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The effects of classroom socioeconomic composition on student's civic knowledge in Chile

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In Chile, the influence of the socioeconomic make-up of classrooms on achievement has been extensively studied in mathematics and language, but less in currently important non-traditional subjects such as civic knowledge. This paper analyses the effects of the socioeconomic composition of classrooms on students' civic knowledge achievement in Chile, using the International Civic and Citizenship Education Study 2009 and a multilevel methodology. This research finds positive influences of higher socioeconomic intakes of 36% of one standard deviation in test scores. These results suggest that in the socioeconomically segregated Chilean education system, these effects would contribute to widening the civic knowledge attainment gap between pupils attending affluent and less affluent schools. In addition, this research finds that, on average, students with a higher individual socioeconomic status are more sensitive to these influences and that socioeconomic composition effects are more acute in the private-voucher sector than in the public sector.

Keywords: compositional effect; socioeconomic stratification; civic education; educational effectiveness; Chile

Introduction

The relationship between student achievement and the background characteristics of their classmates – the so-called compositional effect – has already been studied for more than half a century. The Coleman report (Coleman et al., 1966) is often cited as the initial milestone that has encouraged many later studies addressing this issue. Using a national sample of schools from the United States, this report stated that the achievement of pupils was strongly affected by their classmates' background education and expectations. Subsequently, many studies focusing on traditional outcomes – mathematics and language, and even science – and in different countries have analysed school and classroom socioeconomic composition effects, as the present research does in the field of civic knowledge. Among the findings from these studies, there is important variation, ranging from the absence of effects to a strong influence of socioeconomic composition (for meta-analyses, see Thrupp, Lauder, & Robinson, 2002; Van Ewijk & Slegers, 2010). However, Schwartz (2012), using a natural experiment in a county of the United States, offers probably the most compelling support in favour of these effects. The author had the rare opportunity of comparing poor children with similar characteristics that attended schools with either high or low poverty, finding greater results for the students exposed to more affluent classmates.

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In a socioeconomically segregated education system, the presence of compositional effects would imply that, in addition to individual advantages, pupils going to affluent schools would benefit more from positive influences from their classmates' backgrounds than students going to less affluent institutions. Thus, the presence of positive compositional effects could widen the gap in academic achievement between students with lower and higher individual socioeconomic status (SES). The stronger focus of the study of these effects on traditional subjects might be explained by the potential connection of these subjects with labour market outcomes. Accordingly, educational systems that cumulate strong individual SES effects with composition effects are signalled as inequalitarian by the Organisation for Economic Co-operation and Development (OECD, 2010).

The OECD (2010) also stated that the schools of the Chilean system were the most socioeconomically segregated among the countries participating in their 2009 Programme for International Student Assessment (PISA). The same report placed Chile among the countries with the highest socioeconomic stratification in education. Accordingly, several researchers have studied the influence on traditional outcomes of the socioeconomic composition and heterogeneity of the Chilean schools. The recent work of Mizala and Torche (2012) found positive effects on mathematics and language of the socioeconomic average of schools and the socioeconomic dispersion within them. In addition, these authors found stronger socioeconomic composition effects in private-voucher than in public schools. The former are allowed to charge add-on fees and, until recently, they could use selection mechanisms, and the subsidies they received were not related to their students' socioeconomic situation. Mizala and Torche pointed out these elements as potentially responsible for the stronger compositional effects in private-voucher schools.

In the segregated Chilean education system, besides these traditional outcomes, it is also interesting to study whether the socioeconomic composition and heterogeneity of classrooms also affect other subjects. In the light of recent events, citizenship education is a good candidate to be analysed. On the one hand, in line with the international trend, formal participation in politics among young people in Chile has dramatically diminished in the last decades. On the other hand, in the last years, important social movements involving thousands of students and participation in informal civil organizations have grown (International Association for the Evaluation of Educational Achievement [IEA], 2009). These apparently contradictory facts call for special attention to fostering current involvement and strengthening formal civic participation (Ministry of Education [MINEDUC], 2010).

In this regard, according to Isac, Maslowski, Creemers, and Van der Werf (2014), civic knowledge is an important asset in relation to future conventional citizenship participation. Therefore, in order to strengthen formal future participation, this subject is a meaningful element worthy of enhancement. Within this educational domain, Castillo, Miranda, Escobar, Cox, and Bascopé (2012), focusing on six Latin American countries, including Chile, studied the relationship between students' background characteristics and their civic knowledge. The authors found that individual socioeconomic variables are related with higher achievement in this subject. They further asserted that inequalities in political participation not only put at risk egalitarian participation principles but also the legitimacy of the democratic process. Therefore, if this type of knowledge is an important asset with regard to future political participation and there is evidence of individual inequalities in relation to its achievement, it is highly relevant to study whether classroom socioeconomic composition effects make an additional contribution to the stratification of civic knowledge results.

Moreover, probably the influence of peers' background characteristics is not equal for all students and contexts. In relation to this issue, at least two further specifications of

these effects are worth analysing. First, in the Chilean context of strong differences of SES, it becomes pertinent to study whether there is a difference in sensitivity to the socioeconomic composition effects between students from affluent families compared to those from families with fewer resources. Second, it is also relevant to test whether the different average socioeconomic composition effects found across sectors on traditional outcomes also apply to civic knowledge. In addition, in order to study potential implications of “mixing” policies, it is interesting to know whether more or less diverse classroom intakes achieve better in civic knowledge.

In summary, whereas the Chilean literature focusing on school/classroom socioeconomic composition effects has been mainly centred on traditional subjects, the present research will enrich this literature by studying a non-traditional outcome. Accordingly, the research questions that this paper addresses are the following:

- (1) Are there socioeconomic composition effects on students’ civic knowledge in Chile?
- (2) Are the socioeconomic composition effects stronger for students with higher or lower individual socioeconomic status?
- (3) Are the socioeconomic composition effects different across school sectors?
- (4) Does socioeconomic heterogeneity affect civic knowledge?

Theoretical background

The main focus of this paper is on studying socioeconomic classroom composition effects (classroom SES) on students’ civic knowledge achievement in Chile. In the present research, this concept is defined as the relationship between the socioeconomic make-up of a classroom and the individual achievement of a student, regardless of other personal characteristics such as individual SES. In the literature, this notion has also taken other names such as “effect of peer socioeconomic status”, “peer effect”, “peer group effect”, “contextual effect”, or “aggregated group-level effect” (Van Ewijk & Sleegers, 2010). Moreover, for a secondary purpose of this research, another important concept is the socioeconomic heterogeneity of a classroom, which is defined as the degree of socioeconomic diversity among pupils.

Before studying any classroom effects on civic knowledge, it is relevant to know whether earlier research has found any effect at all on this subject. Isac, Maslowski, and Van der Werf (2011) and Isac et al. (2014) found that schools do influence this outcome. These studies covered 28 and 31 countries respectively – including Chile – and utilised data from the IEA, that is, the same as our research. The latter paper found that 23% of the total variance in civic knowledge achievement was attributable to differences between schools. This finding means that, on average, schools are important stratification units in civic knowledge achievement in the countries included in the study. Therefore, it is interesting to study whether in Chile schools also play an important role in relation to civic knowledge and whether characteristics such as socioeconomic composition are able to explain part of that role.

The Chilean education system

The Chilean education system is characterised by a mixed supply with three sectors: public, private-voucher, and private fee-paying. The schools of the first two sectors (not the families) receive directly a flat per-student subsidy from the state, under the condition – among others – of recruiting at least 15% of socioeconomically vulnerable

students. Private-voucher schools are authorised to collect add-on fees to supplement the state vouchers (the so-called “shared financing”) and to make profits, although the amount of the subsidy is slightly reduced as fees are increased.¹ Private fee-paying schools on average charge monthly fees approximately 5 times higher than the monthly voucher per student delivered to the other types of schools (Mizala & Romaguera, 2000). Unlike in other countries, parents can choose any school among the three sectors. In 2009, the public sector had catered for 46% of the students, the private-voucher sector for 47%, and the private sector for 7% (Agencia de Calidad de la Educación, 2009).

As mentioned in the introduction of this research, the OECD (2010) concluded that the schools of the Chilean education system were the most socioeconomically segregated among the countries participating in their 2009 PISA assessment. The country ranking was based on the proportion between the socioeconomic variation among schools and the total socioeconomic variation among students (the sum of the variation among and within schools), which in the Chilean case was over 50%. A slightly higher figure was found in terms of reading achievement, which illustrates the poor academic inclusiveness of schools in the Chilean education system.

The social composition of each sector is presented in Table 1. As can be seen from this table, both public and private-voucher sectors receive ample segments of the student community. According to the research of Valenzuela, Bellei, and de los Ríos (2014), the private fee-paying schools are the most segregated ones, followed by the private-voucher schools, and finally the public ones. This finding implies that the schools in the private-voucher sector compared to the public schools are more prone to specialise in particular niches of the market and tend to be more homogeneous in their socioeconomic intakes (Mizala & Torche, 2012).

The “shared financing” allows private-voucher schools to charge different fees, which (as Mizala and Torche, 2012, argued) could potentially contribute to the stronger socioeconomic stratification of schools in this sector. Similar arguments may apply to private fee-paying schools, which are free to set high fees – while primary public schools are free. Other institutional characteristics of the private-voucher sector – also signalled by these

Table 1. Percentage of each household SES decile per education sector.

Household SES decile	Education sector		
	Public (%)	Private-voucher (%)	Private fee-paying (%)
1	14.5	5.7	0.0
2	14.7	5.4	0.0
3	13.1	7.5	0.1
4	12.8	7.9	0.2
5	11.3	9.9	0.4
6	10.9	10.5	0.5
7	8.4	13.7	0.9
8	7.0	15.1	3.9
9	5.3	15.8	13.1
10	1.9	8.5	80.8
Total	100.0	100.0	100.0

Note: Reprinted from “Bringing the Schools Back in: The Stratification of Educational Achievement in the Chilean Voucher System” by A. Mizala and F. Torche, 2012, *International Journal of Educational Development*, 32, 132–144. © [2012]. With permission from Elsevier.

authors as possible causes of its stratification – include selective admission mechanisms that this type of schools were allowed to use, and the incentives that the flat vouchers might produce. A survey made by MINEDUC showed that between a third and half of the primary private-voucher schools used selection mechanisms such as parent interviews and entry exams (Mizala & Torche, 2012). A similar picture is expected in the case of private fee-paying schools. As regards the incentives produced by the flat-rate vouchers (unrelated to SES), private-voucher schools might tend to select the most able students in order to save costs and obtain higher results. Supporting the arguments presented in this paragraph, according to Valenzuela et al. (2014), the enrolment in private fee-paying and private-voucher schools in a municipality is a strong predictor of its educational segregation (even stronger predictor than residential segregation), in part due to the elements previously described. Moreover, the effect of the enrolment in private-voucher schools with shared financing on the educational segregation of a municipality was 2.5 times the effect of the enrolment in free private-voucher schools.

As regards civic and citizenship education, these topics are not taught as a separate subject in Chile. They represent a cross-curricular objective mainly covered in the Social Science classes as well as in Language, Philosophy, and optional courses. According to the Ministry of Education of Chile (MINEDUC), the key objectives of civic education are (a) to understand the political and cultural changes of this century and the rights and duties in the society, (b) to comprehend the importance of democratic mechanisms to solve difficulties and norms regulating the societal life, and (c) to assess contemporary problems (IEA, 2009).

Socioeconomic classroom composition effects on student civic knowledge

The literature on school composition effects on traditional outcomes – mathematics and language, and even science – is extensive (for meta-analyses, see Thrupp et al., 2002; Van Ewijk & Slegers, 2010). By contrast, the studies assessing this type of influences on civic knowledge are rather scarce. Fortunately, educational effectiveness literature on the latter subject has grown in recent years. Thus, complementing findings from both literatures can be beneficial to study compositional effects on civic knowledge.

First, in relation to effectiveness research on civic education, the work of Isac et al. (2014) combined Creemers' (1994) comprehensive model of educational effectiveness and findings from citizenship research with the intention of detecting determinants of citizenship outcomes – including civic knowledge. In the model of Isac et al., the individual factors influencing citizenship outcomes are classified into sociocultural and psychological background variables and the opportunities to learn and practise citizenship outside school. The school-level determinants are divided into variables relating to school composition, context, quality, and opportunities to learn. Figure 1 shows the mentioned categories, their corresponding variables, and the findings in relation to civic knowledge of Isac et al. As a result of the authors' research, we know that theoretically all determinants in this figure can affect civic knowledge, including composition. Thus, this model offers a set of potential confounding factors and mechanisms that can help us to isolate and explain the socioeconomic composition effects in this subject.

Second, from the study of compositional effects on traditional outcomes, the literature proposes several potential mechanisms through which these influences could act (Van Ewijk & Slegers, 2010; Willms, 2006, 2010). One of the most intuitive explanations of such effects is the fact that when more able and motivated students – characteristics correlated with SES – work collectively, they may learn from each other, set higher

Figure 1. Comprehensive model of educational effectiveness to explore citizenship outcomes. Adapted from “The Contribution of Schooling to Secondary-School Students’ Citizenship Outcomes Across Countries” by M. M. Isac, R. Maslowski, B. Creemers, and G. van der Werf, 2014, *School Effectiveness and School Improvement*, 25, p. 1. Reprinted by permission of the publisher (Taylor & Francis Ltd., <http://www.tandfonline.com>).

Note: The first sign in parentheses shows Isac et al.’s (2014) theoretical expected direction of the effects and the second one their empirical findings at $p < .001$ level; ? = no expected direction; ns = not statistically significant ($p > .05$); * = statistically significant only at $p < .05$ level.

standards, and work harder. Furthermore, a student body with higher SES may also allow teaching at a faster pace, display higher average motivation and engagement, affect the discipline in a school/classroom, and encourage teachers to adapt their methods and standards according to students’ characteristics. Some potential mechanisms similar to the ones just mentioned can also be found in Figure 1 (student interactions, open climate for expressing opinions and open discussion, expected educational achievement, sense of belonging and behaviour). This makes them candidates to explain part of the

compositional effects on civic knowledge as well, together with other similar determinants from the model that have not been studied in the context of these types of effects.

In addition, as stated by Willms (2010), the average SES of a school is more than just an indicator of peer effects. It can also reflect elements such as the quality of instruction and school resources (Willms, 2010). Other factors examined in the literature that can be confounded with the average SES of a school are support from parents, teacher quality, class size, and the degree of urbanization (Mizala & Torche, 2012; Van Ewijk & Slegers, 2010; Willms, 2006). Since the objective of this research is to study the relationship between the socioeconomic composition of classrooms and civic knowledge attainment, it is important to control for factors that may interfere with this relationship. Some of the potentially confounding determinants – for traditional subjects – just listed can be found in the model presented in Figure 1 (quality, parental involvement, and urbanization). Moreover, as socioeconomic composition effects have not been deeply studied in civic knowledge, other determinants listed in Figure 1 are also worthy to take into account.

Although Isac et al. (2014) assumed that school composition could influence citizenship outcomes, they did not provide further theoretical explanations. In the results of their research – that included Chile and 30 other countries – civic knowledge was positively influenced by average classroom SES. Whereas they produced an average picture for all the countries in the sample, in the socioeconomically segregated Chilean education system, we expect to find stronger compositional effects produced by some of the potential mechanisms previously mentioned. These expectations are in line with the results of Mizala and Torche (2012) for mathematics and language in Chilean schools. Thus, in relation to our first research question, we expect that *students from classrooms with higher average SES will have higher achievement in civic knowledge, controlling for confounding individual and school/classroom variables*.

In the next subsections, the theoretical background of each of the remaining research questions is addressed separately.

Effects for students with different individual SES

Some authors have studied whether compositional effects on traditional outcomes are different for pupils with diverse individual SES. Willms (2006) called this the “triple jeopardy” in the sense that (a) students with less resources usually have lower achievement (first jeopardy); (b) going to schools with students from similar backgrounds, they suffer more from the modest SES of the peer group, compared with individuals going to more affluent schools (second jeopardy); and (c) even if they went to affluent schools, they might be less sensitive to the positive compositional effects (triple jeopardy). In general, the literature studying the latter jeopardy does not propose theoretical arguments potentially explaining this occurrence and found diverging empirical results. Zimmer and Toma (2000), focusing on maths in five Western developed countries, Vandenberghe (2002) on maths and science in 17 OECD countries, and Schneeweis and Winter-Ebmer (2007) on maths and language in Austria found greater benefit from the compositional effects for students with lower SES in all these subjects, except for mathematics in Austria, where there was no significant asymmetry of the effects (i.e., in the latter case, students with high and low SES were equally influenced by their schools’ composition). Similarly to this last result, Willms did not find a significant difference in the compositional effects using the results from the Progress in International Reading Literacy Study (PIRLS) 2001 and from OECD countries participating in PISA 2000. By contrast,

Raudenbush and Bryk (2002), focusing on mathematics in America, found stronger socioeconomic composition effects for students with higher SES.

The contradictory empirical findings cited make any predictions in the Chilean context somewhat hazardous. Thus, in relation to our second research question, no hypothesis is stated and the analysis will be exploratory.

Effects across sectors

Given the stronger socioeconomic segregation in the private-voucher sector, Mizala and Torche (2012) raised the question about the relative importance of the socioeconomic composition effects across sectors. They found that these effects were more than twice as large in the private-voucher sector compared to the public sector, and argued that this may be caused by the institutional features that govern the former type of schools. Accordingly, it is also expected that the average compositional effects on civic knowledge will be stronger in private-voucher than in public schools, and strongest in the private fee-paying. Thus, in relation to our third research question, we expect that *the socioeconomic classroom composition effects will on average be strongest in private fee-paying schools, followed by the private-voucher schools, and finally the public ones, controlling for confounding individual and school/classroom variables.*

Socioeconomic classroom heterogeneity effects

Finally, in order to study potential implications of “mixing” policies, it is relevant to know whether more or less diverse classroom intakes achieve better in civic knowledge – for a given level of socioeconomic composition. For this purpose, the variance of student SES within classrooms is added to the model of Figure 1. This variable was also included in the previous model of Isac et al. (2011) that only focused on civic knowledge – and not in other citizenship outcomes. In this regard, the authors formulated the following competing hypotheses: based on the “contact hypothesis” of Allport (1954), *more heterogeneous classrooms can be expected to give more leeway to discuss controversial issues, and may thus be more conducive to civic knowledge learning; or, on the contrary, more homogeneous settings may lead to more shared values systems, thus fostering the cognitive process.* Similarly, in relation to our fourth research question, positive or negative results are anticipated.

Data

The database used is the International Civic and Citizenship Education Study (ICCS) 2009 from the IEA. The study assessed eighth-grade pupils grade in 38 countries that were 14 years old, on average. The objective of the evaluation was to investigate how well prepared students are to assume their roles as citizens in the 21st century.

The target population of the study were all the eighth-grade students in a country. The schools were selected through a stratified random procedure, and from each school, only one classroom was randomly selected. The students had to respond to a civic knowledge test and a personal questionnaire. In addition, teachers and directors were also surveyed. The target population of the teachers were all those in charge of compulsory subjects taught in eighth grade in the selected schools. In institutions with more than 20 teachers, 15 were randomly selected. Thus, the sample in Chile was composed of 177 schools, 5,192 students, and 1,756 teachers. The Chilean mean and standard deviation of the test

were approximately 483 and 87 points, respectively, while the international mean and standard deviations were fixed at 500 and 100, respectively.

Variables

The variables from the model of educational effectiveness of Isac et al. (2014) and the determinants added to it in the current paper are described in [Appendix 1](#).

The dependent/outcome variable is student civic knowledge, which is constructed from five plausible values (Schulz, Ainley, & Fraillon, 2011). The independent variables represent students', teachers', and directors' characteristics and responses to the surveys. These predictors are divided in student- and school/classroom-level variables, based on the theoretical model presented in [Figure 1](#). The latter level includes the director's, average students', and average teachers' characteristics and responses.

The main predictor of interest is the classroom average SES, which is the operationalisation of the compositional effects and will be the variable used to address the first research question. As in the ICCS 2009 technical report (Schulz et al., 2011), this index is constructed at the individual level by performing a factor analysis of the standardised variables highest parental education, highest parental occupational status, and number of books a student declared to have at home. The only difference with the mentioned technical report is that, in the current paper, the number of books is treated in its original ordinal scale instead of using midpoints of category range as values. In this way, the reliability of the SES scale is higher.

Other important predictors are the ones used to deal with the remaining research questions. At the school/classroom level, the school sector and the heterogeneity of the classrooms are added to the model, where heterogeneity is defined as the standard deviation of the students' SES in a classroom.

At the individual level, the remaining variables used by Isac et al. (2014) are taken into account. These determinants are used to try to disentangle the compositional effects from individual characteristics that might influence civic knowledge, especially the ones that are strongly associated with average SES.

The remaining school/classroom-level variables from the model of educational effectiveness that are considered to be potential confounding factors are added as control variables. Theoretical potential "confounding factors" and "(partial) mechanisms" are presented separately at the bottom of [Appendix 2](#). According to the literature review, teachers' experience and student-teacher ratio per classroom would also be interesting to include as control variables and are available in the dataset. The former is added, but unfortunately the latter has more than 10% missing values in the sample.

[Appendix 2](#) displays the descriptive statistics of the variables mentioned.

Methods

The analysis is performed using a hierarchical linear model (HLM) with two levels. The two levels are student and school/classroom. In the latter level, schools and classrooms are merged because only one classroom per school was selected in the sample. Student and school (total) weights are applied at the corresponding levels to account for the probability of being in the sample. The HLM methodology accounts for the clustering of students within schools/classrooms and allows us to estimate school/classroom determinants of civic knowledge while controlling for student-level variables – and vice versa. All non-categorical variables are grand mean centred, the coefficients used are unstandardised

(except for SES which is a standardised index), and the estimation method utilised is restricted maximum likelihood. The basic model is expressed in the following equation:

$$CK_{ij} = \gamma_{00} + \sum \gamma_{m0} \times \text{Student}_{ij} + \sum \gamma_{0k} \times \text{School/Classroom}_j + u_{1j} \times \text{SES}_{ij} + u_{0j} + r_{ij} \quad (1)$$

CK_{ij} represents the score in Civic Knowledge of student i in classroom j , γ_{00} the grand mean of the scores when all variables are equal to zero, γ_{m0} the effect of a student variable m , Student_{ij} the value of the variable m of student i in classroom j , γ_{0k} the effect of a school or classroom variable k , $\text{School/Classroom}_j$ the value of the variable k of school/classroom j , u_{1j} the deviation of the effect of individual SES in classroom j from the average effect across classrooms, SES_{ij} the individual SES of student i in classroom j , u_{0j} the deviation of the predicted average score of classroom j , and r_{ij} the within-classroom deviation of the predicted score of student i in classroom j . Thus, Civic knowledge is considered to be affected by individual and school/classroom variables. All individual effects are assumed to be fixed among classrooms, except for individual SES. The latter is presumed to be normally distributed among the schools in order to investigate interactions with our main predictor of interest – average SES. The assumption that there is significant variance of the individual SES effects among schools is tested before proceeding to following models.

Missing values

Prior to the imputations that will be explained in this paragraph, the variable with most missing values has just 3% of them with no information. First, before applying factor analysis to construct the SES index, the cases with no information in only one of the three variables that compound this index are partially imputed using predicted values based on the other two variables, similarly as in the ICCS 2009 technical report (Schulz et al., 2011). As the amount of books at home is an ordinal variable, a multinomial logistic regression is used to predict it. Second, two schools represented by just one student are removed. Third, following the mentioned report, a partial imputation process using central tendency statistics is applied to variables with missing data (utilising sample statistics for schools/classrooms and classroom statistics for pupils), and missing indicators are computed so as to include them in the final model. A difference with the cited report is that the students' imputation procedure is performed only for pupils' variables with 10% or less missing values in the corresponding classrooms. This was done so as to obtain more accurate imputations. Finally, the remaining cases with missing values are *listwise* deleted (less than 1.3% of the original cases). After all the treatments, the analysis is performed with 175 schools and 5,118 students with complete data. The number of students per school ranges from 2 to 45 with a weighted average of 25 students and a standard deviation of 11.

Analytical steps

First, an empty model is estimated in order to assess how much variance in students' civic knowledge achievement is located at each level of the analysis. Then, a first model including classroom average SES controlling just for individual SES is specified. Before proceeding to the next steps, as the variables correlated with average SES are

strong candidates to be confounded with the socioeconomic composition effects, the bivariate correlations between average SES and the determinants of civic knowledge are calculated, and only the potential confounding factors with at least weak correlations are included in the following models. Subsequently, student-level variables are added to the model in order to control for individual determinants that affect civic knowledge attainment. Later, a similar procedure is performed with school/classroom-level variables so as to control for potential confounding factors. Finally, separate models to address each of the remaining research questions are estimated.

Results

In order to investigate how much variance of civic knowledge achievement is located at each level, an empty model with civic knowledge as dependent variable is estimated. This procedure shows that 70% of the variance is located at the student level and 30% at the school/classroom level. This rather negative feature of the Chilean system leaves ample space to explain the stratification in civic knowledge achievement through school/classroom-level variables, with socioeconomic composition effects potentially accounting for an important part of it.

Socioeconomic classroom composition effects

Our first research question examines whether there are socioeconomic composition effects on student civic knowledge. These effects were previously defined as the relationship between the socioeconomic make-up of a classroom and the individual achievement of a student, regardless of other personal characteristics such as individual SES. Thus, as a starting point, Model 1 of Table 2 includes classroom average SES controlling only for individual SES. From this representation, it can be seen that, regardless of individual SES, average SES has a strong influence on civic knowledge results. This influence is on average equivalent to around 41 points ($p < .001$) for each extra point of average SES (remember that the SES index is a standardised variable, and the standard deviation of the civic knowledge scale is around 87 points). By including only average SES, already 68% of the between-school/classroom variance is explained.² In relation to the assumption that the effects of individual SES are different among classrooms, the statistical significance ($p < .05$) of the variance term τ_{11} supports this conjecture.

As mentioned in the theoretical section, the average SES effect can reflect more than just compositional effects: It can also result from the correlation between schools' average SES and other determinants. Therefore, Appendix 3 presents the bivariate linear correlations between classroom average SES – our main predictor – and other determinants potentially affecting civic knowledge. The variables correlated with average SES are candidates to be confounded with, suppress, or mediate the socioeconomic composition effects. Accordingly, as a rule of thumb, only potential confounding factors with at least weak correlations of around $\pm .20$ (O'Rourke, Hatcher, & Stepanski, 2005) will be introduced in the following models.

In order to answer whether there are socioeconomic composition effects on civic knowledge, first it is important to isolate individual determinants that influence this outcome. In Model 2 of Table 2, by including ethnicity, expectations for further education, and parental interest in political and social issues, the observed compositional effects decrease by more than 6 points, and these determinants show a positive influence on civic knowledge. This is concordant with the high correlation between these variables and

Table 2. Multilevel analysis to explain variation in civic knowledge by socioeconomic compositional effects.

Parameter	Model 1 Controlling only for SES	Model 2 Individual factors	Model 3 Confounding factors	Model 4 Suppressor factors
Fixed effects				
Intercept	490.73*** (2.49)	487.92 *** (2.36)	491.91 *** (3.25)	490.29 *** (4.61)
Level 1 (student-specific)				
SES	13.58 *** (1.84)	9.49 *** (1.80)	9.52 *** (1.81)	9.56 *** (1.81)
Ethnicity (European = 1)		30.98 *** (4.19)	30.65 *** (4.18)	30.32 *** (4.18)
Expectations for further educ.		19.10 *** (1.23)	19.08 *** (1.23)	19.15 *** (1.23)
Parental interest in pol. & soc.		1.89 (1.47)	1.93 (1.47)	1.94 (1.47)
Level 2 (school/classroom)				
Average SES	41.13 *** (3.57)	34.76 *** (3.39)	31.52 *** (3.46)	41.39 *** (5.20)
Social tensions in the community			-0.61 ** (0.22)	-0.46 * (0.22)
Integrated into all subjects (Yes = 1)			-9.37 * (4.26)	-8.47 * (4.06)
PR (Private fee-paying school = 1)				-0.26 (11.42)
PV (Private-voucher school = 1)				3.49 (5.62)
Urbanicity				-3.38 (2.10)
Teachers' experience				1.63 *** (0.50)
Opportunities to participate in social activities in the community				0.96* (0.42)
Random parameters				
Level 2				
Intercept/Intercept (τ_{00})	658.73*** (95.32)	566.03 *** (83.13)	516.16 *** (78.00)	438.13*** (70.51)
SES/SES (τ_{11})	19.14 * (28.45)	15.76 * (26.46)	13.81 * (25.14)	10.87 * (24.09)
SES/Intercept (τ_{01})	-80.43 (43.28)	-64.31 (38.11)	-53.46 (36.48)	-37.19 (32.37)
Level 1				
Intercept/Intercept (σ^2)	5037.38 *** (127.23)	4738.73 *** (117.99)	4737.00 *** (120.05)	4734.51 *** (119.27)
Explained variance				
Level 2	68%	73%	75%	79%
Level 1	2%	7%	7%	8%

Notes: Standard errors are in parenthesis. The software HLM 7 displays neither deviance statistics when using plausible values as dependent variables nor test of significance for the last two random parameters. The latter were calculated as suggested in Snijders and Bosker (2012, p. 101).

* $p < .05$. ** $p < .01$. *** $p < .001$.

average SES and the expectations about the effects of these determinants on civic knowledge (see [Figure 1](#)).

Once we have isolated individual determinants, it is necessary to explore school/classroom factors that may make part of the compositional effects spurious. To make this section more informative, the following models address separately the determinants that, after being included, decrease or increase the observed average compositional effect. First, in Model 3, it can be noticed that after accounting for social tension in the communities and whether citizenship education is integrated into all subjects, these variables have negative effects on civic knowledge, and the influence of average SES decreases by more than 3 points. This is congruent with the negative correlation between these two variables and average SES and the expected effect of social tension, while the effect of integration of citizenship education in (all) other subjects is unexpected (in a separate analysis, it was noticed that the contribution of the latter variable to the observed reduction is around half as large as the effect of social tension). As these two variables are out of the reach of the compositional effects, it is important to control for them. Otherwise, for instance, the lower compositional effects in some of the less affluent schools could be confounded with the negative influence on civic knowledge of tension in the communities.

Model 4 introduces variables that also modify the compositional effects – but in the opposite direction – by around 10 points. These variables are private school status, urbanicity, teachers' experience, and student opportunities to participate in social activities in the communities. The influences of these determinants on civic knowledge are as expected. Most of the increase in the observed compositional effects was due to the variable urbanicity (more than double than the rest of the variables together), followed by opportunities to participate in social activities in the communities, and finally teachers' experience, while private school status had almost no effect. These results imply that as, in general, smaller cities have less affluent schools and this type of schools tend to offer more opportunities to participate in the communities and to have more experienced teachers, many of the students in these institutions seem to benefit from these factors in their civic knowledge achievement.

At this stage, the compositional effects have been isolated from individual, confounding, and suppressor factors. In order to check whether these effects present increasing or decreasing returns, the shape of their curve is analysed by introducing the squared average SES. As this occurred to be not statistically significant, this result is not displayed.

Thus, in relation to our first research question, from Model 4 it can be concluded that, as expected, there are compositional effects in civic knowledge in Chile. For each extra point in average classroom SES, a student would increase on average his/her score in civic knowledge in around 41 points ($p < .001$), net of school/classroom and student determinants that also affect civic knowledge. This is equivalent to 36% of a standard deviation utilising standardised coefficients. In addition, in a separate analysis, the variance inflation factor (VIF) was calculated using a simple second-level regression where none of the school/classroom level determinants happened to have a high VIF.

Lastly, in relation to potential (partial) mechanism, in [Appendix 3](#) it can be seen that average expected further education, open climate for expressing opinions and open discussion, and teacher–student interaction are correlated with average SES, especially expectations. These correlations and the fact that the aforementioned variables theoretically might be (partially) due to the students' SES make them candidates to mediate the compositional effects. However, this issue will not be studied because these variables can also be influenced by school policies and leadership, a fact that makes it difficult to

disentangle which part could be due to average SES and which due to policies and leadership, especially for the last two variables.

Effects for students with different SES

Table 3 presents the results of models addressing separately each of the remaining research questions. Equation (1) showed the general formula used to address all research questions. In relation to the second question, whether students with lower or higher individual SES are more sensitive to compositional effects, the last term of Equation (2) displays the particular interaction added to Model 4 that helps us to deal with this issue.

$$CK_{ij} = \text{parameters and error terms of Model 4} + \text{Average SES}_j \times \text{SES}_{ij} \quad (2)$$

Accordingly, Model 5 of Table 3 shows that the effect of average SES is stronger for students with higher individual SES. The composition effect for a student with average individual SES (as it is standardised, this is equal to 0) is on average around 40 points ($p < .001$), plus approximately 6 points ($p < .001$) for each extra point of individual SES, net of individual and school/classroom determinants.

Figure 2 illustrates this result by showing the conditional relationship between classroom average SES and civic knowledge for students in the 25th and 75th percentiles of the individual SES distribution (keeping at the mean the rest of the variables). The figure shows that the relationship between average SES and achievement is steeper for students with higher SES.

Effects across school sectors

Regarding our third research question relating to differences in the compositional effects across sectors, Equation (3) displays the interactions added to Model 4 to address this issue.

$$CK_{ij} = \text{parameters and error terms of Model 4} + \text{Average SES}_j \times PR_j \\ + \text{Average SES}_j \times PV_j \quad (3)$$

PR_j and PV_j are dummy variables that are equal to one for private fee-paying and private-voucher schools respectively (i.e., public schools are the reference category). Model 6, as expected, shows that the effects are stronger in the private fee-paying schools, followed by the private-voucher schools, and finally the public ones. On average, students from private fee-paying schools are subject to compositional effects of around 65 points, as opposed to 49 points in private-voucher schools and 26 points in public schools ($p < .001$) (51, 42, and 22% of a standard deviation, respectively). However, the difference in compositional effects between the public (reference category) and private fee-paying schools is not statistically significant, probably due to the smaller share in the sample of the latter schools, compared to the other types of institutions.

Socioeconomic heterogeneity effects

Our fourth and final research question is whether, for a given level of average SES, classroom socioeconomic diversity has an effect on civic knowledge. To address this

Table 3. Multilevel analysis for students with different individual SES, across schools sectors and to study heterogeneity effects.

Parameter	Model 5 Effects for different ind. SES	Model 6 Effects across sectors	Model 7 Heterogeneity effects
Fixed effects			
Intercept	487.62*** (4.60)	493.20*** (8.36)	491.82*** (4.74)
Level 1 (student-specific)			
SES	11.01*** (1.88)	9.58*** (1.79)	9.61*** (1.81)
Ethnicity (European = 1)	29.40*** (4.21)	30.15*** (4.18)	30.38*** (4.20)
Expectations for further educ.	19.31*** (1.22)	19.22*** (1.22)	19.17*** (1.22)
Parental interest in pol. & soc.	1.77 (1.46)	1.88 (1.47)	1.91 (1.47)
Level 2 (school/classroom)			
Average SES	40.34*** (5.29)	25.72*** (7.72)	42.02*** (5.24)
PR (Private fee-paying school = 1)	-9.33 (11.73)	-29.89 (42.15)	-5.98 (12.26)
PV (Private-voucher school = 1)	3.51 (5.57)	7.31 (5.62)	1.67 (5.78)
Social tensions in the community	-0.48* (0.21)	-0.56** (0.21)	-0.49* (0.21)
Integrated into all subjects (Yes = 1)	-8.45* (4.03)	-7.75 (4.01)	-8.23* (4.05)
Urbanicity	-2.57 (2.08)	-1.89 (2.10)	-3.70 (2.09)
Teachers' experience	0.89* (0.41)	0.76 (0.42)	0.84* (0.42)
Opportunities to participate in social activities in the community	1.55** (0.50)	1.53** (0.50)	1.57** (0.50)
Average SES * SES	6.32*** (1.92)		
PR * Average SES		39.44 (29.58)	
PV * Average SES		22.88** (8.47)	
SES standard deviation			-27.27 (18.31)
Random parameters			
Level 2			
Intercept/Intercept (τ_{00})	428.83*** (70.43)	418.73*** (68.64)	436.08*** (70.25)
SES/SES (τ_{11})	11.07 (24.09)	8.22* (23.95)	11.52* (23.91)
SES/Intercept (τ_{01})	-33.88 (31.23)	-33.79 (32.05)	-36.66 (31.88)
Level 1			
Intercept/Intercept (σ^2)	4725.43*** (119.59)	4732.89*** (119.97)	4732.07*** (119.02)
Explained Variance			
Level 2	80%	81%	79%
Level 1	8%	8%	8%

Notes: Standard errors are in parenthesis.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 2. Conditional relationship between classroom average SES and individual civic knowledge for students in the 25th and 75th percentiles of the individual SES distribution.

question, Model 7 includes at school/classroom level the socioeconomic heterogeneity of classrooms. More heterogeneous classrooms seem to be negatively associated with civic knowledge attainment in Chile, although this relationship is not statistically significant (in a separate analysis, the interaction between heterogeneity and average SES was neither found to be statistically significant).

In relation to the missing indicators of the variables included in the models, they are neither included nor displayed because none of them appeared to be statistically significant.

Conclusion

The international and Chilean literature on socioeconomic composition effects mainly focuses on traditional outcomes – maths, language, and science. Recent studies in Chile have found positive influences of the schools' socioeconomic intakes on academic achievement. Accordingly, the current paper also found results supporting these effects on civic knowledge.

As regards the stratification of achievement among schools, our findings are in line with those from research focusing on traditional outcomes. Nonetheless, the stratification seems to be less severe in civic knowledge. For instance, OECD (2010) reported that, in Chile, around 55% of the variance in reading achievement was located between schools, whereas the corresponding share for civic knowledge is 30%.

We also find positive effects of individual SES on civic knowledge attainment. Thus, in addition to these individual influences, the presence of socioeconomic composition effects tends to widen the gap in achievement between students with low and high SES. As students from less affluent families tend to go to schools with lower average SES, they miss the positive influence that pupils from wealthier families are prone to gain when they go to more affluent schools.

As mentioned in the introduction of this paper, OECD (2010) placed the Chilean schools as the most socioeconomically segregated in PISA 2009. Thus, the large differences in the intakes of these schools presented a good opportunity to study the consequences of this socioeconomic stratification on civic knowledge. Moreover, although Chile presented the most segregated schools in socioeconomic terms, in the same report,

one can find other countries with important levels of the same type of segregation and some with even stronger reading achievement segregation. In many cases, the latter is also strongly driven by differences in schools' SES. Therefore, if similar situations were present in these countries in relation to civic knowledge, the Chilean experience can be valuable by warning about the potential consequences of socioeconomic segregation on civic knowledge attainment.

Other results obtained were that, on average, Chilean students with lower socioeconomic backgrounds seem to be less sensitive to the compositional effects on civic knowledge attainment, and the relationship between composition and achievement appears to be stronger in private-voucher schools than public ones.

Lastly, we also detected school/classroom determinants that changed the size of the observed socioeconomic composition effects. The results suggest that social tensions in local communities are associated both with less affluent schools and lower civic knowledge achievement. Therefore, after accounting for them, the observed compositional effects decreased. Furthermore, in general, smaller cities have less affluent schools, and this type of schools tend to offer more opportunities to participate in the communities and to have more experienced teachers. These factors were found to increase civic knowledge attainment. Accordingly, and contrary to the case of social tension, after including these determinants in the analysis, the observed compositional effects increased.

Policy implications

A common discussion in the literature is whether mixing students with different socioeconomic backgrounds across schools would have positive or negative consequences on academic achievement. The present research can contribute to this debate from the civic knowledge perspective. As Vandenberghe (2002) stated, desegregation would be a better option than segregation for improving average achievement when three conditions are met. First, the positive effect of increasing the average SES of a school by bringing a student with high SES should overcompensate for the negative effect of the symmetric decreasing of average SES in another school. This condition can be assessed by analysing the shape of the curve of compositional effects. As neither decreasing nor increasing returns were found, negative and positive consequences of mixing students should cancel out. The second condition stated by Vandenberghe is that more disadvantaged students are more sensitive to the compositional effects, the opposite of what was found in the present research. This means that if pupils were mixed across schools, the individual gains from composition effects for students with low SES would be smaller than the losses of pupils with high SES. Finally, for any given level of average SES, more heterogeneity should be beneficial, whereas in this paper heterogeneity did not have a statistically significant effect. Thus, only when the maximisation of average results is considered and all other determinants are kept constant, according to our findings, desegregation would have some negative consequences. Nonetheless, this finding should be weighted against equity considerations and other social consequences of segregated systems.

In terms of school sectors, Mizala and Torche (2012) found that the composition effects on traditional outcomes were around half as large in public schools as in private-voucher ones, which is equivalent to the findings of the present research (in private fee-paying institutions, the effects were even stronger, though not statistically significant, possibly due to their small number in the sample). As these authors mentioned, recent changes in the private-voucher sector might reduce its internal segregation. In 2008, a law established a mean-tested subsidy and forbade elementary private-voucher schools to

apply recruiting procedures such as parental interviews and entry exams. This may reduce the possibility as well as the incentive to select students on the basis of their socioeconomic characteristics, which in turn may temper the relationship between school composition and civic knowledge achievement in private-voucher schools.

Lastly, the results of the present investigation are relevant for ongoing policy developments in relation to citizenship education in the Chilean schools. A methodology is currently being developed to rank schools according to their performance, so as to identify the ones that need the most support (Agencia de Calidad de la Educación, 2014). The indicator is mainly based on the results of a national standardised test measuring outcomes for traditional subjects (this will represent two thirds of the scores). A third part of the scores will be given to *other indicators of quality of education*, of which citizenship participation and education will represent at least 10%. In order to take into account the differences among education opportunities and contexts, the total individual scores will be adjusted for individual and contextual variables. Among the variables that could be used to adjust the scores, we point out the importance of the socioeconomic composition of schools, which in the current research has proven to significantly affect civic knowledge scores, as it was previously found for more traditional subjects.

Limitations of this study

There are two main limitations in the present research: It disregards potential self-selection bias into schools and sectors, and the dataset does not include any variable to account for previous achievement. We cannot exclude that some omitted variables simultaneously affect the chances of choosing a school or a sector and civic knowledge. In this event, the estimates of the effects of average SES and school sector may be biased. As Mizala and Torche (2012) found for traditional outcomes, it is possible that these non-observable variables (e.g., ability, parents' ambition, etc.) bias upwards the coefficient of the private-voucher sector for civic knowledge as well. The same argument would apply to the private fee-paying sector and average SES.

Another consequence of ignoring previous academic achievement relates to the results of the compositional effects for students with different individual SES. In the absence of an ability measure, the contribution of individual SES to the interaction with average SES likely includes its own effect and the confounded influence of ability (i.e., it is not possible to separate the effects of individual SES from ability). In Flanders, Opdenakker and Van Damme (2001) tried to disentangle the interactions of these two variables with academic composition effects. The authors found that high-ability students were more sensitive to average academic achievement, and, in addition, at equal levels of ability, students from families with low SES were more susceptible to these compositional effects. Thus, if similar effects would apply in Chile for socioeconomic composition influences, the interactions between these effects and individual SES and ability would go in the opposite direction.

Avenues to further research

First, including variables to account for prior achievement and to reduce the mentioned bias would increase the accuracy of the estimated socioeconomic composition effects. In relation to the latter issue, for instance, McEwan (2001) tackled the selection bias into sectors by using a two-step Heckman (1979) correction utilising as instrumental variable the share of each sector in the municipalities where a student lives.

Second, it is possible that the socioeconomic composition of schools/classrooms not only has a direct effect on civic knowledge achievement but also an indirect one. Therefore, an interesting further development would be to study potential influences of the schools' composition on the effects of different organisational variables and/or processes of the institutions. For instance, previous research (see Dumay & Dupriez, 2007, 2008; Opdenakker & Van Damme, 2001) has focused on the interactions between composition and some of the determinants included in the educational effectiveness model used in the current paper, such as opportunities to learn, learning environment, teacher participation in school governance, and student behaviour.

Third, in the present paper on socioeconomic composition effects, an educational effectiveness model was used to study civic knowledge. This model proved to be useful in the present research and could be fully tested so as to determine which factors are important for civic knowledge attainment in Chile. Results from such a study could be highly beneficial for educators and policymakers working in this field. Finally, an even more ambitious research project would be to empirically analyse the relationship between civic knowledge and long-term citizenship outcomes.

Notes

1. Secondary public schools can also charge fees to the parents; nevertheless, according to information from 2002, very few did so, and the amounts were very low. In the same year, among the private-voucher schools, about 20% were free and 70% operated as for profit. Subsidies were not reduced up to US\$9 of add-on fees, a 10% reduction was applied between US\$9 and US\$17, 25% between US\$17 and US\$68, and the subsidy was fully removed thereafter (Mizala & Torche, 2012).
2. The approximation of this and later similar percentages were calculated as suggested in Hox (2010, p. 77). Thus, the percentages are estimated comparing the empty model and models without the random slope.

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Appendix 1. Description of variables

Variable NAME	Description	Reliability	Type
Outcome			
Civic knowledge	80-item test covering: civic society, systems, principles, participation, and identities (3/4 involved reasoning)	$\alpha = 0.83$	Continuous Scale
Student level			
Age	Age		Continuous
Expectations for further education	Self-report based on the International Standard Classification of Education (ISCED) (0 = not complete Level 2, 1 = Level 2, 2 = Level 3, 3 = Level 4 or 5B, 4 = Level 5A or 6)		
Exposure to political & social issues information	Isac et al. (2014) built this variable based on 3 items on a 4-point scale asking about how often students used TV, newspaper, and internet with these purposes. As the reliability of this scale was very low in Chile and the 3 items were not highly correlated, they are used individually here.		
Gender (Female = 1)	Gender		Dichotomous
Ethnicity (European = 1)	It replaces immigration status because there are few immigrants in Chile, and ethnicity is an approximation. The categories Chilean, Chilean natives, and others were collapsed together because the difference of their effects is not statistically significant		
SES	Factor analysis of the standardised variables highest_parental_education, highest_parental_occupational_status and amount_of_books	$\alpha = 0.694$	Continuous Index
Parental interest in political & social issues	Maximum parental interest on a 4-point scale		
Interest in political & social issues	Based on 5 items asking about these issues at a local, country, and international level	$\alpha = 0.84$	Continuous Scale (IRT-WLE scores ^a)
Citizenship self-efficacy	Based on 7 items asking about how well students would discuss, lead, follow, and communicate political & social issues	$\alpha = 0.83$	
Discussion of political & social issues outside school	Based on 4 items asking about discussing these issues with parents and friends	$\alpha = 0.66$	
Civic participation in wider the community	Based on 7 items asking about the involvement in political & social issues	$\alpha = 0.71$	

(continued)

Appendix 1. (Continued)

Variable NAME	Description	Reliability	Type
School/Classroom level			
Average SES	Average students' SES in a classroom		Continuous
Average expected further education	Average students' expected further education in a classroom		
SES standard deviation	Standard deviation of students' SES in a classroom		
Urbanicity	Director's statement about school location on a 5-point scale (1 = less than 3,000 people; 2 = 3,000–15,000; 3 = 15,000–100,000; 4 = 100,000–1,000,000; 5 = over 1,000,000)		
Teachers' experience	Average teacher's statement about how many years they have been teaching during their careers		Dichotomous
Private school status	Dummy variables indicating whether schools are public, private-voucher, or private fee-paying		
Having a coordinator of citizenship education (YES = 1)	Director's statements		
Having it as a separate subject (YES = 1)			
Taught by teachers related to human and soc. sciences (YES = 1)			
Integrated into all subjects (YES = 1)			
Social tension in the community	Based on 12 items asking the directors the extent of common social problems as source of tension in the schools' surroundings	$\alpha = 0.87$	Continuous Scale (IRT-WLE scores ^a)
Student behaviour at school	Based on 4 items asking the directors about students' behaviour	$\alpha = 0.84$	
Teachers' participation in school governance	Based on 7 items asking the directors about teachers' involvement in the administration and improvement of schools	$\alpha = 0.91$	
School's relationship with parents	Based on 5 items asking the directors about parents' involvement in school life	$\alpha = 0.74$	
Teachers' sense of belonging to school	Based on 4 items asking the directors about this issue	$\alpha = 0.86$	
Students' sense of belonging to school	Based on 4 items asking the directors about this issue	$\alpha = 0.87$	

(continued)

Appendix 1. (Continued)

Variable NAME	Description	Reliability	Type
Teacher–student interaction	Average students’ perceptions (based on 5 items asking them about the quality of these interactions)	$\alpha = 0.81$	Continuous Scale (Average ^b IRT-WLE scores ^a)
Student–student interaction	Average teachers’ perceptions (based on 4 items asking them about the quality of students’ interactions)	$\alpha = 0.66$	
Open climate for expressing opinions & open discussion	Average students’ perceptions (based on 6 items asking them about teachers’ encouragement and classmates’ participation)	$\alpha = 0.77$	
Opportunities to participate in social activities in the community	Average teachers’ perceptions (based on 7 items asking them whether students have participated in this type of activities carried out by the schools)	$\alpha = 0.59$	
Opportunities for students to practice democracy at school	Average students’ participation (based on 6 items asking them whether they have participated in democratic or cultural [music or theatre] activities)	$\alpha = 0.65$	

Notes: A detailed explanation of the construction of the variables can be found in the ICCS 2009 user guide for the international database (Brese, Jung, Mirazchiyski, Schulz, & Zuehlke, 2011a, 2011b). The reliabilities of the individual variables of pupils and principals are taken from the ICCS 2009 technical report (Schulz et al., 2011), except for individual SES, which is based on the factor analysis performed in the current research (with Kaiser-Meyer-Olkin [KMO] index = 0.62 and minimum factor of 0.66). ^aAll item response theory-weighted likelihood estimates (IRT-WLE) scores have an international mean of 50 and a standard deviation of 10 for equally weighted countries. ^bThe reliability of the aggregated students and teachers’ responses used as group constructs is calculated utilising the methodology described in Lüdtke, Robitzsch, Trautwein, and Kunter (2009). When calculating these reliabilities, the average group size of the respective variable and the final student, teacher, and schools weights are used (on average, there are around 8 teachers per classroom with a standard deviation of 3.5 and ranging from 2 to 19).

Appendix 2. Descriptive statistics of the sample

Variable NAME	Mean	SD	Min.	Max.
Outcome variable				
Civic knowledge				
PV1	495.03	88.31	211.94	790.27
PV2	495.34	88.78	210.89	810.25
PV3	494.53	88.87	215.10	818.66
PV4	494.89	88.46	189.86	761.88
PV5	495.71	88.72	198.27	782.91
Student Characteristics				
Variable of interest				
SES	0.18	1.03	-2.76	2.88
Other individual variables affecting civic knowledge				
Age	14.18	0.60	12.00	17.75
Gender (Female = 1)	0.52	N/A	0.00	1.00
Ethnicity (European = 1)	0.10			
Expectations for further education	3.35	0.87	0.00	4.00
Interest in political & social issues	51.02	9.70	26.58	73.81
Citizenship self-efficacy	51.45	10.36	15.53	79.88
Parental interest in political & social issues	1.76	0.81	0.00	3.00
Exposure to pol. & soc. issues info (TV)	3.31	1.01	1.00	4.00
Exposure to pol. & soc. issues info (newspaper)	2.09	1.06	1.00	4.00
Exposure to pol. & soc. issues info (internet)	1.66	0.92	1.00	4.00
Discussion of political & social issues outside school	49.53	9.90	32.62	82.96
Civic participation in the wider community	50.74	9.57	38.68	86.34
<i>N</i> = 5118				
School/Classroom Characteristics				
Variables of interest				
Average SES	0.13	0.82	-1.66	1.98
SES standard deviation	0.70	0.12	0.40	1.03
PR (Private fee-paying school = 1)	0.16	N/A	0.00	1.00
PV (Private-voucher school = 1)	0.37			
Potential confounding factors				
Urbanicity	3.43	1.35	1.00	5.00
Social tension in the community	54.92	10.51	22.56	77.18
Teachers' participation in school governance	46.44	11.34	15.84	72.84
School's relationship with parents	54.12	9.49	25.06	80.53
Teachers' sense of belonging to school	49.97	10.55	12.90	59.06
Having a coordinator of citizenship educ (Yes = 1)	0.53	N/A	0.00	1.00
Having it as a separate subject (Yes = 1)	0.13			
Taught by teachers related to human and social sciences (Yes = 1)	0.94			
Integrated into all subjects (Yes = 1)	0.49			
Opportunities to participate in social activities in the community	45.06	4.11	33.58	59.47
Opportunities for students to practice democracy at school	52.11	3.12	44.57	70.21
Teachers' experience	17.24	5.62	5.92	29.20
Potential (partial) mechanisms				
Average expected further education	3.33	0.37	2.22	4.00
Student behaviour at school	48.33	12.28	11.93	64.40
Students' sense of belonging to school	53.64	9.24	22.57	63.81
Teacher-student interaction	51.27	4.47	33.13	69.62
Student-student interaction	50.10	5.56	29.27	63.46
Open climate for expressing opinions and open discussion	52.17	4.07	38.22	65.96
<i>N</i> = 175				

Note: N/A = not applicable. Cases are not weighted.

Appendix 3. Bivariate correlations between average SES and determinants of civic knowledge

Level	Variables	Average SES
Student	Age	-.10***
	Gender (Female = 1)	.03*
	Ethnicity (European = 1)	.25***
	Expectations for further education	.31***
	Interest in political & social issues	-.01
	Citizenship self-efficacy	.01
	Parental interest in political & social issues	.18***
	Exposure to pol. & soc. issues info (TV)	.07***
	Exposure to pol. & soc. issues info (newspaper)	.10***
	Exposure to pol. & soc. issues info (internet)	.10***
	Discussion of political & social issues outside school	.11***
	Civic participation in the wider community	-.10***
<i>N</i> = 5118		
School/Classroom	Potential confounding factors	
	Private school status	.72***
	Urbanicity	.66***
	Social tension in the community	-.18*
	Teachers' participation in school governance	-.13
	School's relationship with parents	-.04
	Teachers' sense of belonging to school	-.06
	Having a coordinator of citizenship education	.03
	Having it as a separate subject	.08
	Taught by teachers related to human and social sciences	.12
	Integrated into all subjects	-.21***
	Opportunities to participate in social activities in the community	-.42***
	Opportunities for students to practice democracy at school	-.01
	Teachers' experience	-.38***
	Potential (partial) mechanisms	
	Average expected further education	.72***
	Student behaviour at school	.13***
	Students' sense of belonging to school	.16*
	Teacher–student interaction	-.23***
	Student–student interaction	.05
	Open climate for expressing opinions and open discussion	.30***
<i>N</i> = 175		

Note: Pearson correlations, except for private school status, which is treated as a categorical variable here; therefore, this correlation is calculated using eta.

* $p < .05$. ** $p < .01$. *** $p < .001$.