)	8.5	28	(4.2)	9.8	5	(5.7)
Brandenburg	26	(2.7)	9.0	35	(3.4)	12.4	**9**	(4.3)
Berlin[1]	36	(3.2)	13.7	38	(4.4)	14.2	3	(5.4)
Hamburg[1]	31	(2.9)	12.4	38	(3.2)	13.2	7	(4.3)
Saarland[1]	30	(7.8)	10.9	31	(6.2)	8.4	1	(9.9)



Notes: The values in the table are rounded. As a result, the difference in the regression coefficients may deviate minimally from the difference presented in Δb. *a* = intercept; *b* = unstandardized regression coefficient; *SE* = standard error; R^2 = determination coefficient.
[1] The findings should be interpreted with caution due to the large percentage of missing data (> 20%).
The strength of the social gradients is statistically significantly different from 0 ($p < .05$) for every state in Germany and for Germany as a whole. Differences printed in bold type are statistically significantly different from 0 ($p < .05$).

many states, students with one parent born abroad even had slightly higher proficiency levels than students without an immigration background.

Figure 15 presents changes in student proficiency in the domain of *reading comprehension* in English over time. Along with changes in mean proficiency levels within the individual groups (ΔM), we were also interested in finding out whether the changes were greater among young people from immigrant families. Greater increases in proficiency levels among young people from immigrant families compared to students without an immigration background would mean a reduction of immigration-related disparities. In Figure 15, significant group differences in changes over time are labeled with a superscript [a] in column ΔM.

Looking at the results of the analysis, immigration-related disparities in the subject of German changed little between 2009 and 2015. In the subject of English, however, disparities for young people with both parents born abroad declined in both domains in Germany as a whole and in the states of Bavaria and Rhineland-Palatinate, and in *listening comprehension* in Schleswig-Holstein. In most states, however, this group of students continued to have significantly lower proficiency levels in 2015 (see Fig. 14).

The results suggest that schools are more effective at fostering proficiency in English among young people from immigrant families than they were in 2009. At the same time, the need to reduce immigration-related disparities in proficiency development in both subjects—but even more in German than in English—continues to present a challenge.

Some immigration-related disparities can be traced back to characteristics of students' socioeconomic backgrounds and to the frequency with which German is spoken at home. After controlling statistically for the socioeconomic status of the family, the educational background of the parents, and the language spoken at home, the gap in proficiency scores between students with an

immigration background and those without is reduced substantially, but for some subgroups, substantial disparities remain. The finding that the language spoken at home is associated with students' proficiency levels confirms the results of past studies: students who never speak German at home achieve on average lower proficiency scores than students who always or almost always speak German at home. Significantly lower proficiency levels among the much larger group of young people from immigrant families who sometimes speak German at home were only identified for the subject of German, but not for the subject of English. Thus, schools appear to have more success in fostering the learning potential of students from immigrant families in English than in German.

In addition to analyzing disparities in proficiency levels, IQB Trends in Student Achievement 2015 also investigated—for the first time in an IQB study—the extent to which young people from immigrant families have a similar sense of belonging at school to young people without an immigration background. The aim of this was to gain indications of students' social integration. The results show a strong sense of belonging among students in all groups examined in the study. Young people with an immigration background differ little in this respect from those without an immigration background. Both in Germany as a whole and in some individual states, students with both parents born abroad have a significantly lower sense of belonging than students without an immigration background, but the differences are very small. Nevertheless, educational monitoring studies should continue to examine this aspect of social integration of young people from immigrant families.

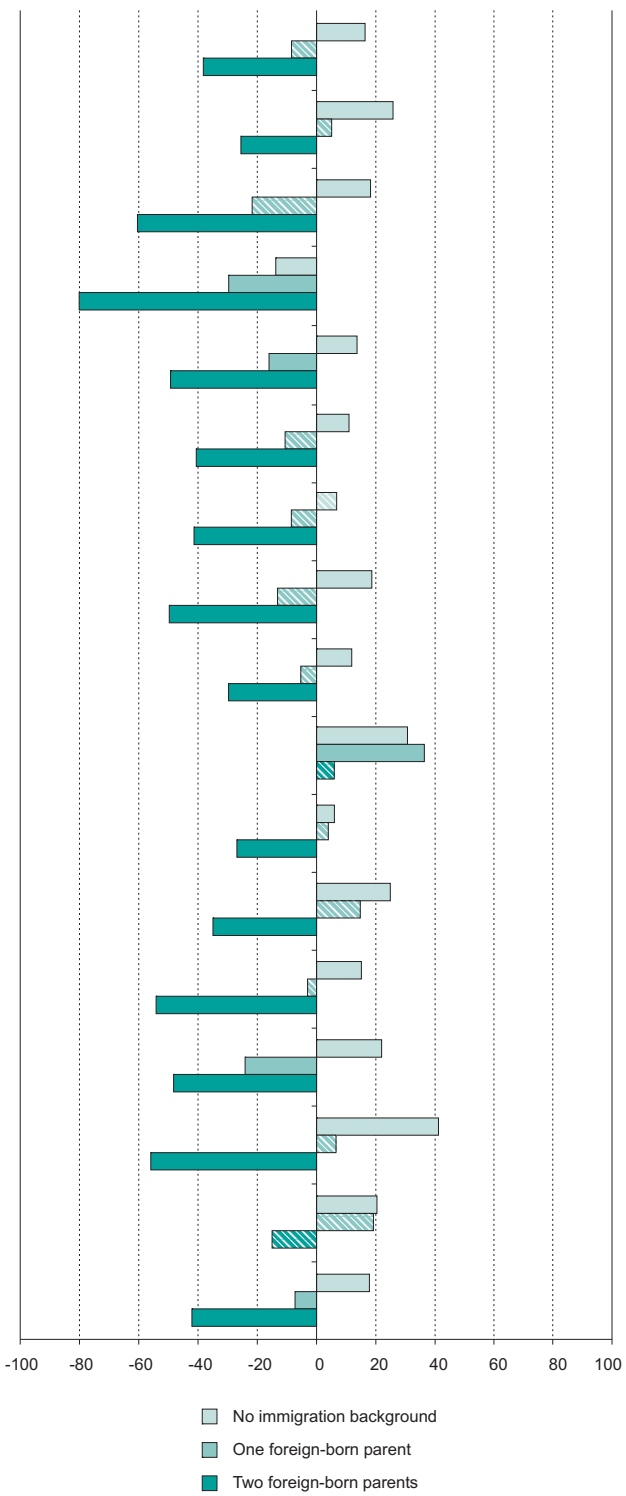
Education and Further Professional Development of Teachers as a Prerequisite for Teaching and Learning Processes

The IQB's studies on educational monitoring contain additional chapters devoted to the key prerequisites for teaching and learning processes. Due to the increased complexity resulting from the analysis of trends over time, this first IQB trend report contains just one additional chapter. This chapter deals with the characteristics of teachers in the languages of German and English and rounds out the series of corresponding analyses in the IQB National Assessment Study 2011 on teachers of German and mathematics at the primary level and the IQB National Assessment Study 2012 on teachers of mathematics, biology, chemistry, and physics at secondary level I.

In IQB Trends in Student Achievement 2015, teachers of the students tested were asked about their instructional practices, their education, and their further professional development as teachers. A total of 2,988 teachers of German and English from 16 states took part in the survey. Based on their responses, we were able to conduct a detailed examination of the association between teacher characteristics and student proficiency levels in each state. Like previous IQB National Assessment Studies, IQB Trends in Student Achievement 2015 analyzed the subject-specific teaching qualifications of teachers as well as their participation in further professional training. For the first time in an IQB study, we also studied the percentage of teachers who had made a career change to the teaching profession.

Figure 13: Means and Standard Deviations of Proficiency Scores, as Well as Group Differences and Deviations From the German National Mean in the Domain of *Reading* in German by Immigration Status and State in 2015

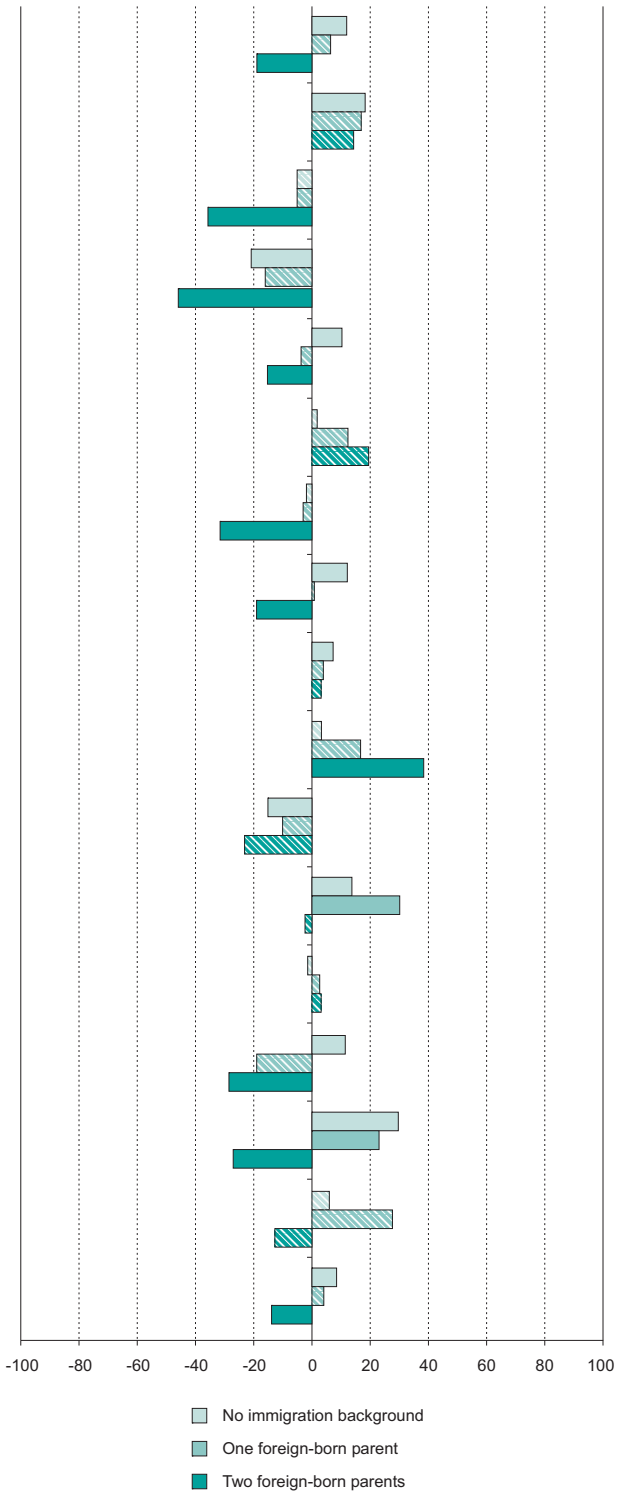
State	*N*	Valid %	*M*	*(SE)*	*SD*	*d*
Baden-Wuerttemberg	1357	65.8	516	(3.7)	89	
	267	13.3	**492**	(8.4)	94	**-0.38**
	403	20.9	**462**	(7.4)	107	**-0.82**
Bavaria	1388	73.8	526	(4.4)	92	
	189	10.6	**505**	(8.2)	92	**-0.32**
	266	15.6	**474**	(10.7)	99	**-0.79**
Brandenburg	1809	90.6	518	(3.6)	91	
	113	5.9	**478**	(13.5)	108	**-0.57**
	66	3.6	**440**	(21.6)	109	**-1.03**
Bremen	817	51.5	486	(6.7)	106	
	237	15.7	470	(8.8)	105	-0.21
	519	32.8	**420**	(7.7)	110	**-0.89**
Hesse	1403	61.6	514	(4.3)	95	
	306	14.2	**484**	(7.6)	100	**-0.43**
	529	24.2	**451**	(5.7)	98	**-0.89**
Mecklenburg-Western Pomerania	1867	91.8	511	(3.8)	105	
	77	3.7	489	(14.3)	114	-0.28
	90	4.6	**459**	(11.9)	103	**-0.64**
Lower Saxony	1530	75.7	507	(4.0)	87	
	194	9.6	**491**	(6.4)	88	**-0.25**
	292	14.8	**459**	(7.2)	91	**-0.78**
North Rhine-Westphalia	1405	62.4	519	(3.3)	93	
	293	12.2	**487**	(6.9)	93	**-0.48**
	586	25.4	**450**	(8.8)	100	**-1.04**
Rhineland-Palatinate	1303	71.9	512	(3.3)	90	
	168	9.4	495	(9.9)	95	-0.26
	337	18.7	**470**	(8.9)	99	**-0.62**
Saxony	1399	91.0	531	(3.2)	87	
	74	4.7	536	(9.9)	80	0.10
	67	4.3	506	(21.4)	98	-0.43
Saxony-Anhalt	1687	93.1	506	(2.4)	98	
	63	3.5	504	(18.6)	108	-0.03
	59	3.3	**473**	(12.6)	99	**-0.43**
Schleswig-Holstein	1340	82.4	525	(4.0)	91	
	136	8.3	515	(11.4)	92	-0.16
	144	9.3	**465**	(9.4)	95	**-0.92**
Thuringia	1953	92.7	515	(3.4)	99	
	69	3.5	497	(15.0)	101	-0.26
	76	3.7	**446**	(17.1)	119	**-0.97**
Berlin [1]	1335	57.7	522	(4.9)	97	
	390	17.2	**476**	(7.3)	106	**-0.64**
	567	25.0	**452**	(8.6)	104	**-0.93**
Hamburg [1]	1033	57.2	541	(4.0)	89	
	263	13.8	**507**	(6.9)	92	**-0.54**
	550	28.9	**444**	(6.9)	101	**-1.49**
Saarland [1]	637	83.6	520	(4.7)	86	
	53	6.8	519	(16.2)	85	-0.02
	90	9.6	**485**	(16.5)	100	**-0.59**
Germany	22263	71.2	518	(1.3)	92	
	2892	10.8	**493**	(2.7)	95	**-0.38**
	4641	18.0	**458**	(3.5)	101	**-0.89**



Notes:
1st line: Students without an immigration background (both parents born in Germany)
2nd line: Students with one foreign-born parent
3rd line: Students with two foreign-born parents
N = sample size, *M* = mean, *SE* = standard error,
SD = standard deviation, *d* = effect size Cohen's *d*.
[1] The findings should be interpreted with caution due to the large percentage (> 20%) of missing data.
Figures in bold indicate a statistically significant deviation ($p < .05$) from the mean for young people without an immigration background. Hatched bars show a non-significant deviation from the German national mean (*M* = 500).

Figure 14: Means and Standard Deviations of Proficiency Scores, as Well as Group Differences and Deviations From the German National Mean in the Domain of *Reading Comprehension* in English by Immigration Status and State in 2015

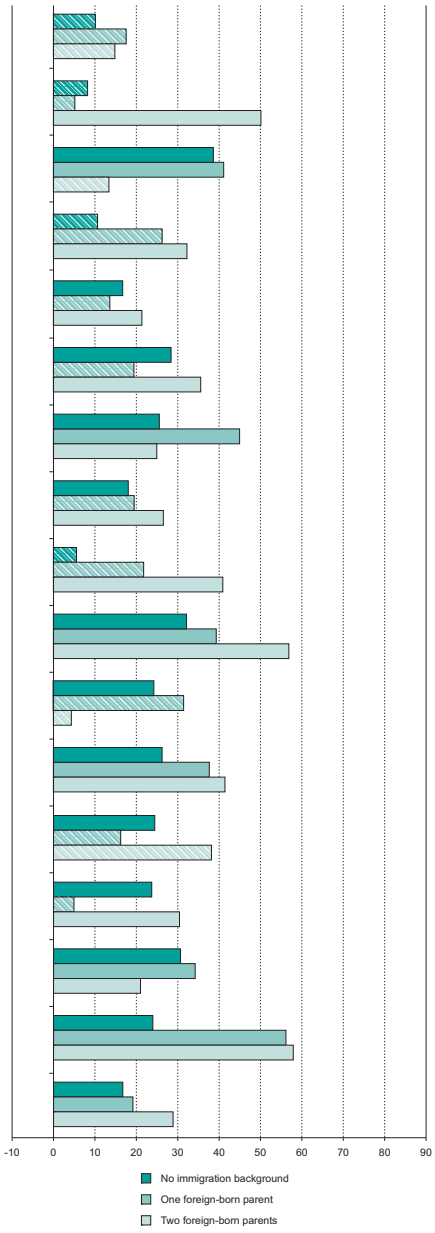
State	*N*	Valid %	*M*	*(SE)*	*SD*	*d*
Baden-Wuerttemberg	1329	66.2	512	(3.4)	90	
	256	13.1	506	(8.4)	100	-0.08
	390	20.7	**481**	(5.0)	97	**-0.44**
Bavaria	1302	73.7	518	(4.5)	100	
	182	10.8	517	(9.9)	98	-0.02
	256	15.5	514	(8.6)	92	-0.06
Brandenburg	1778	90.8	495	(4.6)	98	
	110	5.8	495	(11.7)	103	0.00
	63	3.4	**464**	(14.1)	102	**-0.42**
Bremen	771	52.5	479	(8.5)	119	
	226	15.9	484	(10.5)	117	0.06
	464	31.6	**454**	(8.9)	110	**-0.30**
Hesse	1382	61.8	510	(4.3)	90	
	299	14.1	496	(7.8)	97	-0.21
	518	24.1	**485**	(6.0)	93	**-0.37**
Mecklenburg-Western Pomerania	1736	91.8	502	(3.2)	87	
	70	3.6	512	(12.0)	97	0.16
	84	4.6	519	(12.2)	87	0.26
Lower Saxony	1529	75.9	498	(4.2)	96	
	194	9.6	497	(7.1)	99	-0.02
	288	14.5	**468**	(8.6)	95	**-0.42**
North Rhine-Westphalia	1365	63.1	512	(3.8)	103	
	283	12.1	501	(8.9)	108	-0.15
	562	24.8	**481**	(6.4)	94	**-0.41**
Rhineland-Palatinate	1244	71.5	507	(3.5)	88	
	162	9.6	504	(9.9)	96	-0.05
	326	19.0	503	(9.9)	90	-0.06
Saxony	1397	91.1	503	(3.3)	96	
	73	4.6	517	(9.7)	92	0.20
	66	4.3	538	(19.2)	95	0.54
Saxony-Anhalt	1660	93.4	485	(3.4)	105	
	61	3.5	490	(19.6)	115	0.06
	54	3.1	477	(13.7)	104	-0.10
Schleswig-Holstein	1323	82.7	514	(4.1)	90	
	136	8.5	530	(12.1)	91	0.26
	138	8.9	498	(9.8)	92	-0.25
Thuringia	1887	93.0	499	(3.1)	93	
	65	3.5	503	(19.1)	112	0.06
	71	3.5	503	(13.9)	102	0.06
Berlin [1]	1275	57.1	511	(4.7)	105	
	379	17.4	**481**	(10.5)	120	**-0.38**
	548	25.5	**471**	(10.1)	117	**-0.47**
Hamburg [1]	1047	58.0	530	(4.5)	103	
	262	13.9	523	(6.9)	106	-0.09
	533	28.1	**473**	(7.6)	112	**-0.75**
Saarland [1]	492	82.6	506	(7.9)	99	
	44	6.5	528	(14.1)	88	0.33
	77	10.9	487	(15.7)	99	-0.30
Germany	21517	71.4	508	(1.3)	97	
	2802	10.8	504	(3.5)	103	-0.06
	4438	17.8	**486**	(2.7)	97	**-0.31**



Notes:
1st line: Students without an immigration background (both parents born in Germany)
2nd line: Students with one foreign-born parent
3rd line: Students with two foreign-born parents
N = sample size, *M* = mean, *SE* = standard error, *SD* = standard deviation, *d* = effect size Cohen's *d*.
[1] The findings should be interpreted with caution due to the large percentage (> 20%) of missing data.
Figures in bold indicate a statistically significant deviation ($p < .05$) from the mean for young people without an immigration background. Hatched bars show a non-significant deviation from the German national mean (*M* = 500).

Figure 15: Means and Standard Deviations of Proficiency Scores, as Well as Group Differences and Deviations From the German National Mean in the Domain of *Reading Comprehension* in English by Immigration Status and State, Comparing the Years 2009 and 2015

			2009				2015				Difference 2015–2009		
State	Valid %	+ / -	*N*	*M*	*(SE)*	*SD*	*N*	*M*	*(SE)*	*SD*	*ΔM*	*(SE)*	*d*
Baden-Wuerttemberg	66.1	**-6.0**	1092	502	(4.6)	75	1342	513	(3.5)	90	10	(6.0)	0.12
	13.1	3.1	155	489	(9.2)	83	262	507	(8.5)	100	18	(12.7)	0.20
	20.8	2.9	257	466	(6.2)	69	400	481	(5.0)	97	15	(8.2)	0.18
Bavaria	73.2	**-2.1**	1484	517	(3.4)	80	1337	525	(4.5)	91	8	(6.0)	0.09
	10.9	1.9	186	514	(8.6)	81	185	519	(9.9)	96	5	(13.3)	0.06
	15.9	0.2	323	464	(7.5)	86	266	514	(8.6)	92	**50** [a]	(11.6)	**0.56**
Brandenburg	90.7	0.8	2038	462	(2.7)	85	1720	501	(4.2)	94	**39**	(5.3)	**0.44**
	5.9	0.9	119	456	(9.9)	87	108	497	(11.6)	102	**41**	(15.4)	**0.43**
	3.4	**-1.8**	111	456	(11.2)	98	63	469	(14.2)	100	13	(18.1)	0.13
Bremen	53.0	**-7.2**	617	479	(6.1)	93	717	490	(8.5)	109	11	(10.7)	0.11
	16.0	**3.8**	118	465	(9.3)	91	212	492	(10.4)	111	26	(14.1)	0.26
	31.0	3.4	271	435	(8.3)	84	435	468	(8.7)	100	**32**	(12.1)	**0.35**
Hesse	61.6	**-5.7**	1702	496	(3.1)	77	1374	513	(3.8)	87	**17**	(5.3)	**0.21**
	14.1	**2.5**	294	484	(6.4)	81	298	498	(7.8)	97	14	(10.3)	0.16
	24.3	3.2	603	464	(5.5)	85	522	485	(6.1)	93	**21**	(8.4)	**0.24**
Mecklenburg-Western Pomerania	91.7	1.4	1474	475	(4.1)	82	1679	503	(3.4)	87	**28**	(5.6)	**0.33**
	3.6	-0.2	60	492	(15.0)	87	68	511	(12.3)	98	19	(19.5)	0.21
	4.7	-1.2	106	482	(9.9)	85	86	518	(12.5)	85	**36**	(16.0)	**0.42**
Lower Saxony	75.7	**-4.4**	1398	479	(4.2)	87	1488	504	(4.2)	90	**26**	(6.2)	**0.29**
	9.7	**2.9**	143	456	(13.1)	100	190	501	(6.7)	96	**45**	(14.8)	**0.46**
	14.6	1.6	234	448	(7.8)	85	282	473	(8.7)	91	**25**	(11.9)	**0.28**
North Rhine-Westphalia	63.1	-5.1	1538	499	(3.3)	79	1269	518	(3.9)	96	**18**	(5.5)	**0.20**
	12.0	**3.2**	206	489	(8.4)	88	260	509	(8.8)	100	19	(12.2)	0.20
	24.9	2.0	540	459	(6.0)	78	510	486	(6.4)	88	**27**	(9.0)	**0.32**
Rhineland-Palatinate	71.5	-3.0	1525	502	(3.7)	83	1265	508	(3.4)	87	6	(5.4)	0.07
	9.6	0.5	201	482	(6.7)	79	162	504	(9.9)	96	22	(12.1)	0.25
	18.9	2.4	336	464	(7.4)	82	328	505	(9.7)	88	**41** [a]	(12.4)	**0.48**
Saxony	91.0	0.7	1165	481	(4.1)	83	1328	513	(3.3)	85	**32**	(5.6)	**0.38**
	4.6	0.5	51	483	(12.8)	85	70	522	(9.7)	89	**39**	(16.1)	**0.45**
	4.4	-1.3	70	483	(15.9)	89	68	540	(19.0)	95	**57**	(24.8)	**0.62**
Saxony-Anhalt	93.3	2.3	1081	476	(4.0)	84	1528	501	(2.8)	89	**24**	(5.2)	**0.28**
	3.5	-0.1	45	483	(17.1)	100	56	515	(13.7)	87	32	(21.9)	0.34
	3.2	**-2.2**	63	482	(15.4)	90	54	486	(12.4)	96	4	(19.9)	0.04
Schleswig-Holstein	82.5	-3.1	1114	492	(4.1)	78	1291	518	(3.9)	85	**26**	(6.0)	**0.32**
	8.6	**2.9**	80	495	(9.7)	75	136	533	(11.0)	88	**38**	(14.8)	**0.46**
	8.9	0.2	112	458	(9.3)	78	138	500	(9.9)	92	**41**	(13.8)	**0.48**
Thuringia	93.0	1.5	1077	476	(3.7)	81	1863	501	(3.0)	90	**24**	(5.1)	**0.28**
	3.6	-0.4	42	486	(16.4)	85	67	503	(19.1)	112	16	(25.2)	0.16
	3.5	-1.1	48	465	(16.4)	83	71	503	(14.2)	103	38	(21.8)	0.41
Berlin [1]	57.1	1.6	1267	495	(4.9)	91	1278	518	(4.6)	97	**24**	(6.9)	**0.26**
	17.4	3.5	349	481	(10.5)	98	376	486	(11.0)	116	5	(15.3)	0.05
	25.5	-5.1	835	447	(6.6)	93	551	477	(9.7)	113	**30**	(11.9)	**0.29**
Hamburg [1]	58.2	1.2	1229	503	(3.7)	81	1007	534	(4.4)	98	**31**	(6.1)	**0.34**
	13.8	1.3	293	493	(7.0)	91	256	527	(7.8)	103	**34**	(10.6)	**0.35**
	28.0	-2.5	704	458	(4.7)	85	530	479	(7.2)	107	**21**	(8.8)	**0.22**
Saarland [1]	82.4	6.3	504	483	(6.6)	86	615	507	(8.1)	98	**24**	(10.7)	**0.26**
	6.6	0.2	40	471	(12.8)	94	53	528	(14.1)	88	**56**	(19.1)	**0.62**
	11.0	**-6.4**	99	429	(9.4)	87	89	487	(15.7)	99	**58**	(18.4)	**0.62**
Germany	71.2	**-2.6**	20305	497	(1.4)	82	21101	514	(1.3)	91	**17**	(2.7)	**0.20**
	10.8	**2.1**	2382	489	(3.4)	88	2759	508	(3.4)	99	**19**	(5.2)	**0.20**
	18.0	0.5	4712	460	(2.5)	82	4393	489	(2.7)	94	**29** [a]	(4.2)	**0.33**



Notes:
1st line: Students without an immigration background (both parents born in Germany)
2nd line: Students with one foreign-born parent. 3rd line: Students with two foreign-born parents
N = sample size, *M* = mean, *SE* = standard error, *SD* = standard deviation, *d* = effect size Cohen's *d*.
+/- = change since the 2009 IQB National Assessment Study; Δ*M* = mean difference
[1] The findings should be interpreted with caution due to the large percentage (>20%) of missing data.
Figures in bold indicate a statistically significant deviation ($p < .05$) from the mean for young people without an immigration background.
[a] significant Difference ($p < .05$) from students without an immigration background.
Hatched bars show a non-significant deviation from the German national mean ($M = 500$).

The results of IQB Trends in Student Achievement 2015 show that almost all of the states employed both teachers who were not trained in the subject they were teaching as well as career changers to teaching. The percentage of career changers was especially high in the Eastern German states, which is due to the high rate of retirement and resulting teacher shortages that have been ongoing in that part of the country for many years. In addition, the results show that the overwhelming majority of teachers who were teaching subjects they were not trained to teach and career changers were employed in schools below the upper-secondary (*Gymnasium*) level.

With regard to teachers' participation in further professional development, the analysis shows that three out of four teachers had taken part in at least one training program within the previous two years. Participation in professional development varied significantly, however, between states. Breaking down the training programs attended further by the content of training, we see that teachers primarily attended programs focused on specific subjects or programs providing didactic training in specific subjects. Teachers attended programs dealing with pedagogical themes, school administration, and self-management much less frequently.

In addition to teachers' participation in further professional development, IQB Trends in Student Achievement 2015 also surveyed teachers on the subjectively perceived need for further professional development. The results show that teachers are mainly interested in training programs dealing with the challenges of diverse student achievement levels in the classroom, issues of inclusion, and methods of providing support to weaker students.

Moreover, IQB Trends in Student Achievement 2015 also studied whether teachers' qualifications and participation in further professional development show an association with the proficiency levels of the students they teach. In addition, we checked whether the pattern of findings changes when taking class composition into account (that is, the mix of students in the class, for instance, students from different socioeconomic backgrounds). The results show that students of teachers who were not trained in the subject they were teaching achieve lower levels of proficiency on average in both German and English even after statistical control for class composition. In some domains, the lag in proficiency among students at non-upper secondary schools is particularly large.

Following the IQB National Assessment Study 2011, which identified negative associations between being taught by teachers who were not trained in the subject they were teaching and the proficiency levels of students, and the IQB National Assessment Study 2012, which identified similar negative associations at secondary level I in the subject of mathematics, findings from the present report, IQB Trends in Student Achievement 2015, show that these associations also exist in the language subjects at secondary level I.

The pattern of findings in IQB Trends in Student Achievement 2015 on career changers to teaching is less clear. Here, we can only identify a gap in proficiency among students of career changers in the subject of English when class composition is also taken into account. Future research should analyze the development of student proficiency when taught by career changers in more detail.

Conclusions

IQB Trends in Student Achievement 2015 is intended to provide the states with important insights into the outcomes of educational processes in state school systems in relation to the Standing Conference's educational standards. By covering a variety of subjects and domains of proficiency; offering a comprehensive analysis of current proficiency level distributions, and social, gender-specific, and immigration-specific disparities; and above all by describing changes in the various indicators over time, this study presents a differentiated picture for each German state that cannot be reduced to simple messages. To be able to draw robust conclusions from the results of the IQB Trends in Student Achievement 2015 requires detailed analysis of the pattern of findings in each state and an examination of these results within the larger context of that state's educational system. Together with the results of the IQB National Assessment Study 2011 in the subjects of German and mathematics at the primary level and the IQB National Assessment Study 2012 in the subjects of mathematics, biology, chemistry, and physics,[5] the results of the present trend report can be used to identify strengths and weaknesses in each state and offer important points of orientation for improvements that are still needed.

IQB Trends in Student Achievement 2015 marks the beginning of the second cycle of national educational monitoring based on the Standing Conference's educational standards. Through the analysis of changes in student outcomes over time, the IQB trend reports are now capable of achieving the Standing Conference's second key goal of monitoring developments in educational systems at the state level on an ongoing basis. The analysis will continue with IQB Trends in Student Achievement 2016, which will again study student proficiency at the primary level in the subjects of German and mathematics, five years after the IQB National Assessment Study 2011. The publication of that report, IQB Trends in Student Achievement 2016, is planned for fall 2017. The third IQB Trends in Student Achievement 2018 will analyze ninth-graders' proficiency in mathematics and the natural sciences for the second time since the IQB National Assessment Study 2012, and will conclude the second cycle of national educational monitoring.

5 Figures comparing state mean proficiency levels from past National Assessment Studies with the results of the first IQB National Assessment of Educational Trends can be found as supplementary material on the IQB website (see Fig. 12.1web to Fig. 12.7web).

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Further Information on the IQB Analysis of Student Achievement 2015:

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