



Language lesson learned—foreign-origin teachers and their effect on students' language skills

Lisa Sofie Höckel¹ 

Received: 17 April 2023 / Accepted: 21 February 2024
© The Author(s) 2024

Abstract

International migration increases classroom diversity around the world, but little is known about the effect of foreign-origin teachers on students' academic achievement. This study investigates whether foreign-origin teachers causally affect their students' academic performance. Exploiting within-student variation in assignment to teachers in Germany, I find that teachers who are immigrants or descendants of immigrants significantly increase the reading comprehension of their students in secondary school, but do not affect their math skills. This study is the first to investigate bilingualism as a potential mechanism and shows that the effect on reading comprehension is driven by bilingual foreign-origin teachers. Given their own experience in language learning, they seem exceptionally well-equipped to teach languages. This study contributes to the scant evidence on the causal relationship between teachers' foreign origin and students' academic achievement in light of a large and persistent achievement gap between native and foreign-origin students.

Keywords Bilingualism · Education · Language skills · Migration · Role model effect · Teacher bias

1 Introduction

International migration does not only affect the labor force, it also affects its training ground—the classroom. In OECD countries, more than 25% of 15–34-year-olds report a foreign origin, and the share of foreign-origin students continues to rise (OECD 2018). Large and persistent achievement gaps between native and foreign-origin students, meaning students who are either immigrants or descendants of immigrants,

Responsible editor: Milena Nikolova

✉ Lisa Sofie Höckel
lisa.hoeckel@rwi-essen.de

¹ RWI – Leibniz Institute for Economic Research, Hohenzollernstrasse 1-3, 45128 Essen, Germany

prevail in most countries (e.g., Schnepf 2007; Algan et al. 2010; Giannelli and Rapallini 2016; Ruhose and Schwerdt 2016; Alieva et al. 2018; OECD 2018), and the literature has identified language as the single most important determinant associated with the educational achievement gap (e.g., Dustmann et al. 2010, 2012; Geay et al. 2013; Danzer et al. 2022).

While the share of foreign-origin students continues to increase, foreign-origin teachers remain severely underrepresented in many OECD countries. This underrepresentation is especially high in countries with a relatively large migrant population. In the US, under 10% of all teachers are Hispanic although Hispanic students make up about one-quarter of all K-12 students (Urban Institute 2017). In Germany, 33% of under-15-year-old students have a foreign origin, but this is only true of 8% of primary and secondary school teachers (Statistisches Bundesamt 2012, 2018). The share of foreign-origin teachers is also less than half that of the student population in countries such as the UK, Italy, or Denmark (European Commission 2016).

The European Commission recommends its member states adopt policies to increase teacher diversity (European Commission 2016), but there is little empirical evidence on the effect of foreign-origin teachers on students' academic achievements. Are foreign-origin teachers better equipped to help foreign-origin children overcome potential language barriers and socio-economic disadvantages? And how do they affect the achievement of native students? For the US, the literature shows that minority students benefit from same-race teachers (e.g., Dee 2004; Fairlie et al. 2014; Gershenson et al. 2016), but it is unclear if these findings can be transferred to the context of migration.

In this paper, I investigate whether having a foreign-origin teacher causally affects students' reading comprehension scores in lower-secondary school, holding constant both observed and unobserved factors related to academic outcomes. I define foreign-origin teachers as foreign-born teachers, teachers with at least one foreign-born parent, or teachers who report a mother tongue other than German. Using data from the German National Educational Panel Study (NEPS) with unique information on teacher characteristics and exploiting within-student variation in assignment to teachers over time, I find that foreign-origin teachers increase objective reading comprehension scores of their students but do not affect their students' math test scores. Importantly, the positive effect on language skills is driven by foreign-origin teachers who report a mother tongue other than German. Ruling out alternative explanations, I argue that bilingual teachers are particularly well-equipped in transmitting language skills.

This study contributes to the literature in three ways. First, it adds to the scant evidence on the causal relationship between teachers' foreign origin and students' academic achievement. Given that second-generation immigrant students are on average the fastest-growing group across OECD countries (OECD 2018), it is of particular policy relevance to study what role foreign-origin teachers can play in their school integration. Second, this study is the first to investigate teachers' language skills due to bilingualism as a potentially migration-related channel. While the economic literature has focused mainly on matching effects through role model and teacher bias effects, this paper not only introduces a different mechanism but also tests for all three channels in the same setting. Third, the panel data employed allows for investigating student attainment within the same subject over time. Following the teacher value-

added literature, I can estimate the gain in student achievement after being taught by a foreign-origin teacher using variation in teacher assignment over time. This strategy adds to previous studies (e.g., Seah 2018, 2021), which have largely relied on the National Education Longitudinal Study of 1988 (NELS) and used variation in teacher assignment across subjects.

Theoretically, there are three reasons why foreign-origin teachers can affect students' academic achievement differently than native teachers. First, foreign-origin teachers can have different *language skills* compared to native teachers. On the one hand, they can be less proficient in the language of instruction. Foreign-born teachers are more likely to have accents that hamper students' understanding and thus make the course content less accessible. On the other hand, they can use their own experience in language learning to teach their students. According to the "conscious competence" learning model, foreign-origin teachers who have consciously learned a language could be better at explaining it in comparison to native teachers who use the language largely instinctively (Robinson 1974).

Second, *student-teacher matching* can influence students' academic achievement. Matching effects comprise two complementary channels that can make demographic matching of students and teachers particularly advantageous for matched students. A *role model effect* describes a positive reaction of foreign-origin students to foreign-origin teachers. Triggered by the teacher's presence, rather than an explicit behavior, foreign-origin students' beliefs about their educational possibilities can improve, making them more confident and engaged in class. A *teacher bias effect* describes teachers' behavior. Foreign-origin teachers could actively or unconsciously allocate more class time to interacting with students of the same origin or they can be less likely to discriminate against foreign-origin students in their grading (Dee 2007). A teacher bias effect could also emerge from different teaching cultures (Fleisher et al. 2002) or a lack of host-country-specific human capital of foreign-origin teachers due to cultural differences. Foreign-origin teachers could then be less able to provide culturally relevant examples for native students but serve as better communicators to foreign-origin students.

Third, foreign-origin and native teachers could vary in the *effort* and time they allocate towards their teaching activities. If they systematically differ in terms of their intrinsic motivation or cultural values regarding their profession, one of the groups could, for example, work longer hours or put more effort into their teaching activities (e.g., spend more time mentoring their students).

Given these mechanisms, the effect of having a foreign-origin teacher on students' academic achievement is theoretically ambiguous.

To investigate a foreign-origin teacher effect, this study builds upon different literature strands. A small but growing strand of the literature discusses the language skills of teachers. Early studies analyze the effect of foreign teaching assistants on the academic achievements of undergraduate students in university (Borjas 2000; Asano 2008). The contradictory effects found by these studies can be explained by the non-random assignment of teaching assistants to students. In the study most closely related to this paper, Seah (2021) examines the effect of having a linguistically similar teacher on the academic achievements of secondary school students in the United States. Using data from the NELS, he exploits within-student variation in test scores and the native

language of teachers across two subjects. He finds no effect of being assigned to a linguistically similar teacher once the teacher's ethnicity is controlled for.

A larger literature strand studies matching effects with respect to demographic characteristics, mostly gender and race (e.g., Dee 2004; Bettinger and Long 2005; Hoffmann and Oreopoulos 2009; van Ewijk 2011; Cho 2012; Fairlie et al. 2014; Antecol et al. 2015; Griffith and Main 2021). Dee (2004) examines test scores from the Project STAR class-size experiment, which randomly matches students and teachers within participating schools. He shows that assignment to own-race teachers significantly increases Math and reading achievement of both black and white students. Fairlie et al. (2014) and Egalite et al. (2015) confirm ethnicity and race-matching effects using large administrative data for US high schools and community colleges. More recently, Seah (2018) investigates the effect of immigrant teachers on 8th graders in the US and finds no adverse effect of immigrant teachers on the achievement of (native) students.

Lastly, the paper builds upon the literature showing that immigrants and natives differ in terms of hours worked (Hamermesh and Trejo 2013; Vargas 2016; Fertig 2010). Studies by Hamermesh and Trejo (2013) and Coniglio et al. (2021) show that foreign-born individuals invest more time in educational activities.

The remainder of the study is organized as follows. Section 2 gives a short institutional overview of the German school system and the role of immigrant teachers in it. Section 3 discusses the data, Section 4 introduces the empirical strategy, and Section 5 presents the findings. Section 6 concludes.

2 Institutional background

A key feature of the German education system is that students are typically tracked after 4 years of elementary schooling.¹ Students are sorted based on their academic ability and assigned to one of three secondary school tracks: lower-secondary track (*Hauptschule*), middle-secondary track (*Realschule*), and upper-secondary track (*Gymnasium*).² *Hauptschule* provides practical education and prepares students for vocational education (until grade 9); *Realschule* has a broader range of emphasis for intermediate students (until grade 10); and *Gymnasium* qualifies students for higher education (until grade 12 or 13).³ Depending on the federal state, the track is determined by parental choice or a binding teacher recommendation based on the students' academic achievement and ability to work independently. Schooling is compulsory for 9 or 10 years, depending on the federal state. Students usually finish the track they have been assigned to, but switching tracks is possible and became more common in recent years.⁴

¹ In the federal states of Berlin and Brandenburg, students are tracked after 6 years of schooling.

² Additionally, there are comprehensive schools (*Gesamtschulen*) that combine all education types and amount to 12% of all German secondary schools (Malecki et al. 2014).

³ See Fig. A1 for an illustration of the German education system.

⁴ School changes within the same track only account for approximately 14% of school changes in Germany (Kliche and Täubig 2019).

A second relevant feature of the German education system is that teaching is organized in classes rather than courses. More specifically, a class refers to a group of up to 30 students who are allocated by their school's headmaster to the same classroom upon entry into secondary school. All students in one class share the same teacher for a given subject. In contrast to the US, students do not take different courses in the same subject based on their proficiency.⁵ Instead, class composition may change when students choose different electoral courses in grade 7 or 9. Teachers do not specialize in teaching a particular grade but the school's headmaster assigns them to classes on a yearly basis.

Most German teachers are graduates of a formal teaching education program (*Lehramtstudium*). Conditional on having earned a degree that qualifies for tertiary education, teacher training for secondary education comprises two components. First, teacher candidates complete 4 to 6 years of university courses covering the two subjects they later want to teach in combination with pedagogical training. At the end of the first phase, the candidates take exams on pedagogic and theoretical knowledge of the subjects studied. In addition to the grades earned at the university, these exams comprise the first state examination grade. Second, candidates participate for 18–24 months in a practical program of teaching seminars (*Referendariat*) at a teaching training school. During this phase, candidates have teaching positions, complete a thesis, and deliver demonstration lessons rated by head teachers. The combination of assessments of the demonstration lessons, the thesis grade, and exams sum up to the second state examination.

The second state examination is compulsory for entry into civil service.⁶ Ultimately, the grade of the second state examination, in combination with the local demand for teachers, determines the school a teacher is assigned to. Federal states can hire teaching candidates without the second state examination on regular salaried positions without awarding them civil servant status. For subjects with teacher scarcity, even teachers without a formal teacher training are eligible (*Quereinsteiger*).

Immigrant teachers or candidates who have studied abroad do not have to reside in Germany for a certain period before becoming teachers but they have to exhibit a comparable teaching degree or obtain the second state examination in Germany to become civil servants. While the recognition of foreign degrees is easier for candidates from within the European Union, immigrant teachers typically face significant obstacles during the recognition process. According to GEW (2021), only about 15% of foreign teaching degrees are successfully granted without further requirements. Around 68% of recognition requests are granted conditional on additional training and thus imply high costs for immigrant candidates. The conditioning is mainly due to the fact that the German teaching degree consists of two different subjects while in most countries one subject is sufficient. Another hurdle to becoming a civil servant in Germany is the high German language standard required. While the actual prerequisites differ by federal state, immigrants typically have to speak German at C1 level irrespective of the subject studied. In comparison to other occupations, the recognition process to

⁵ German language and Math classes are compulsory in German schools. Students are obliged to take them and cannot choose courses based on their preferences for teachers.

⁶ In most federal states, teachers become civil servants. Nevertheless, approximately one in four teachers is hired as an employee rather than a civil servant.

becoming a teacher therefore leads to a rather positively selected group of immigrant teachers who actually end up working in their job.

3 Data and descriptive statistics

This study uses data from the German National Educational Panel Study (NEPS) (NEPS Network 2021). The NEPS has a multi-cohort design and draws from a representative sampling frame of students from six starting cohorts. The NEPS follows students as they move through the education system and contains extensive questionnaires answered by persons in the students' personal environment, such as parents, teachers, and headmasters.

For the empirical analysis, I employ data from starting cohort 3 (SC3) as it provides unique information on teachers' origin for German and Math teachers. SC3 follows students from grades 5 to 9, an age cohort that is particular suitable for the research question, as the first nine years of education are compulsory and crucial for lifelong education outcomes (Angrist and Krueger 1991). The sampling population of SC3 contains all German fifth graders in schools offering lower-secondary education in the school year 2010/2011. First, schools are randomly drawn from the population of public schools to be representative by school type.⁷ Second, classes are randomly selected within each school (see Steinhauer and Zinn 2016 for sampling design). Participation is voluntary and implies that students complete competency tests and answer a socio-economic questionnaire. Overall, the participation rate of students is very high with 94.5% in the first wave. The teacher questionnaire contains information on teachers' demographics and aspects of their career choice and studies. I disregard interview data on parents and headmasters to minimize sample attrition.

In order to determine the students' foreign origin, I combine three variables provided by the NEPS data set. (a) Students report which citizenship they hold. If they mention any (additional) nationality other than German, I code them as foreign origin. (b) Interviewers record students' country of origin. I code non-German origins as foreign origin. (c) Students are asked if they have a Russian or Turkish migration background. If they mention one of the two migration backgrounds, I code them as foreign origin.⁸

To determine German language teachers' foreign origin, I use two variables. (a) Teachers are asked about their migration background, namely if they are foreign born or if they have at least one foreign-born parent. (b) Teachers report their mother tongue, meaning the language they learned as a child in the family. If they mention a mother tongue additional to German, or other than German, I code them as foreign origin. If teachers do not report a migration background or mother tongue, I code them as native Germans.

Besides containing unique information on teacher origin, the NEPS has the advantage of providing objective and unidimensional competence scores for students' performance in different subjects conducted by NEPS interviewers. This feature is

⁷ Students from schools with a predominant foreign teaching language and students who are not able to participate in the normal testing procedure are excluded.

⁸ This question does not bias the sample towards students of Russian and Turkish background. It only identifies an additional 6% of foreign-origin students.

crucial in a setting where teacher bias effects might be at work as German language teachers cannot manipulate the NEPS competence scores. For the empirical analysis, I focus on reading comprehension as the main outcome variable. The score is designed to measure the ability to understand and use written texts, which are important preconditions to develop personal skills and participate in social life and the labor force (Gehrer et al. 2012). Reading comprehension is assessed by multiple-choice questionnaires, which test the understanding of five text functions and associated text types, namely informational, commenting, instructional, advertising, and literary texts. The reading competence test lasts 28 min per text function and fits the thematic orientation, lexical, semantic, and grammatical properties of the specific age cohort (Gehrer et al. 2012). The answers to the multiple choice questions are aggregated by a weighted maximum likelihood estimation and constrained to having a mean of zero in the first wave. This standardization ensures that scores are comparable across different survey waves. As promoting reading comprehension is one of the key objectives of German language classes, I can attribute this skill to the domain of the German language teacher. Overall, reading comprehension skills can serve as a suitable proxy for language skills (e.g., in particular with respect to written language) as a substantial connection between reading comprehension and both receptive and expressive vocabulary has been established in the literature (Berendes et al. 2013).

I impose several restrictions on the data. From the initially 6527 students, I observe 6485 in the years when the tests take place. Of those, I drop 358 students because they do not participate in the competence test. I can link 5758 students to their German language teacher, and I have context data for 718 German language teachers of 4724 students. This might lead to a small bias towards better (organized) schools.

Further, the data do not allow for consistent tracking of students who change classes and schools—a practice which is rare in the German school system.⁹ I also cannot link students if schools withdrew their participation from the NEPS, and if teachers or students do not answer the questionnaire.¹⁰ Of the 4724 students in my sample, one-third of students are only observed once.

To illustrate the data, the first two columns of Table 1 present descriptive statistics for all students observed. The first variable describes the main outcome variable, i.e., the objective reading comprehension scores. The average of 0.29 indicates that the reading comprehension in the sample has increased over time.¹¹ Out of the 4724 students in the sample, 36% are of foreign origin. This share is in line with statistics of the German Microcensus, which estimate a share of (narrowly defined) foreign-origin students of 33% in 2012 (Statistisches Bundesamt 2012). The most common countries of origin in the data are Turkey (16%), Russia (14%), and Poland (12%), which together account

⁹ If parents with strong anti-immigrant sentiments are more likely to switch their children spontaneously out of class once they are informed about the foreign origin of the teacher at the beginning of the school year, and their children are less likely to be receptive to the teaching content of foreign-origin teachers, the foreign-origin teacher effect might be upwards biased. Given that switches are rare, I expect this concern to be of no statistical relevance.

¹⁰ To avoid further sample attrition, I keep teacher observations with missing information if the teacher answers at least two questions used for the control variables.

¹¹ Further, the sample is slightly skewed towards higher achieving students as the average reading comprehension in grade 5 is 0.07 rather than 0.

Table 1 Descriptive statistics—students

	All		Native		Foreign origin		<i>t</i> -test
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	
Main outcome variable							
Reading comprehension	0.285	1.29	0.411	1.29	0.058	1.27	***
Student characteristics							
Foreign origin	0.358	0.48					
Female	0.494	0.50	0.486	0.50	0.509	0.50	
Birth year	1999.502	0.61	1999.531	0.60	1999.449	0.64	***
Grade	6.647	1.57	6.685	1.57	6.578	1.56	***
School year repeated	0.025	0.16	0.023	0.15	0.028	0.16	*
Household size	4.439	1.38	4.392	1.31	4.523	1.49	**
Other outcome variables							
Mathematics score	0.304	1.23	0.453	1.21	0.036	1.22	***
German grade	4.375	0.83	4.445	0.83	4.247	0.82	***
Reading frequency on a school day	0.829	0.74	0.820	0.74	0.845	0.76	
Teacher expects me to try my very best	4.030	0.88	4.045	0.86	4.003	0.93	*
Satisfaction with school	7.276	2.39	7.334	2.33	7.173	2.48	**
Panel observations	7351		4768		2583		
Student observations	4724		3035		1689		

Notes: The descriptive statistics are shown for the whole sample as well as for the two subsamples of native and foreign-origin students. Significance stars indicate the result of the respective *t*-test of differences in mean values.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

for around 42% of foreign-origin students. The sample is balanced with respect to gender, and almost 95% of the students are born in 1999 or 2000. The sample contains observations from grades 5, 7, and 9, because reading comprehension is tested in these grades.¹² I observe most students in fifth grade due to the 3% of students who repeated a school year and sample attrition due to missing linkages. The average household size is 4 and around 80% of students live in households of 3 to 5 people.

Besides reading comprehension scores and student characteristics, Table 1 provides information on additional outcome variables. It shows an average math score of 0.30, indicating that the math test score also increases over time. The German grade corresponds to the subjective grade given by the German language teacher at the end of the school year and it ranges from one to six. Here, six corresponds to an outstanding achievement while one (and two) refers to an insufficient achievement. The most prevalent grade is satisfactory (4), which 44% of students receive. The NEPS data also contain survey items that can be linked to the German language teacher's influence.

¹² The missing years are not necessarily a concern, as teachers typically change classes every two years implying that a teacher teaching a certain subject in grade 5 (7) is likely to teach the same class in grade 6 (8).

First, students are asked how much time they spend reading outside of school on a normal school day. The answers rank from zero, not at all to 2.25, more than two hours. On average, the students read less than an hour with around 16% of students not reading anything (incl. books, e-mails or internet) outside of school. To approximate the students' perception of their German teacher, I use an item in which students rate the statements "My German teacher expects me to try my very best" on a scale ranging from one to five.¹³ In the sample, 33% (43) of students (rather) agree with the statement that their teacher expects them to try their very best, illustrating that students perceive their teachers as very engaged. As an additional outcome variable, I use the item which captures how satisfied students are with their situation at school. The answers rank from zero, completely dissatisfied, to 10, completely satisfied with a mean of seven. Table 1 further provides descriptive statistics for the subsamples of native and foreign-origin students separately. It reveals significant differences with respect to all, control variables except gender, birth month and reading frequency. In line with the existing literature, the table shows a large native-foreign gap in achievement with a mean reading comprehension score for native students of 0.41 (0.45 for Math) and 0.06 (0.04 for Math) for foreign-origin students. In addition, foreign-origin students are older and more likely to live in larger households.

Table 2 summarizes the main explanatory variable, being taught by a foreign-origin German language teacher, and the teacher characteristics controlled for in the empirical analysis. Of the German language teachers observed in the sample, 7% are of foreign origin. This share is comparable with national estimates for 2012 (8%) (Statistisches Bundesamt 2018). Around 60% of foreign-origin teachers are born in Germany, implying that the majority of foreign-origin teachers are second and higher generation immigrants. Further, 60% of foreign-origin teachers report a mother tongue other than (or additional to) German. In contrast to the student population, teachers are evenly distributed across mother tongues. In the sample, 34% of foreign-origin teachers have a Slavic mother tongue (mainly Polish and Russian), 34% a Romance mother tongue (mainly Italian), and 32% another (*Other*) mother tongue (mainly English). Less than one in four German language teachers is male, and the German teachers' average age is 44. Besides age and birth decade, I further control for the age when the respondent claims to have decided to become a teacher. Almost 45% of teachers report that they chose their profession in their teens. While this question might be prone to response bias, I include it to control for unobserved intrinsic motivation. To proxy German language teachers' overall ability, I include their average grade at the first state examination which is standardized to have a mean of zero and a standard deviation of one in the full sample. While I do not observe how much experience the teachers have, I can control for the year in which they obtained their state examination to proxy for the time since they are eligible to teach. On average, teachers obtained their state examination in 1997 and around 87% of them completed their teaching degree either in Germany or abroad, while the information is missing for a rather large share of 12%. Of the German language teachers in the sample, 92% studied German language studies and 44% studied other languages such as English or Slavic languages.

¹³ The categories are as follows: does not apply at all (1), does rather not apply (2), partly (3), does rather apply (4), applies completely (5).

Table 2 Descriptive statistics—German language teachers

	All		Native		Foreign origin		<i>t</i> -test
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	
Foreign origin	0.058	0.23	0.000	0.00	1.000	0.00	***
No foreign origin	0.945	0.23	1.000	0.00	0.063	0.24	
Second- and higher generation immigrant	0.035	0.18	0.000	0.00	0.604	0.49	
First-generation immigrant	0.019	0.14	0.000	0.00	0.333	0.47	
Bilingual	0.034	0.18	0.000	0.00	0.604	0.49	***
German	0.966	0.18	1.000	0.00	0.396	0.49	
Slavic	0.010	0.10	0.000	0.00	0.208	0.41	
Romance	0.014	0.12	0.000	0.00	0.208	0.41	
Others	0.009	0.10	0.000	0.00	0.187	0.39	
Female	0.785	0.42	0.782	0.42	0.771	0.42	
Age	43.692	11.68	44.085	11.68	37.626	10.42	
<i>Birth year</i>							***
1940s	0.033	0.18	0.034	0.18	0.021	0.14	
1950s	0.283	0.45	0.294	0.46	0.104	0.31	
1960s	0.198	0.40	0.204	0.40	0.104	0.31	
1970s	0.252	0.43	0.246	0.43	0.354	0.48	
1980s	0.233	0.42	0.222	0.42	0.417	0.49	
Missing	0.000	0.00	0.000	0.00	0.000	0.00	
<i>Age when job was chosen</i>							***
Between 0 and 14	0.141	0.35	0.136	0.34	0.188	0.39	
Between 15 and 19	0.454	0.50	0.453	0.50	0.396	0.49	
Between 20 and 24	0.208	0.41	0.204	0.40	0.354	0.48	
After 25	0.106	0.31	0.111	0.31	0.062	0.24	
Missing	0.090	0.29	0.095	0.29	0.000	0.00	
Grade at first state exam	-0.015	0.89	-0.005	0.89	-0.098	0.93	***
Year of state exam	1996.858	12.64	1996.549	12.76	2001.938	10.26	***
<i>Completed teaching degree</i>							***
Yes	0.884	0.32	0.879	0.33	0.938	0.24	
No	0.007	0.08	0.007	0.08	0.042	0.20	
Missing	0.109	0.31	0.114	0.32	0.021	0.14	
German language studies	1.049	0.44	1.051	0.45	1.021	0.32	
Language studies	0.473	0.70	0.483	0.71	0.396	0.60	***
Teacher-year observations	7351		6926		425		

Notes: The descriptive statistics are shown for the whole sample as well as for the two subsamples of native and foreign-origin German language teachers. Significance stars indicate the result of the respective *t*-test of differences in mean values.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

I include controls for the federal state where the German language teacher acquired his/her higher education entrance qualification, but I do not report them due to data confidentiality.

Columns (3)–(6) of Table 2 display the teacher characteristics for the subsamples of native and foreign-origin teachers. The characteristics differ significantly with respect to all variables, except the federal state where they acquired their higher education entrance qualification and languages studied. Foreign-origin teachers are younger and decided to become teachers earlier than native teachers. Further, their average grade at the first state examination is 0.18 standard deviations below the grade of native teachers and they are more likely to teach in the academic track (*Gymnasium*). While 25% of native teachers work in *Realschule*, only 10% of foreign-origin teachers do so. Further, a higher share of foreign-origin teachers study German language studies emphasizing that their average German language knowledge is very high. In sum, native and foreign-origin teachers differ with respect to important observable characteristics. Therefore, it is crucial to control for these characteristics.

4 Empirical strategy

An ideal empirical setting to study the effect of having a foreign-origin teacher on students' academic achievement requires random allocation of teachers across classes. Otherwise, simple OLS regressions might lead to biased estimates due to two main threats to identification: First, native and foreign-origin teachers might select into schools with students who systematically differ with respect to their proficiency. In most German federal states, teachers are allocated to schools partly based on their second state examination grade. Additionally, residential sorting by socio-economic status produces significant quality differences between school catchment areas even within small geographical areas (Noreisch 2006). If foreign-origin teachers were better teachers and had better grades, they could, for example, be more likely to be sent to schools with better performing students. Consequently, this allocation would lead to an overestimation of the effect of foreign-origin teachers.

Second, within schools, headmasters could allocate teachers to more or less proficient classes based on their origin or confounding factors correlated with origin. For example, foreign-origin teachers could be allocated to classes with a high share of foreign-origin students, and, thus, more heterogeneous classes. If class heterogeneity is negatively correlated with student performance, the effect of foreign-origin teachers would be underestimated.

In order to address these biases, I follow the teacher value-added literature, which decomposes students' test scores into components related to student heterogeneity and components related to teacher quality (e.g., Aaronson et al. 2007; Chetty et al. 2014). More specifically, I employ longitudinal data with class fixed effects and use variation in teacher assignment over time to estimate the gain in student achievement after exposure to a foreign-origin teacher.

For the class fixed effects specification, I estimate the model

$$y_{ict} = \beta FT_{ct} + \phi' X_{it} + \gamma' C_{ct} + \rho_c + \delta_t + \varepsilon_{ict}, \quad (1)$$

where $y_{i clt}$ is the outcome of student i in class c with teacher l in year t . FT_{clt} is a dummy variable for the German language teacher being of foreign origin and X_{it} is a vector of student characteristics. C_{clt} denotes a vector of other teacher characteristics and ρ_c is a class fixed effect. δ_t are year dummies and $\varepsilon_{i clt}$ is the error term.

Equation (1) estimates the return to individual and teacher inputs. The main variable of interest is FT_{clt} , whose parameter β indicates the effect of having a foreign-origin teacher in a given school year.

The identification relies on the assumption that the assignment to a foreign-origin German language teacher (in a given year) is as good as random. To test this assumption, I first regress pre-determined student characteristics on a dummy variable indicating a foreign-origin teacher in column (1) of Table 3. Of the student characteristics none are significantly associated with being assigned to a foreign-origin teacher.¹⁴ In column (2), I include the students' previous reading comprehension test scores as a control. The reading comprehension test is common to all students in the sample and standardized to a mean of zero and a standard deviation of one. Column (2) illustrates that students' previous achievements in the reading comprehension tests are uncorrelated to the assignment to a foreign-origin teacher. This implies that even if headmasters assign teachers dynamically to classes (e.g., good teachers follow after bad teachers), the assignment is orthogonal to the origin of teachers. Overall, Table 3 gives important confidence that based on the characteristics included in the data, teacher assignment is uncorrelated to previous achievements and student characteristics.

To ensure that the estimates are not biased due to differences in student characteristics as well as changes in class composition over time (e.g., due to students choosing different electoral courses in grade 7 or 9), I adapt Eq. (1) by including student fixed effects and dropping student-level variables that are time invariant. This within-student identification strategy uses variation in assignment to teacher due to student mobility and varying yearly teacher assignments. In doing so, it accounts for time-invariant student heterogeneity (e.g., with respect to student's unobserved ability or motivation). This strategy yields unbiased estimators if there are no unobserved, time-varying student-specific factors that are correlated with both students' outcomes and class assignment.¹⁵

For the student fixed effects specification, I estimate the model

$$y_{i clt} = \beta FT_{clt} + \phi' X_{it} + \gamma' C_{clt} + \rho_c + \delta_t + \omega_i + \varepsilon_{i clt} \quad (2)$$

where ω_i are student fixed effects.

This specification ensures that the differences in student characteristics do not bias the internal validity of the empirical analysis. For the external validity, I investigate the selectivity of the identifying sample. First, I test if classes that are exposed to both, a foreign-origin and native teacher systematically differ from those who do not

¹⁴ Descriptive statistics for the subsamples of students who have (not) been taught by foreign-origin teachers are provided in Table A1. Significant differences exist regarding the foreign origin of students and the grade. Furthermore, all outcome variables except the German grade are higher for students who have been taught by a foreign-origin teacher.

¹⁵ This specification controls for absolute sorting that takes place if students who take classes with foreign-origin teachers are systematically different from those who do not—irrespective of their foreign origin.

Table 3 Foreign-origin teacher assignment

	(1)	(2)
Previous German test	–	–0.002 (0.003)
Student characteristics		
Female	–0.002 (0.006)	–0.002 (0.006)
Foreign origin	0.011 (0.008)	0.011 (0.008)
Student age	0.001 (0.000)	0.001 (0.000)
Grade (ref.: 5)		
7	0.022 (0.027)	0.021 (0.027)
9	0.015 (0.027)	0.016 (0.027)
Grade repeated	0.011 (0.050)	0.011 (0.050)
Household size	–0.001 (0.002)	–0.001 (0.002)
School type (ref.: Hauptschule)		
Realschule	–0.022 (0.026)	–0.021 (0.026)
Gymnasium	0.000 (0.026)	0.004 (0.026)
Others	–0.007 (0.026)	–0.005 (0.026)
Observations	6179	6179

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

experience a change in teacher origin. Overall, there are 241 students in 83 classes who experience a change in teacher's origin over time. These students are slightly more likely to be of foreign origin and in lower grades. Otherwise, students who experience a switch in the origin of teachers are not different from those who do not experience a switch (Table 4). While the identifying variation relies on a small subsample, this subsample is larger than in previous studies (c.f., Borjas 2000; Fleisher et al. 2002; Asano 2008) and comparable to that of Seah (2018).

Second, I formally test for selective sample attrition by regressing the test participation on a foreign-origin teacher dummy as the main explanatory variable along with the set of student characteristics in Table 5. While students are less likely to be observed

Table 4 Student characteristics by switch, *t*-test

	No switch	Switch	Difference	Std. error
Student characteristics				
Female	0.493	0.515	-0.022	(0.033)
Foreign origin	0.354	0.432	-0.078	(0.032)**
Birth year	1999.500	1999.544	-0.043	(0.041)
Grade	6.039	5.490	0.500	(0.088)**
School year repeated	0.034	0.037	-0.003	(0.012)
Household size	4.455	4.490	-0.035	(0.092)
Observations	4483	241		

Notes: Results are obtained from OLS regressions. Robust standard errors are in parentheses.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

in grade 7 and 9, household size is the only student characteristic negatively associated with test participation. Both selectivity tests provide an important reassurance that the identifying sample contains a rather representative sample of the NEPS data with a larger share of foreign-origin students. To ensure that the over-representation

Table 5 Sample attrition

	(1)
Foreign-origin teacher	0.014 (0.011)
Student characteristics	
Female	-0.002 (0.002)
Foreign origin	-0.008 (0.006)
Student age	-0.000 (0.000)
Grade (ref.: 5)	
7	-0.002** (0.001)
9	-0.103*** (0.023)
Grade repeated	-0.004 (0.006)
Household size	-0.002* (0.001)
Observations	8283

Notes: Robust standard errors are in parentheses.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

of foreign-origin students does not bias the results, I provide all results separately for native and foreign-origin students. While the NEPS dataset contains a large number of teacher characteristics, the empirical strategy does not allow to test for systematic differences in unobserved characteristics between native and foreign-origin teachers. I therefore address potential differences in effort as a mechanism in Section 5.2.2.

5 Results

5.1 Foreign-origin teacher effect

I start the empirical analysis by testing if foreign-origin teachers affect students' reading comprehension. Panel A of Table 6 displays the foreign-origin teacher effect for the full sample. Panels B and C provide separate estimates for native and foreign-origin students to investigate if there are differential effects by students' origin. As we move along the columns, I increasingly restrict the variation used to identify the parameter of interest. The specification in column (1) controls for student characteristics and class fixed effects. Following Eq. (1), it accounts for peer effects and teacher allocation across schools and classes. Column (2) includes teacher characteristics, and column (3) displays results from the preferred specification described in Eq. (2), which contains both student and class fixed effects.¹⁶

For the overall sample, there is a positive and significant correlation between reading comprehension scores and having a foreign-origin teacher in column (1). The foreign-origin teacher estimate becomes larger once its effect is disentangled from teacher characteristics in column (2). This increase in effect size is mainly caused by the inclusion of the teacher grade at the first state exam control variable as foreign-origin teachers perform significantly worse at this examination. Interestingly, teachers who studied languages other than German also positively affect students reading comprehension (see Table A2). In column (3), the effect is identified by within-student variation in teacher allocation. This specification removes correlations between being taught by a foreign-origin teacher and changes in the class composition. Further, it controls for differences in unobserved student heterogeneity. Consequently, less variation is employed and β is less precisely estimated. Nevertheless, the effect stays significant and the magnitude rises to 0.27. The coefficient of 0.27 amounts to 0.2 standard deviations in the reading comprehension test score. The effect size is comparable in magnitude to the effect found by Seah (2018) for immigrant teachers on science test scores of native students.

For native students, in panel B, the effect size of having a foreign-origin teacher is similar in size in the specifications including class and student fixed effects (columns (2) and (3)). For foreign-origin students, in panel C, the correlation between student unobserved heterogeneity and the teacher's origin matters. With student fixed effects, the effect of having a foreign-origin teacher doubles in size and becomes statistically

¹⁶ For ease of exposition, coefficients of the control variables are presented in Table A2. They are in the expected direction.

Table 6 Effect of foreign-origin teacher on reading comprehension

	(1)	(2)	(3)
Panel A: all students			
Foreign-origin teacher	0.191*** (0.067)	0.264*** (0.073)	0.270* (0.140)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.377	0.377	0.661
Observations	7351	7351	7351
Panel B: native students			
Foreign-origin teacher	0.286*** (0.102)	0.359*** (0.107)	0.342 (0.233)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.361	0.362	0.651
Observations	4768	4768	4768
Panel C: foreign-origin students			
Foreign-origin teacher	0.116 (0.087)	0.151 (0.095)	0.366* (0.199)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.399	0.398	0.654
Observations	2583	2583	2583

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

significant. This improvement in reading comprehension can have important implications for lifelong outcomes of foreign-origin students, such as productivity and wages, because language fluency facilitates the transfer and adaptation of skills in the job market (Dustmann and van Soest 2001; Hayfron 2001; Dustmann and Fabbri 2003; Clarke and Skuterud 2016; Lochmann et al. 2019; Foged et al. 2022; Lang 2022). Overall, in the preferred third specification, the foreign-origin teacher effect is larger and more precisely estimated for foreign-origin than native students. Neverthe-

less, results obtained from a fully interacted model do not reveal significantly different effects of foreign-origin teachers on students with and without a foreign origin. This finding is in line with Seah (2018), who shows a positive but insignificant correlation between immigrant teachers and both native and immigrant students for English test scores in the US. In contrast to the literature on race-matching, the positive effect of foreign-origin teachers is not caused by matching effects in the sense that there are positive effects on the matched group (here: foreign-origin students) and adverse effects on the mismatched group (here: native students). Instead, Table 6 indicates positive effects for foreign-origin students and clearly no negative effect for native students. This result is robust to the inclusion of students' math test scores (see Table A3). Math test scores proxy student-year-specific performance and accordingly provide a lower bound estimate of the foreign-origin teacher effect if there are positive spillover effects, i.e., if better reading comprehension increases math test scores.

5.2 What explains the foreign-origin teacher effect?

5.2.1 Language-specific skills

To understand why there is an effect of teachers' origin, not only for foreign-origin students but also for native students, this section focuses on an obvious characteristic in which native and foreign-origin teachers differ: language skills. Native teachers—by definition—only have German as a mother tongue, while foreign-origin teachers often grew up learning different mother tongues.

The economic literature has established the importance of languages in preference formation (Angerer et al. 2016; Sutter et al. 2018; Chen et al. 2019) and studied the advantages of bilingual education for both targeted and un-targeted students (Chin et al. 2013; Lleras-Muney and Shertzer 2015; Cappellari and Di Paolo 2018).¹⁷ However, we know little about how bilingualism affects the way foreign-origin teachers understand and teach languages.

The “conscious competence” learning model describes the psychological progress from incompetence to competence in a skill. The model implies that “conscious competence” teachers (e.g., bilingual teachers who have consciously learned German language skills) are better teachers than “unconscious competence” teachers (e.g., native teachers), because “unconscious competence” teachers can have difficulties in explaining the skill that has become largely instinctual to them (Robinson 1974). Such an “awareness” mechanism would be in line with recent evidence indicating that teachers of color are particularly well-equipped in teaching students in a culturally relevant and engaging way in the US (Egalite and Kisida 2018).

This study is the first to elicit the effect of a potential language-specific skill by testing if foreign-origin teachers who report a mother tongue other than German affect students' reading comprehension differently. In the data at hand, the main mother

¹⁷ Chin et al. (2013), for example, evaluate the effect of a bilingual education program on the achievement of limited English proficient (LEP) students and their classmates. Employing a regression-discontinuity design, they find no impact on the achievement of students for whom the program was designed (LEP students), but estimate a positive effect for their classmates.

tongues spoken by bilingual teachers are Polish (19%), Italian (17%), and English (17%) and, overall, the distribution of different mother tongues of bilingual teachers is similar for the samples of foreign-origin and native students.¹⁸ Table 7 splits the category of foreign-origin teacher into two and distinguishes between bilingual teachers, i.e., teachers who report a mother tongue other than German, and foreign-origin teachers which do not report to be bilingual. The table illustrates that the positive effect of foreign-origin teachers is driven by bilingual foreign-origin teachers. In comparison to the baseline regression in Table 6, the effect of having a bilingual teacher is larger and more significant than the effect of having a foreign-origin teacher for both native and foreign-origin students. For native students, the reading comprehension increases by 0.53, i.e., 0.43 standard deviations, when they have a bilingual teacher. The positive effect of being taught by a non-bilingual foreign-origin teacher is smaller in size and statistically insignificant for both subsamples.

The information on teachers' mother tongues further allows for the analysis of the linguistic distance between the teacher's mother tongue and German. In line with the "conscious competence" learning model, we would expect that bilingual teachers with a large linguistic distance to German have a stronger awareness of linguistic difficulties in German and thus are more successful in teaching German. Table 8 displays the effect of the linguistic distance between bilingual teachers' mother tongue and German. It illustrates that teachers with mother tongues very dissimilar to German influence students' reading comprehension more positively than teachers who have German or languages similar to German as a mother tongue. This positive effect of teachers with linguistically different mother tongues to German adds valuable insights to the literature which has identified negative effects of linguistic distance on language acquisition (Isphording and Otten 2014; Isphording 2014) and employment prospects (Wong 2023) of immigrants.

As the majority of foreign-origin teachers are second-generation immigrants, I alternatively test if the effect of bilingual teachers is caused by second-generation immigrants, who could be more likely to be bilingual. However, only 33% of bilingual teachers in the sample are second-generation immigrants, indicating that the majority of bilingual teachers are rather immigrant teachers with strong knowledge in their mother tongue who have studied German long enough to be considered bilingual. Overall, there is no effect for neither first nor second-generation immigrant teachers per se (see Table A5) and differences in bilingualism are more successful in explaining the positive effect of foreign-origin teachers' effect on their students' reading comprehension.¹⁹

A second concern is that the effect could be driven by a particularly well-equipped immigrant group, which is more likely to be bilingual. One example of such a group could be German minorities in Eastern Europe who typically learn German at home and have easier access to permanent residence in Germany through the Federal Expellees

¹⁸ Table A4 displays descriptive statistics for students with and without bilingual teachers.

¹⁹ Alternatively, I test whether it matters if bilingual teachers state that they have learned German as their first mother tongue, their second mother tongue or not as a mother tongue at all. While the overall effect is less pronounced in comparison to the effect of bilingual teachers, Table A6 indicates that foreign-origin students benefit in particular from bilingual teachers who have learned German as a second language or did not mention German as a mother tongue at all.

Table 7 Effect of bilingual teacher on reading comprehension

	(1)	(2)	(3)
Panel A: all students			
Bilingual teacher (ref.: native teacher)			
Foreign-origin teacher	0.033 (0.091)	0.136 (0.102)	0.027 (0.138)
Bilingual foreign-origin teacher	0.292*** (0.074)	0.358*** (0.103)	0.440** (0.181)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.377	0.378	0.661
Observations	7351	7351	7351
Panel B: native students			
Bilingual teacher (ref.: native teacher)			
Foreign-origin teacher	0.141 (0.167)	0.209 (0.167)	0.049 (0.249)
Bilingual foreign-origin teacher	0.365*** (0.108)	0.456*** (0.134)	0.528* (0.291)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.361	0.361	0.651
Observations	4768	4768	4768
Panel C: foreign-origin students			
Bilingual teacher (ref.: native teacher)			
Foreign-origin teacher	-0.027 (0.107)	0.052 (0.137)	0.125 (0.291)
Bilingual foreign-origin teacher	0.231** (0.115)	0.244* (0.133)	0.575*** (0.218)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.399	0.398	0.655
Observations	2583	2583	2583

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Table 8 Effect of linguistic distance between teacher's mother tongue and German on reading comprehension

	(1)	(2)	(3)
Panel A: all students			
Linguistic distance	0.003*** (0.001)	0.004*** (0.001)	0.004** (0.002)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.382	0.382	0.669
Observations	7206	7206	7206
Panel B: native students			
Linguistic distance	0.004*** (0.001)	0.004*** (0.002)	0.005 (0.003)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.365	0.366	0.654
Observations	4686	4686	4686
Panel C: foreign-origin students			
Linguistic distance	0.002 (0.001)	0.002 (0.002)	0.006** (0.002)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.406	0.405	0.672
Observations	2520	2520	2520

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Act. While I do not observe which foreign-origin teachers belong to German minorities in Eastern Europe, I can test for differential effects across language groups. In doing so, I find positive and large point estimates for all language groups (see Table A7). Accordingly, the results cannot be explained by one particularly motivated or able bilingual immigrant group.

In summary, the results in this section show that foreign-origin teachers who are bilingual are especially equipped to teach reading comprehension. They increase the

reading comprehension of both native and foreign-origin students significantly.²⁰ Furthermore, bilingual teachers with linguistically distant mother tongues to German are particularly successful in improving the reading comprehension of their students. Although the bilingual teacher effect is identified by a rather small sample of bilingual teachers, related teacher characteristics such as language family or immigrant generation do not provide better explanations for the positive foreign-origin teacher effect.

5.2.2 Alternative mechanisms

Besides language-specific skills of bilingual teachers, the positive effect of foreign-origin teachers could be explained by other mechanisms. First, I test if foreign-origin students benefit from teacher bias and role model effects in a similar way to minority students benefiting from same-race teachers. Second, I investigate if foreign-origin teachers put more effort and time into their work. Given the high requirements for immigrant teachers to practice teaching in Germany, foreign-origin teachers who end up working as teachers could be a particularly positively selected group of teachers.

Empirically, role model and teacher bias effects are difficult to disentangle. Therefore, some studies directly test for teacher bias and discrimination effects (Paredes 2014; Hinnerich et al. 2015; Gershenson et al. 2016; Alan et al. 2018; Alesina et al. 2018). Dee (2005) exploits student-specific evaluations from teachers and shows that ethnic matching between student and teacher has large effects on teachers' perception of student performance. Similarly, Gershenson et al. (2016) find that non-black teachers have significantly lower educational expectations for black students. Evidence from Germany finds teacher discrimination for essay grades for students with a Turkish-sounding first name (Sprietsma 2013) and grade penalties in primary school for second-generation immigrants (Kiss 2013). For the Netherlands, van Ewijk (2011) cannot confirm a grading bias but lower expectations and unfavorable attitudes of majority teachers towards minority students. Employing Chilean data to investigate gender matching effects on academic achievement, Paredes (2014) uniquely tests for role model and teacher bias effects in the same setting. She finds that girls benefit from having female teachers and shows that the effect is only significant for subjects with lower proportions of female teachers and for girls with less educated mothers. Accordingly, she interprets her results as a role model rather than a teacher bias effect.

Following these studies, I first test for a teacher bias effect, meaning an explicit positive behavior of teachers targeted towards matched students. I analyze the grading of foreign-origin teachers towards native and foreign-origin students. A teacher bias effect would imply a positive effect of foreign-origin teachers on the grade rewarded to students whom they demographically match with, i.e., foreign-origin students and a negative effect on students, they demographically do not match with, i.e., native students. In Germany, few centralized exams are conducted until grade 9, and the grading of students is mostly left to the discretion of the teacher. Table 9 shows the

²⁰ One further concern could be that students who are exposed to a change in bilingualism of the teacher significantly differ from those who do not. Table A8 shows that foreign-origin students are more likely to be in schools with bilingual teachers and that changes rather happen in higher grades. Apart from that the student characteristics are balanced.

Table 9 Effect of foreign-origin teacher on German grade

	(1)	(2)	(3)
Panel A: native students			
Foreign-origin teacher	-0.032 (0.076)	-0.062 (0.050)	-0.081 (0.088)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.225	0.224	0.641
Observations	5704	5704	5704
Panel B: foreign-origin students			
Foreign-origin teacher	-0.174** (0.083)	-0.122 (0.101)	-0.075 (0.129)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.174	0.176	0.630
Observations	2864	2864	2864

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

effect on the German grade rewarded by the teacher and does not reveal a teacher bias effect in the sense that foreign-origin teachers favor foreign-origin students in their grading.²¹ Overall, the results illustrate that the foreign teacher effect is not driven by an obvious teacher bias leading to a better grading of foreign-origin students by foreign-origin teachers. Instead, there is a negative but insignificant association between foreign-origin teachers and students' German grade for both foreign-origin and native students.

Second, I investigate a role model effect. While studies in a university setting interpret exposure to female faculty members or female instructors in initial courses as female role model effects (e.g., Canes and Rosen 1995; Bettinger and Long 2005), these studies cannot rule out direct teacher influence via teacher bias effects. To overcome this problem, Dee (2007) compares students' perception on the subject taught by matched and unmatched teachers to elicit the role model effect more directly. Survey questions included "Subject is not useful for my future" and "I am afraid to ask questions in subject class". Likewise, I approximate role model effects by employing survey questions which reflect the potential influence German language teachers have

²¹ I obtain similar results running regressions on a harmonized sample of students taking the reading comprehension test.

on students' subject involvement, their teacher perception and overall happiness. More specifically, I test if having a foreign-origin German teacher affects (i) the time students spend reading outside of school, (ii) students' perceptions if their German language teachers expects them to try their very best, and (iii) how satisfied students are with their situation at school. These three questions capture different dimensions in which a role model effect can operate from a subject-specific to a general way. If teachers' foreign origin can explain part of the variation in students' survey answers, this effect can be attributed to a role model effect.²²

Table 10 displays the results on a role model effect. For all three survey items, the coefficients for foreign-origin students in panel B in comparison to native students in panel A are larger but not significantly different from zero in the preferred specifications. The effect sizes are small and insignificant for foreign-origin students' reading time outside of school, while the effects seem sizable but insignificant with respect to teacher perception and school satisfaction.²³ This lack of a clear role model effect is different from earlier work from Egalite and Kisida (2018), who show that students who have the same gender or/and racial characteristics as their teacher report a more positive perception of their teacher in terms of feeling cared for and instructional characteristics regarding the student-teacher communication compared to unmatched students in the same classroom.²⁴

Instead, the results in Table 10 can partly be explained by the “imperfect” nature of the matches studied. Here, a role model effect implies that foreign-origin students can be influenced by any foreign-origin teacher equally and by a similar amount. However, the countries of origin differ widely between foreign-origin students and teachers in the sample, including combinations in which role model effects are unlikely to emerge.²⁵

An alternative approach is to allow foreign-origin interaction to operate only if a student is matched with a teacher which is a “closer match” with respect to the foreign origin. Therefore, I further employ a language match variable as the main variable of interest, which is equal to one if student and teacher report a mother tongue of the same language group. The estimates of the language match variable are insignificant for reading comprehension (see Table A9) and grading (see Table A10). For the reading comprehension estimations of foreign-origin students, the point estimate of having a student-teacher language match is smaller than the effect of having a foreign-origin teacher and the standard errors are larger.²⁶ Overall, the positive effect of foreign-origin

²² In this context, I define a role model effect as a positive attitude of the student irrespective of this attitude being caused by an underlying teacher bias effect or not.

²³ The results of Table 10 are comparable when controlling for students test scores.

²⁴ Results on other survey items such as “I am convinced that I can learn a lot through reading”, “My German teacher first tries to understand my point of view, and then tells me what he/she would do.”, “My German teacher encourages me to ask questions”, and “How satisfied are you currently and in general terms, with your life?” do also not reveal a clear role model effect in the sense that there is a positive effect on the matched and a negative effect on the unmatched students. They are available upon request.

²⁵ E.g., a student from a culturally distant country such as China would probably not identify much more with a Swiss than a German teacher.

²⁶ Using a linguistic distance measure to proxy the match with respect to the disadvantage in reading comprehension arising from the linguistic distance between student and teacher (e.g., Isphording 2014) yields in similar results (see Table A11).

Table 10 Role model effect

	Reading time			Teacher expectation			School satisfaction		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: native students									
Foreign-origin teacher	0.050 (0.073)	0.034 (0.089)	-0.025 (0.143)	0.046 (0.091)	0.027 (0.088)	0.081 (0.186)	0.498* (0.300)	0.420* (0.239)	0.373 (0.429)
Class FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Student controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Student FE	No	No	Yes	No	No	Yes	No	No	Yes
Adjusted R ²	0.113	0.111	0.447	0.072	0.070	0.174	0.089	0.092	0.343
Observations	4601	4601	4601	4682	4682	4682	4708	4708	4708
Panel B: foreign-origin students									
Foreign-origin teacher	-0.052 (0.061)	-0.076 (0.078)	0.056 (0.174)	0.072 (0.090)	0.059 (0.118)	0.285 (0.261)	0.083 (0.257)	0.393 (0.289)	0.619 (0.582)
Class FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Student controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Student FE	No	No	Yes	No	No	Yes	No	No	Yes
Adjusted R ²	0.154	0.150	0.410	0.076	0.071	0.186	0.078	0.084	0.270
Observations	2439	2439	2439	2521	2521	2521	2549	2549	2549

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

teachers can therefore not be explained by matching effects between foreign-origin teachers and students.

To test if foreign-origin teachers are in general a particularly motivated selection of teachers, I estimate whether the effect of foreign-origin teachers is equally strong on students' analytical math skills. If foreign-origin teachers put more effort into their work than their native counterparts, this should be equally true for German and math teachers. Table 11, however, reveals no effect of having a foreign-origin teacher on

Table 11 Effect of foreign-origin teacher on math test scores

	(1)	(2)	(3)
Panel A: all students			
Foreign-origin teacher	-0.040 (0.064)	-0.016 (0.064)	-0.036 (0.087)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.469	0.470	0.737
Observations	8937	8937	8937
Panel B: native students			
Foreign-origin teacher	-0.059 (0.073)	-0.072 (0.076)	-0.064 (0.085)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.439	0.440	0.725
Observations	5902	5902	5902
Panel C: foreign-origin students			
Foreign-origin teacher	0.006 (0.118)	0.034 (0.120)	-0.053 (0.220)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.501	0.503	0.742
Observations	3035	3035	3035

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

math test scores. Instead, the effect is close to zero and insignificant in all specifications.²⁷ This finding supports the interpretation that the effect of bilingual teachers is language-specific rather than driven by a particular positive selection of foreign-origin teachers in general. If the intrinsic motivation of immigrant math teachers, however, systematically differs in comparison to immigrant German teachers, the effect could still be attributed to a positive selection of immigrant German teachers.²⁸

As a second approach to measure effort, I include self-declared aspects of the teachers' career choice as additional controls into the regression. In particular, the aspect of "wanting to achieve something above average" can serve as a suitable proxy for teachers' motivation. Table 12 shows that the effect of bilingual teachers is robust to the inclusion of aspects of the career choice. Last, I proxy intrinsic motivation by controlling for variables that capture cultural orientation (Table A13).²⁹ Different motivations for becoming a teacher do not influence the students' performance significantly while teachers who believe in the relevance of multicultural ideals have a positive effect on native students' reading comprehension. The general pattern of the bilingual teacher effect remains.

As I cannot observe the actual hours worked by teachers and their time spent on instruction outside of regular class (and it is beyond the scope of this paper to discuss potential differences in unobservables between foreign-origin and native teachers), I cannot rule out that foreign-origin and native German language teachers differ in time invested into their work. Therefore, the positive effect of foreign-origin teachers should be interpreted as an "overall effect" of being taught by a foreign-origin teacher with a particular role of language in it.

6 Conclusion

This study is the first to provide evidence on a positive effect of having a bilingual teacher on students' academic achievement. Given the large migrant populations in many OECD countries and the persistent underperformance of an increasing share of foreign-origin students, the evaluation of the effect of foreign-origin teachers on the academic achievement of their foreign-origin and native students fills an important gap in the economics literature. Using data from the German National Educational Panel Study and exploiting variation in teacher assignment within student and subject, I analyze the effect of having a foreign-origin German language teacher on reading comprehension in secondary school. In doing so, I show that objectively measured

²⁷ The samples on reading comprehension and math scores do not match perfectly as the NEPS data contain more observations with information on math teacher than German teacher. More information on math teachers' characteristics are displayed in Tables A12.

²⁸ The teacher scarcity for math could lead to more immigrant math teachers being employed as "Quereinsteiger" without teacher training, for which less formal (language) qualification is required. Given that in 2010/11, only 5.9% of all teachers worked as "Quereinsteiger" (Statistisches Bundesamt 2023), this phenomenon is unlikely to affect the results of this analysis in a quantitatively meaningful way.

²⁹ As native and foreign-origin teachers differ significantly with respect to grades at the first state examination, I also test if bilingual teachers who receive better grades are driving the effect. Table A14 displays the results and hints at an effect that is rather driven by poorly performing bilingual teachers than bilingual teachers who perform particularly well.

Table 12 Effect of foreign-origin teacher on reading comprehension controlling for aspects of teacher's career choice

	(1)	(2)	(3)
Panel A: all students			
Bilingual teacher	0.263*** (0.078)	0.264** (0.119)	0.471** (0.199)
Aspects of teacher's career choice			
Enjoy teaching		-0.069 (0.059)	-0.066 (0.073)
Prestige of teachers		0.007 (0.032)	0.031 (0.039)
Enjoy subject		-0.005 (0.045)	0.081 (0.068)
Good pay		0.008 (0.032)	0.021 (0.049)
Achieving something above average		-0.024 (0.030)	-0.046 (0.038)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.378	0.378	0.665
Observations	6627	6627	6627
Panel B: native students			
Bilingual teacher	0.251** (0.098)	0.354** (0.145)	0.509** (0.258)
Aspects of teacher's career choice			
Enjoy teaching		-0.145** (0.072)	-0.113 (0.089)
Prestige of teachers		0.043 (0.040)	0.074 (0.051)
Enjoy subject		-0.001 (0.058)	0.103 (0.084)
Good pay		0.002 (0.040)	-0.012 (0.060)
Achieving something above average		-0.072* (0.037)	-0.117** (0.054)
Class FE	Yes	Yes	Yes

Table 12 continued

	(1)	(2)	(3)
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.359	0.358	0.653
Observations	4286	4286	4286
Panel C: foreign-origin students			
Bilingual teacher	0.317*** (0.122)	0.167 (0.163)	0.621* (0.323)
Aspects of teacher's career choice			
Enjoy teaching		0.080 (0.104)	0.040 (0.211)
Prestige of teachers		-0.055 (0.049)	0.006 (0.081)
Enjoy subject		-0.048 (0.077)	0.031 (0.149)
Good pay		0.049 (0.065)	0.083 (0.115)
Achieving something above average		0.047 (0.049)	0.059 (0.073)
Class FE	Yes	Yes	Yes
Student controls	Yes	Yes	Yes
Teacher controls	No	Yes	Yes
Student FE	No	No	Yes
Adjusted R ²	0.398	0.396	0.651
Observations	2341	2341	2341

Notes: Results are obtained from OLS regressions. All reported standard errors are clustered at the teacher level.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

reading test scores are positively affected by having a foreign-origin teacher. As I find no clear indication of a teacher bias or role model effect in line with studies on race and gender matching (e.g., Dee 2004; Bettinger and Long 2005; Paredes 2014), this study suggests that role model effects are less likely to emerge for “imperfect” matches, meaning matches with non-identical countries of origin of foreign-origin students and teachers.

Most notably, the study finds that bilingual foreign-origin teachers increase students' reading comprehension scores universally. Ruling out alternative explanations, I argue that bilingual teachers have language-specific skills that make them particularly well-equipped to improving the reading comprehension of both native and foreign-origin students. The study further shows that bilingual teachers with mother tongues

dissimilar to German are most successful in improving their students' reading comprehension. While promoting reading comprehension is an important objective of German language classes, I cannot test for teacher's effect on oral language skills.

The identifying variation relies on a rather small number of foreign-origin and bilingual teachers. Therefore, a word of caution on the external validity of the findings is in order here. These teachers are more likely to teach foreign-origin students and therewith not a representative sample of the German student population. Immigrant teachers in Germany are specific in the sense that the high requirements to become a civil servant teacher probably lead to a rather motivated selection of immigrant teachers with very high German language skills (C1 level in most federal states). This is similar to countries such as Canada, the United States, or Australia, where difficulties in gaining access to the required training to obtain a teacher certifications pose a major obstacle and cause high levels of under-employment among immigrant teachers (Niyubahwe et al. 2013). The foreign-origin teacher effect found in this study would probably be quite different for a randomly selected immigrant teacher for whom the high language requirements do not apply. Accordingly, external validity is limited for countries with different (immigrant) teacher training requirements.

While I cannot rule out a positive selection of immigrant German teachers due to the high language requirements, the positive effect of bilingual teachers on reading comprehension but not of foreign-origin math teachers on math test scores strongly suggests that the results cannot be solely explained by general differences in unobserved effort between native and foreign-origin teachers.

Overall, the paper suggests that policies which foster teacher mobility within the European Union are a promising political path, as long as the quality standard of the teaching requirements are met, and teachers' language skills are not being compromised. Furthermore, the paper calls for further research on bilingualism and linguistic distance as a resource in teaching. Administrative data with detailed information on teachers' origin and motivation as well as large foreign-origin teacher populations are needed to investigate in which institutional settings the positive effects of bilingual teachers can be replicated.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s00148-024-01019-6>.

Acknowledgements I am grateful to the editor, Milena Nikolova, three anonymous referees, Jan Feld, Colin Green, Carla Haelermans, Ingo Isphording, David Jaeger, and participants at the AEA Annual Meeting, the IZA Annual Migration Meeting, the IZA Summer School in Labor Economics, the International Workshop on Applied Economics of Education, the EALE, the Verein für Socialpolitik Annual Meeting as well as seminar participants at the WZB Berlin and Rutgers University for valuable comments and suggestions. All remaining errors are my own. This paper uses data from the National Educational Panel Study (Blossfeld and Roßmann 2019). The NEPS is carried out by the Leibniz Institute for Educational Trajectories (IIfBi, Germany) in cooperation with a nationwide network.

Funding Open Access funding enabled and organized by Projekt DEAL.

Data Availability The data that support the findings of this study are available from NEPS but restrictions apply to the availability of these data, which were used under license for the current study. All replication codes are available from the author upon request.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Aaronson D, Barrow L, Sander W (2007) Teachers and student achievement in the Chicago public high schools. *J Labor Econ* 25(1):95–135
- Alan S, Ertac S, Mumcu I (2018) Gender stereotypes in the classroom and effects on achievement. *Rev Econ Stat* 100(5):876–890
- Alesina A, Carlana M, La Ferrara E, Pinotti P (2018) Revealing stereotypes: evidence from immigrants in schools. *NBER Working Paper* 25333
- Algan Y, Dustmann C, Glitz A, Manning A (2010) The economic situation of first and second-generation immigrants in France, Germany and the United Kingdom. *Econ J* 120(542):F4–F30
- Alieva A, Hildebrand VA, Van Kerm P (2018) How does the achievement gap between immigrant and native-born pupils progress from primary to secondary education?. Luxembourg Institute of Socio-Economic Research (LISER) Working Paper Series 20
- Angerer S, Glätzle-Rützler D, Lergetporer P, Sutter M (2016) Cooperation and discrimination within and across language borders: evidence from children in a bilingual city. *Eur Econ Rev* 90:254–264
- Angrist JD, Krueger AB (1991) Does compulsory school attendance affect schooling and earnings? *Q J Econ* 106(4):979–1014
- Antecol H, Eren O, Ozbeklik S (2015) The effect of teacher gender on student achievement in primary school. *J Labor Econ* 33(1):63–89
- Asano A (2008) Are native and non-native English speaking tutors equally effective? *Aust Econ Rev* 41(1):56–66
- Berendes K, Weinert S, Zimmermann S, Artelt C (2013) Assessing language indicators across the lifespan within the German National Educational Panel Study (NEPS). *Journal for Educational Research Online* 5(2):15–49
- Bettinger EP, Long BT (2005) Do faculty serve as role models? The impact of instructor gender on female students. *Am Econ Rev* 2(95):152–157
- Blossfeld H-P, Roßmann H-G (eds) (2019) Education as a lifelong process: the German National Educational Panel Study (NEPS). Edition ZfE, 2nd edn. Springer VS, Wiesbaden
- Borjas GJ (2000) Ethnic enclaves and assimilation. *Swed Econ Policy Rev* 7(2):89–122
- Canes BJ, Rosen HS (1995) Following in her footsteps? Faculty gender composition and women's choices of college majors. *Ind Labor Relat Rev* 48(3):486–504
- Cappellari L, Di Paolo A (2018) Bilingual schooling and earnings: evidence from a language-in-education reform. *Econ Educ Rev* 64:90–101
- Chen JI, He T-S, Riyanto YE (2019) The effect of language on economic behavior: examining the causal link between future tense and time preference in the lab. *Eur Econ Rev* 120:103307
- Chetty R, Friedman JN, Rockoff JE (2014) Measuring the impacts of teachers II: teacher value-added and student outcomes in adulthood. *The American Economic Review*, pp. 2633–2679
- Chin A, Daysal NM, Imberman SA (2013) Impact of bilingual education programs on limited English proficient students and their peers: regression discontinuity evidence from Texas. *J Public Econ* 107:63–78
- Cho I (2012) The effect of teacher-student gender matching: evidence from OECD countries. *Econ Educ Rev* 31(3):54–67
- Clarke A, Skuterud M (2016) A comparative analysis of immigrant skills and their utilization in Australia, Canada, and the USA. *J Popul Econ* 29:849–882
- Coniglio ND, Hoxhaj R, Jayet H (2021) Immigrants' demand for informal and formal education: evidence from US time use data. *J Demogr Econ*, pp. 1–29

- Danzer AM, Feuerbaum C, Piopiunik M, Woessmann L (2022) Growing up in ethnic enclaves: language proficiency and educational attainment of immigrant children. *J Popul Econ* 35(3):1297–1344
- Dee TS (2004) Teachers, race, and student achievement in a randomized experiment. *Rev Econ Stat* 86(1):195–210
- Dee TS (2005) A teacher like me: does race, ethnicity, or gender matter? *Am Econ Rev* 2(95):158–165
- Dee TS (2007) Teachers and the gender gaps in student achievement. *J Human Res* 42(3):528–554
- Dustmann C, Fabbri F (2003) Language proficiency and labour market performance of immigrants in the UK. *Econ J* 113(489):695–717
- Dustmann C, Frattini T, Lanzara G (2012) Educational achievement of second-generation immigrants: an international comparison. *Econ Policy* 27(69):143–185
- Dustmann C, Machin S, Schönberg U (2010) Ethnicity and educational achievement in compulsory schooling. *Econ J* 120(546):F272–F297
- Dustmann C, van Soest A (2001) Language fluency and earnings: estimation with misclassified language indicators. *Rev Econ Stat* 83(4):663–674
- Egalite AJ, Kisida B (2018) The effects of teacher match on students' academic perceptions and attitudes. *Educ Eval Policy Anal* 40(1):59–81
- Egalite AJ, Kisida B, Winters MA (2015) Representation in the classroom: the effect of own-race teachers on student achievement. *Econ Educ Rev* 45:44–52
- European Commission (2016) Study on the diversity within the teaching profession with particular focus on migrant and/or minority background: final report to DG education and culture of the European Commission. Luxembourg: Publications Office of the European Union
- Fairlie RW, Hoffmann F, Oreopoulos P (2014) A community college instructor like me: race and ethnicity interactions in the classroom. *Am Econ Rev* 104(8):2567–2591
- Fertig M (2010) The societal integration of immigrants in Germany. In: Epstein GS, Gang IN (eds) *Migration and culture*. Emerald Group Publishing Limited
- Fleisher B, Hashimoto M, Weinberg BA (2002) Foreign GTAs can be effective teachers of economics. *J Econ Educ* 33(4):299–325
- Foged M, Hasager L, Peri G, Arendt JN, Bolvig I (2022) Language training and refugees' integration. *Review of Economics and Statistics*, pp. 1–41
- Geay C, McNally S, Telhaj S (2013) Non-native speakers of English in the classroom: what are the effects on pupil performance? *Econ J* 123(570):F281–F307
- Gehrer K, Zimmermann S, Artelt C, Weinert S (2012) The assessment of reading competence (including sample items for grade 5 and 9): Scientific Use File 2012, Version 1.0.0. Bamberg: University of Bamberg, National Educational Panel Study
- Gershenson S, Holt SB, Papageorge NW (2016) Who believes in me? The effect of student-teacher demographic match on teacher expectations. *Econ Educ Rev* 52:209–224
- GEW (2021) Verschenkte Chancen?! - Die Anerkennungs- und Beschäftigungspraxis von migrierten Lehrkräften in den Bundesländern. *Handout zur Pressekonferenz am 6. September 2021*
- Giannelli GC, Rapallini C (2016) Immigrant student performance in math: does it matter where you come from? *Econ Educ Rev* 52:291–304
- Griffith AL, Main JB (2021) The role of the teaching assistant: female role models in the classroom. *Econ Educ Rev* 85:102179
- Hamermesh DS, Trejo SJ (2013) How do immigrants spend their time? The process of assimilation. *J Popul Econ* 26(2):507–530
- Hayfron JE (2001) Language training, language proficiency and earnings of immigrants in Norway. *Appl Econ* 33(15):1971–1979
- Hinnerich BT, Höglin E, Johannesson M (2015) Discrimination against students with foreign backgrounds: evidence from grading in Swedish public high schools. *Educ Econ* 23(6):660–676
- Hoffmann F, Oreopoulos P (2009) A professor like me: the influence of instructor gender on college achievement. *J Human Res* 44(2):479–494
- Isphording IE (2014) Disadvantages of linguistic origin - evidence from immigrant literacy scores. *Econ Lett* 123(2):236–239
- Isphording IE, Otten S (2014) Linguistic barriers in the destination language acquisition of immigrants. *J Econ Behav Organ* 105:30–50
- Kiss D (2013) Are immigrants and girls graded worse? Results of a matching approach. *Educ Econ* 21(5):447–463

- Kliche H, Täubig V (2019) Begleitung schulischer Übergänge in Wohngruppen der Kinder- und Jugendhilfe. *Soziale Passagen* 11(1):47–63
- Lang J (2022) Employment effects of language training for unemployed immigrants. *J Popul Econ* 35(2):719–754
- Lleras-Muney A, Shertzer A (2015) Did the Americanization movement succeed? An evaluation of the effect of English-only and compulsory schooling laws on immigrants. *American Economic Journal: Economic Policy* 7(3):258–290
- Lochmann A, Rapoport H, Speciale B (2019) The effect of language training on immigrants' economic integration: empirical evidence from France. *Eur Econ Rev* 113:265–296
- Malecki A, Schneider Christoph, Vogel Silvia, Wolters M (2014) *Schulen auf einen Blick: Ausgabe 2014*. Statistisches Bundesamt, Wiesbaden
- NEPS Network (2021) National Educational Panel Study, scientific use file of starting cohort grade 5. Leibniz Institute for Educational Trajectories (LIfBi), Bamberg. <https://doi.org/10.5157/NEPS:SC3:11.0.1>
- Niyubahwe A, Mukamurera J, Jutras F (2013) Professional integration of immigrant teachers in the school system: a literature review. *McGill Journal of Education/Revue des sciences de l'éducation de McGill* 48(2):279–296
- Noreisch K (2006) School catchment area evasion: the case of Berlin. Germany. *J Educ Policy* 22(1):69–90
- OECD (2018) *The resilience of students with an immigrant background: factors that shape well-being*. OECD Publishing, Paris
- Paredes V (2014) A teacher like me or a student like me? Role model versus teacher bias effect. *Econ Educ Rev* 39:38–49
- Robinson WL (1974) Conscious competency - the mark of a competent instructor. *Personnel Journal* 53:538–539
- Ruhose J, Schwerdt G (2016) Does early educational tracking increase migrant-native achievement gaps? Differences-in-differences evidence across countries. *Econ Educ Rev* 52:134–154
- Schnepf SV (2007) Immigrants' educational disadvantage: an examination across ten countries and three surveys. *J Popul Econ* 20(3):527–545
- Seah KKC (2018) Immigrant educators and students' academic achievement. *Labour Econ* 51:152–169
- Seah KKC (2021) Do you speak my language? The effect of sharing a teacher's native language on student achievement. *Southern Economic Journal* 88(1):245–273
- Sprietsma M (2013) Discrimination in grading: experimental evidence from primary school teachers. *Empir Econ* 45(1):523–538
- Statistisches Bundesamt (2012) *Bevölkerung und Erwerbstätigkeit: Bevölkerung mit Migrationshintergrund - Ergebnisse des Mikrozensus 2012, Fachserie 1, vol. 2.2*
- Statistisches Bundesamt (2018) *Sonderauswertung. Bevölkerung und Erwerbstätigkeit: Bevölkerung mit Migrationshintergrund - Ergebnisse des Mikrozensus 2012-2016*. Wiesbaden
- Statistisches Bundesamt (2023) *Jede zwölfte Lehrkraft an allgemeinbildenden Schulen war im Schuljahr 2021/2022 Quer- oder Seiteneinsteiger/-in*. Pressemitteilung Nr. N053 vom 4. Oktober 2023
- Steinhauer HW, Zinn S (2016) NEPS technical report for weighting: weighting the sample of starting cohort 3 of the National Educational Panel Study (Wave 1 to 3). *NEPS Working Paper No. 63*
- Sutter M, Angerer S, Glätzle-Rützler D, Lergetporer P (2018) Language group differences in time preferences: evidence from primary school children in a bilingual city. *Eur Econ Rev* 106:21–34
- Urban Institute (2017). *Diversifying the classroom: examining the teacher pipeline*
- van Ewijk R (2011) Same work, lower grade? Student ethnicity and teachers' subjective assessments. *Economics of Education Review* 30(5):1045–1058
- Vargas AJ (2016) Assimilation effects beyond the labor market: time allocations of Mexican immigrants to the US. *Review of Economics of the Household* 14(3):625–668
- Wong L (2023) The effect of linguistic proximity on the labour market outcomes of the asylum population. *J Popul Econ* 36(2):609–652

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.