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Classroom Climate and Political Learning: Findings from a Swedish Panel Study and Comparative Data

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Numerous studies have shown that an open classroom climate for discussion increases students' civic knowledge. However, most previous studies draw on cross-sectional data and have not been able to show that the effect is causal. This article presents results from a Swedish panel survey following students during the first year in the gymnasium (upper secondary level). Using this study, we are better equipped to evaluate the link between an open classroom climate and political knowledge. Results suggest that the effect is causal. A 10% increase in open classroom climate is associated with about 5 percentage points higher knowledge. The beneficial effect of an open classroom climate is an important insight that should be seriously considered not only by researchers but also by educational policy makers, school managements, and teachers.

KEY WORDS: political knowledge, open classroom climate, political science education.

The Problem

Which teaching practices are most effective to increase students' civic and political knowledge? Numerous studies have shown that an open classroom climate, that is a learning environment that is focused on open discussion about political and social issues, is positively correlated with civic knowledge (e.g., Andersson, 2012; Campbell, 2006, 2007, 2008; Hess & Posselt, 2002; Hooghe & Dassonneville, 2011, Torney-Purta, 2001–2002, 2002a, 2002b; Torney, Oppenheim, & Farnen, 1975).[1] These studies suggest that active engagement in political discussions in the classroom increase knowledge more than traditional teaching styles.

However, most previous knowledge builds upon one-shot cross-sectional data that cannot account for self-selection effects. Although the evidence from cross-sectional studies is substantial, there is a lingering possibility that students who already have high political knowledge are more likely to create a good open classroom climate for discussion and that the relationship is thus not as strong as previous research suggest.

This article presents results from a Swedish panel survey that follows students during the first year in the gymnasium (which most Swedish students attend at age 16 to 19 and which offers both theoretical and vocational tracks). Using this survey, we can better evaluate whether there is a causal

[1] However, a recent study by Niemi, Neundorf, and Smets (Forthcoming) shows that classroom climate is not the most important school variable affecting political engagement and political participation. Instead, they point at the importance of the amount of formal civic education and the inclusion of group projects.

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link between an open classroom climate and civic knowledge. Results lend support to the conclusion that the effect is causal. A 10% increase in open classroom climate is associated with about 5 percentage points higher political knowledge.

Previous research has also shown that an open classroom climate can be especially effective for students with a low level of stimulating political discussions in the home environment. For that reason, the interaction between home environment and an open classroom climate is tested. However, no significant interaction effect is found; an open classroom climate seems to be as beneficial across students from different home environments.

While it is well documented that an open classroom climate is positively correlated with civic knowledge, it is less clear whether it has the same kind of effect on other forms of knowledge as well. This study includes a battery of items on factual political knowledge and finds a significant effect of an open classroom climate on this form of knowledge as well.

As a robustness check, the results are compared with equivalent analyses drawing on the comparative cross-sectional study CivEd (Civic Education Study) from 1999. Results from CivEd show a substantially similar effect of an open classroom climate on civic knowledge, both in Sweden as well as in most of the 28 countries under study.

This article brings three contributions to the debate. First, it confirms the effect of an open classroom climate on civic knowledge when applying a panel study design, which is a better research approach than those existing in prior research. Hence, it confirms this finding from previous studies with a far superior research design. Second, it shows that an open classroom climate does not only positively affect civic knowledge but also factual political knowledge. Consequently, this study does not only replicate previous studies but also offers new insights. Third, it shows that an open classroom climate has positive effects not only on students from disadvantaged home environments but for all students.

Theory and Previous Research

Studies of how school-related factors affect civic and political knowledge have consistently found that one specific factor stands out as especially important: an open classroom climate for discussion. In classic works such as Almond and Verba's *The Civic Culture* (1963) and Niemi and Junn's (1998) *Civic Education*, an open classroom climate was pointed out as an important predictor. The broader literature on the determinants of political knowledge also provides support for the positive effects of discussion on political knowledge. Among others, Delli Carpini and Keeter (1996) show that being involved in political discussion is positively related to political knowledge.

It is, however, not obvious why and how an open classroom climate is supposed to have these effects. Niemi and Junn (1998) state that the mechanisms at work "remain hidden" (p. 122), and no other studies have been able establish the exact causal mechanisms connecting an open classroom climate with civic outcomes. According to theoretical expectations, taking part in stimulating discussions increases students' political and civic knowledge more than traditional teacher-centered lessons. As Campbell (2008) explains the benefits of an open classroom climate: "Rather than dry, abstract lessons on the institutional mechanisms of the political system, students are provided with opportunities to wrestle with political and social issues. From such discussions, they glean knowledge about the political process" (p. 440). Hence, by being active and expressing their voices in political matters, students tend to learn more about the political issues and the political system. By taking active part in the learning process when participating in discussions, students tend to learn more than when they passively listen to their teachers. Promoting political discussion also promotes active thinking about politics, and political knowledge will increase as a by-product.

Most studies on the effects of school contexts on civic knowledge draw on data from the comparative surveys administrated by the International Association for the Evaluation of Educational

Achievement (IEA) (Ichilov, 2007; Torney-Purta, 2001–2002, 2002a, 2002b; Torney et al., 1975). In the most sophisticated study to date, Campbell (2008) uses the U.S. data from the CivEd study. Unlike previous studies, Campbell does not rely only on the respondents' own self-report of the classroom climate but also includes aggregate measures of classroom climate at the class level. This approach dampens the endogeneity problem since it captures the contextual classroom effect rather than the respondents' own perceptions of the climate. When relying only on the respondents' own perceptions, there is a problem that knowledgeable students might state that they perceive the classroom climate as more open than their peers perceive it. Using these measures, Campbell finds that an open classroom climate has a significant positive effect on civic knowledge, even under control for a number of other factors at the individual, classroom, school, and district level.

A further important conclusion from Campbell's study is that an open classroom climate does not have the same effect on all groups of U.S. students: it seems to be especially beneficial for students from disadvantaged homes. This idea resembles the pattern found in Langton and Jennings (1968) seminal study which detected a stronger curriculum effect on low-SES students.[2] According to this so-called compensation hypothesis, an open classroom climate compensates for the small amount of stimulating discussions at home for low-SES students. Campbell finds support for the compensation hypothesis in terms of the effect of an open classroom climate on informed voting and appreciation of conflict but not on civic knowledge.

However, given the importance ascribed to an open classroom climate in the literature, further replications in other contexts are called for to validate the relationship found in previous research. This study aims to provide such a piece of evidence.

Data

This article uses data from a one-year panel survey designed to track changes in students' knowledge over time. The first wave of the survey was conducted as the students started the gymnasium. Before the gymnasium, they all shared the same curriculum in the compulsory nine years of schooling. About 500 students were followed during their first year in the gymnasium, and the data makes it possible to follow each single individual over time. Three gymnasium schools in three different municipalities in Sweden were recruited for the study, and the survey aimed to include all first-year students.[3] The three schools are public schools that include the majority of all students in each of the municipalities and encompass both vocational and academic tracks.[4] During the first year in the gymnasium, all students had a course in social science comprising 100 lesson hours, and it was the classroom climate during these lessons that students were asked to reflect upon in the survey.

The first wave of the survey took place at the start of the first year, August 2008. By the end of the first year, the second wave was conducted—at the end of May and early June 2009.[5] Table 1 in

[2] One could also expect a reversed effect, i.e., that an open classroom climate has a stronger effect on those who already have a high level of political knowledge since they might have better skills to participate in classroom discussion.

[3] In Sweden, students at age 16 start the gymnasium in August.

[4] The sample is not nationally representative. However, the three schools could be characterized as rather typical Swedish schools. The students at the three schools have mean grades close to the national mean. In Swedish gymnasiums, mean grades range from 0 to 20. In 2009, the national mean was 14.1, while the three schools in the study range from 13.7 to 14.7.

[5] In total, 976 students in 44 classes participated in the first wave of the survey. Panel mortality was about 46%, which is about what could be expected and roughly equivalent to studies with similar designs (cf. Hooghe & Dassonneville, 2011; John & Morris, 2004). A major part of the sample loss was due to the fact that six classes were not able to participate in the second wave. The two-wave sample includes 530 respondents in total, but due to the use of the "don't know" option, the number of students in the analysis presented here are 471.

An important question is whether persons included in both waves are significantly different from those who were only included in the first wave and later dropped out. A comparison at T1 between the eventual drop-outs and those who stayed in the panel shows that they do not significantly differ on a number of key characteristics. As for the variables number of books at home, the amount of political discussion with friends, teachers, and family, and watching television news, those included in both waves of the survey did not significantly differ from those who only participated in the first wave.

the appendix summarizes descriptive statistics for the two waves of the survey. A more comprehensive panel study covering an extended time span with less panel attrition would, of course, be preferable. Unfortunately, at this point the design of the empirical study is irreversible. But we should keep in mind that the relatively short time-span and the fact that some students dropped out of the panel are potential sources of bias.

To increase comparability with previous research, the questionnaire replicates the items used by CivEd. As for classroom climate, a battery of six items was used which was taken directly from the CivEd study to construct a sum scale. These questions were included in the second wave of the study, and the students were asked to think back on how the classroom climate was during the past year. The variables and their factor loadings are summarized in Table 2 in the appendix.[6] The items measure factors like whether students feel free to express different opinions than their teachers, whether they are encouraged to make up their own minds, whether their opinions are respected, etc.

As for the knowledge questions, two different batteries of items were included. In the CivEd study from 1999, not all of the 49 knowledge questions were publicly released making a full-scale comparison impossible. However, five questions that were publicly released from the CivEd study were included in the panel survey. These are multiple-choice questions, giving four response alternatives to the students. The questions concern principles of democracy and the political system. They ask about the purpose of laws in society, what constitutes a political right, what discrimination is, who should govern in a democratic system, and the major purpose of the United Nations. The question wordings and the factor loadings are summarized in Table 3 in the appendix. Chronbach's alpha scale reliability coefficients are .75 at T1 and .76 at T2, which should be judged as acceptable. At T1, the mean value of correct answers was 73% while the corresponding mean value at T2 was 77%.

The advantage of these civic-knowledge questions is that they are possible to use in different countries and at different points in time. However, Campbell has pointed out that "a priority in future research" should be to include questions about "students' fluency with current issues and events, since that type of knowledge is presumably also enhanced by classroom discussion" (Campbell, 2008, p. 444). Going beyond the CivEd study, this piece offers such a battery of items to test the effects of an open classroom climate on political knowledge as well. It uses a five-question index inspired by the ideal political knowledge index measures proposed by Delli Carpini and Keeter (1996). The questions are open-ended, and no response options are given. The questions ask about five different factual matters: who Anders Borg is (minister of finance in Sweden at the time of the survey), who Gordon Brown is (prime minister in the United Kingdom at the time of the survey), which body enacts the laws in Sweden (the parliament "Riksdagen"), how many parties were currently in the Government of Sweden (4), and whether Spain is a member of the EU.[7] Exact question wordings are supplied together with the factor loadings in Table 3 in the appendix. The political knowledge index has a Cronbach's alpha coefficient of .58 at T1 and .64 at T2, which is not as good as for the civic knowledge index. The mean values of correct answers were also considerably lower for this index compared to the former: 31% at T1 and 41% at T2. For both indices of knowledge items, the same questions were repeated at T1 and T2.

[6] Since the different variables include missing values, we used imputation to eliminate missing values. More precisely, for each of the variables, a procedure was used to take the other five variables to impute the values on the sixth variable. This gives us an index with considerably fewer missing values. However, using the original coding does not substantially change the results from the models. The index has a satisfactory Cronbach's alpha value (.85).

[7] It should be noted that the questions used here are not totally equivalent to those used by Delli Carpini and Keeter (1996). For example, Delli Carpini and Keeter ask about which party control congress while the question in this study asks which body enacts laws in Sweden (i.e., while the Swedish question asks about a constitutional provision, the American question can change with every election cycle.

To control for the influence of other factors, we included a small number of items measuring students' background characteristics. The SES of the family environment is, of course, of central importance for the level of political knowledge. However, previous studies show that this information is hard to acquire from youth respondents. In international comparative studies such as CivEd and Trends in International Mathematics and Science Study (TIMSS), the number of books at home is frequently used as a proxy to measure the SES of the family (cf. Campbell, 2008; Wolbrecht & Campbell, 2007) since this item correlates strongly with parents' education (Evans, Kelley, Sikora, & Treiman, 2010). For that reason, we use books at home as our primary indicator on SES. As an alternative measure of the family SES, we also included planned education. Finally, we also include a control for gender. In the models, we include as well a lagged dependent variable (political knowledge/civic knowledge at T1). The lagged dependent variable presumably accounts for a number of unobserved characteristics affecting the level of political knowledge at T1, which yields the inclusion of further control variables less important.

Although the dataset has the advantage of a longitudinal design, it has the drawback that it consists of a nonprobability sample, and for that reason external validity is an important issue: Can these results be generalized to the entire population? In order to check that the results presented here resemble the pattern among the general population, we present results from equivalent models that draw upon the CivEd 1999 study for the civic knowledge index. The model specifications and the independent variables included in these models are equivalent to the models from the panel study, with the exception that the models from CivEd do not include a lagged dependent variable for knowledge at T1.

The analysis drawing on the Swedish part of the CivEd study includes about 2,800 students in 138 classrooms/schools. Table 5 in the appendix presents descriptive statistics for the variables included in the analyses of the Swedish CivEd data. The analysis drawing on the total comparative CivEd study includes about 78,000 students in 4,202 classrooms in 28 countries (Table 6 in the appendix presents descriptive statistics). The CivEd study aimed to cover national representative samples in each country, and the measurement instruments have been subject to advanced methodological evaluations. For further information, see the technical report for the CivEd study (Schulz & Sibberns, 2004).

Factor loadings for the classroom climate items are presented in Table 7 in the appendix, and factor loading for the knowledge items are presented in Table 8 in the appendix.[8]

Methods and Results

In the panel survey, the Swedish CivEd data, and the entire comparative CivEd dataset, the students in the surveys are not statistically independent but are sampled from specific classes in schools (and nations as for the comparative dataset). Due to these nested structures of the data, the dependency between observations needs to be taken into account in the computation of standard errors. For that reason multilevel modeling is employed. Performing nonhierarchical regression that ignores the dependency would be likely to produce biased results.

The analyses do not only include the individual-level self-evaluation of the classroom climate but also a class-level measure of classroom climate. However, if both the individual-level measure and a classroom-level measure are included as independent variables, the models would suffer from the correlation between the measures. To be able to include an aggregate measure of an open classroom climate for each individual that is cleaned from his/her influence, I follow a procedure proposed by Campbell (2008). For each individual, an aggregate measure is created which separates the influence

[8] Cronbach's alpha for the knowledge index was .66 in the Swedish data and .22 in the comparative dataset. As for the classroom climate index, Cronbach's alpha was .81 in the Swedish data and .77 in the comparative dataset.

Table 1. Effects of an Open Classroom Climate on Civic Knowledge, Results from Panel Study

	(1)	(2)	(3)	(4)	(5)
Classroom climate	8.918***	5.097**	4.910**	5.010**	4.985**
	(3.062)	(2.228)	(2.233)	(2.226)	(2.214)
Individual perception of classroom climate	3.783***	2.468***	2.469***	2.471***	2.492***
	(0.803)	(0.728)	(0.728)	(0.728)	(0.728)
Male	–0.328	–0.246	–0.238	–0.240	–0.245
	(0.231)	(0.203)	(0.203)	(0.204)	(0.203)
Books at home	1.032**	0.631	0.630	0.631	0.617
	(0.467)	(0.417)	(0.417)	(0.417)	(0.418)
Expected education	1.248**	0.874*	0.880*	0.851	0.867*
	(0.589)	(0.514)	(0.513)	(0.521)	(0.513)
Civic knowledge (T1)		0.483***	0.482***	0.484***	0.483***
		(0.041)	(0.041)	(0.041)	(0.041)
Classroom climate × Civic knowledge (T1)			–0.030		
			(0.065)		
Classroom climate × Expected education				–0.240	
				(0.757)	
Classroom climate × Books at home					–0.436
					(0.647)
Constant	78.474***	77.643***	77.733***	77.675***	77.703***
	(1.822)	(1.301)	(1.299)	(1.295)	(1.292)
Standard deviation of standard error at class level	8.451***	4.982***	4.849***	4.900***	4.883***
	(1.772)	(1.487)	(1.511)	(1.509)	(1.496)
Standard deviation of standard error at individual level	22.791***	20.377***	20.390***	20.385***	20.380***
	(0.780)	(0.698)	(0.699)	(0.699)	(0.698)
Number of individuals	467	464	464	464	464
Number of classrooms	35	35	35	35	35
Bayesian Information Criteria	4329.528	4189.161	4195.098	4195.204	4194.850

Note. Standard errors in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

of the individual by regressing the classroom mean on the individual-level variable and saving these residuals. These residuals are then used as the classroom-level measure of an open classroom climate that is uncorrelated with the individual measure. In other words, for each individual, these residuals reflect the classroom-level measure purged from the influence of the individual.

All the knowledge indices are recoded so that they vary between 0 and 100 while all independent variables (except for the lagged dependent variable) are recoded so that they vary theoretically between 0 and 10. Each independent variable is centered around its mean value. Thus, the coefficients in the models can be interpreted as the change in percentage points of correct answers on the knowledge scales resulting from a 10% change in the independent variables. The dependent variables in the models are knowledge at T2, while knowledge at T1 is used only as a control variable.[9]

We begin by looking at Table 1 in which the models on civic knowledge drawing on the panel data are presented. The models are linear two-level models taking into account that the students are clustered in 35 classes.[10] Model 1 estimates the impact of classroom climate at the individual level and the classroom level. It also controls for gender, books at home, and planned education. The model shows that an open classroom climate has a significant positive effect, both the individual perception as well as the class-level measure. A 10% increase in the class-level measure of an open classroom climate result in about 9 percentage points higher level of correct answers on the civic

[9] The data is niether differenced or stacked. It is analyzed in "wide" stata format.
[10] Models are estimated with the STATA command XTMIXED.

knowledge scale. In model 2, we include the lagged dependent variable to see whether the results hold under control for the level of political knowledge at the start of the year. A significant effect of an open classroom climate when the lagged dependent variable is included diminishes the probability that the results are due to self-selection processes since the lagged dependent variable accounts for the initial level of knowledge. Interestingly, the classroom climate indicators are still significant when controlling for knowledge at T1. The impact of the aggregate-level measure of an open classroom climate is reduced to about 5 percentage points, while the individual perception of an open classroom climate increases knowledge by about 2.5 percentage points.

Next, we include interactions between the number of books at home, planned education, and knowledge at T1 to test the compensation hypothesis. The three different interactions represent three different operationalizations of the compensation hypothesis: whether the effect of an open classroom climate is stronger for individuals with low SES, with low educational ambition, or low initial knowledge. However, neither of these three interaction terms is significant. An open classroom climate seems to have about the same beneficial effects across all students rather than being more effective for disadvantaged students. Hence, the compensation hypothesis gains no support in the Swedish context.

Table 2 presents equivalent models for political knowledge. The coefficient for classroom-level open classroom climate is positive but does not quite reach significance in model 1. However, when the lagged dependent variable is included in model 2, the aggregate measure turns significant: a 10% change in an open classroom climate results in an increase in political knowledge of about 6

Table 2. Effects of an Open Classroom Climate on Factual Political Knowledge, Results from Panel Study

	(1)	(2)	(3)	(4)	(5)
Classroom climate	6.303	6.119**	8.215**	5.816**	6.211**
	(3.949)	(2.982)	(3.993)	(2.966)	(2.995)
Individual perception of classroom climate	0.766	–0.029	–0.043	–0.022	–0.045
	(0.793)	(0.726)	(0.726)	(0.726)	(0.727)
Male	1.098***	0.648***	0.654***	0.664***	0.648***
	(0.231)	(0.212)	(0.212)	(0.213)	(0.212)
Books at home	0.350	0.244	0.224	0.245	0.255
	(0.469)	(0.425)	(0.426)	(0.425)	(0.426)
Expected education	2.139***	1.492***	1.469***	1.419***	1.493***
	(0.600)	(0.545)	(0.545)	(0.549)	(0.545)
Political knowledge (T1)		0.508***	0.513***	0.508***	0.509***
		(0.047)	(0.048)	(0.047)	(0.047)
Classroom climate × Political knowledge (T1)			–0.065		
			(0.082)		
Classroom climate × Expected education				–0.876	
				(0.799)	
Classroom climate × Books at home					0.333
					(0.670)
Constant	41.307***	25.856***	25.714***	25.973***	25.782***
	(2.377)	(2.301)	(2.314)	(2.289)	(2.310)
Standard deviation of standard error at class level	12.310***	8.593***	8.650***	8.467***	8.628***
	(1.971)	(1.588)	(1.592)	(1.574)	(1.592)
Standard deviation of standard error at individual level	22.727***	20.720***	20.699***	20.709***	20.710***
	(0.771)	(0.703)	(0.703)	(0.703)	(0.703)
Number of individuals	471	471	471	471	471
Number of classrooms	35	35	35	35	35
Bayesian Information Criteria	4382.028	4287.627	4293.155	4292.586	4293.535

Note. Standard errors in parentheses, *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

percentage points. Moreover, the individual perception of the classroom climate does not seem to matter for political knowledge since the coefficient and the standard error is about equal size. However, we can draw the important conclusion that an open classroom climate does not only have positive impact on civic knowledge but also on factual political knowledge as well.

In models 3 to 5, the interaction terms are included. We find no support for the compensation hypothesis since all interaction terms are insignificant. Here it should be noted that Campbell (2008) did not find any significant compensation effect on civic knowledge, but he did for other civic outcomes. A possible explanation to the lack of an interaction effect is that Sweden is more homogenous than, for example, the United States. Moreover, at the time of the survey, the Swedish school system was quite uniform with a large majority of the students in public schools run by the municipalities. Hence, a likely explanation to the lack of an interaction effect is that the difference between students from high- and low-SES families is relatively small compared to the corresponding difference in other countries.

We move forward to look closer at the results from the Swedish CivEd study to evaluate whether these national representative data show a similar pattern as the panel data. Model 1 presents the main effects of the variables. It is evident that the mean level of civic knowledge is about the same in the panel data as well as in the CivEd study (75% in the CivEd study). Moreover, in both the datasets books at home and planned education have significant positive effects (although they turn insignificant when including the lagged dependent variable in the panel data sample). The coefficients of the open classroom climate measures are very similar to the coefficients from the panel data. A 10% positive change in the classroom-level measure results in about 5.5 percentage points higher civic knowledge. The similarities in the results from the two datasets increase our confidence in the findings. The panel data shows that the effect of an open classroom climate indeed seems to be causal; it holds under control for the knowledge level one year earlier. And the CivEd data show that these results closely resemble the patterns in the results from a national representative study.

Model 2 and 3 in Table 3 include the interaction between an open classroom climate and planned education as well as books at home to evaluate whether the compensation hypothesis gains any support when using a national representative sample. The results show that the compensation hypothesis gains no support in the Swedish CivEd data. Hence, we can be quite confident in our conclusion that an open classroom climate has more or less the same beneficial effects on students with different background characteristics.

Table 4 presents results from the entire CivEd study covering all 28 countries to evaluate whether an open classroom climate generally has positive effects in different national contexts or if this is something only occurring in some specific countries such as Sweden and the United States. The models are linear three-level models taking into account that the data consists of students within classrooms within countries. Apart from the three-level structures, the model specification is identical to the models drawing on the Swedish data. The results from all of the 28 countries tell more or less the same story as the Swedish data. An open classroom climate has a positive significant effect, albeit slightly smaller in its size than in the Swedish data. A 10% positive change in class-level classroom climate corresponds to about 4.5 percentage points higher civic knowledge, and the individual perception of the classroom climate increases civic knowledge by about 1.3 percentage points. Moreover, when including the interaction terms in model 2 and 3, the compensation hypothesis is once again rejected.

In order to look closer at the effects of an open classroom climate in each of the 28 countries, Figure 1 plots the effect of the class-level measure of an open classroom climate on civic knowledge, drawing on the results from the previous model specification. From this graph, we can see that the effect is nowhere negative, and it is largely positive in several countries. Hence, the effect of an open classroom climate is far from a regional phenomenon in the Swedish context.

Table 3. Effects of an Open Classroom Climate on Civic Knowledge, Results from CivEd, Sweden 1999

	(1)	(2)	(3)
Classroom climate	5.424***	5.507***	5.459***
	(1.100)	(1.103)	(1.101)
Individual perception of classroom climate	2.157***	2.176***	2.162***
	(0.309)	(0.309)	(0.309)
Male	–0.001	0.001	0.001
	(0.082)	(0.082)	(0.082)
Books at home	1.556***	1.552***	1.533***
	(0.173)	(0.173)	(0.173)
Expected education	1.417***	1.422***	1.418***
	(0.183)	(0.183)	(0.183)
Classroom climate × Expected education		–0.337	
		(0.295)	
Classroom climate × Books at home			–0.449
			(0.284)
Constant	74.662***	74.722***	74.731***
	(0.645)	(0.647)	(0.646)
Standard deviation of standard error at class level	5.876***	5.876***	5.879***
	(0.595)	(0.595)	(0.595)
Standard deviation of standard error at individual level	21.025***	21.020***	21.015***
	(0.288)	(0.288)	(0.288)
Number of individuals	2804	2804	2804
Number of classrooms	138	138	138
Bayesian Information Criteria	25230.404	25237.033	25235.838

Note. Standard errors in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Summary and Conclusion

This article evaluates the effect of an open classroom climate on civic and political knowledge. Previous research drawing on cross-sectional one-shot data has shown a positive relationship between classroom climate and civic knowledge. However, the field has lacked panel studies following respondents over time. This article presents panel data that confirm the effect of an open classroom climate with a better study design than previous studies. It also goes beyond previous research by demonstrating the existence of an effect on factual political knowledge as well. While we should judge these findings as lending stronger support to the hypothesis about a causal effect than a cross-sectional survey, even a panel study cannot completely rule out selection bias. It is possible that students who perceive a more open classroom have a greater capacity for acquiring political knowledge. Still, this study shows that an open classroom climate has a positive effect even under control for the initial level of political knowledge.

Data from national representative surveys are used as a robustness test and show a similar pattern. This indicates that the results might be possible to generalize to the entire population. The null finding for the compensation effect should also be stressed; it suggests that the compensation effects found on some civic outcomes in previous U.S. studies are far from universal. Regarding civic and political knowledge, the compensation hypothesis does not seem to hold in Sweden. The beneficial effect of an open classroom climate is not restricted to students who come from less advantageous backgrounds.

While most previous research draws on data from CivEd 1999, which surveyed students at the age of 16, this panel study looks at students who are one year older. Further research would benefit from evaluating whether an open classroom climate has the same effects on older and younger students. In particular, it would also be of interest to look closer at the effects of an open classroom

Table 4. Effects of an Open Classroom Climate on Civic Knowledge, Results from Cived, 28 Countries, 1999

	(1)	(2)	(3)
Classroom climate	4.501***	4.504***	4.497***
	(0.401)	(0.401)	(0.397)
Individual perception of classroom climate	1.343***	1.343***	1.343***
	(0.048)	(0.048)	(0.048)
Male	0.005	0.005	0.005
	(0.014)	(0.014)	(0.014)
Books at home	0.771***	0.771***	0.772***
	(0.029)	(0.029)	(0.029)
Expected education	1.510***	1.510***	1.510***
	(0.027)	(0.027)	(0.027)
Classroom climate × Expected education		0.048	
		(0.057)	
Classroom climate × Books at home			0.070
			(0.061)
Constant	74.930***	74.927***	74.927***
	(0.981)	(0.981)	(0.981)
Standard deviation of random coefficient for open classroom climate	1.332	1.327	1.299
	(0.452)	(0.452)	(0.455)
Standard deviation of standard error at country level	5.142***	5.142***	5.141***
	(0.700)	(0.700)	(0.700)
Standard deviation of standard error at class level	7.060***	7.060***	7.059***
	(0.110)	(0.110)	(0.110)
Standard deviation of standard error at individual level	19.308***	19.308***	19.308***
	(0.047)	(0.047)	(0.047)
Number of individuals	78106	78106	78106
Number of classrooms	4202	4202	4202
Number of countries	28	28	28
Bayesian Information Criteria	781407.697	781418.396	781417.792

Note. Standard errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$

climate in higher education; could an open classroom climate have the same beneficial effects on students in late adolescence and early adulthood as well?

The results presented here provide some new insights, but further studies and replications are, of course, needed in order to better understand how an open classroom climate affects students' attitudes, knowledge, and behavior. In particular, studies should try to follow students over longer time spans, preferably during their entire education and beyond. Moreover, the results from the comparative dataset show some considerable variation in the effect of an open classroom climate. While the effect is not negative in any country, it is rather weak in some countries. Future research should try to explain why the effect of an open classroom climate varies between contexts.

A further weakness of this study is the lack of measures of other school-related factors beyond an open classroom climate. For example, some specific forms of pedagogy or curriculums might promote both an open classroom climate and increased political knowledge, rendering the relationship between an open classroom climate and knowledge found here spurious. Or put another way, an open classroom climate might be the causal mechanism linking certain pedagogy with increased knowledge. Whether this is the case is an open question, and further studies would benefit from studying what kind of teaching makes an open climate occur in some classrooms.

To conclude, we need more knowledge on how an open classroom climate comes about. To answer this question, research should look more closely at how successful teachers act in order to increase the openness of the classroom climate. Given the beneficial effects of an open classroom

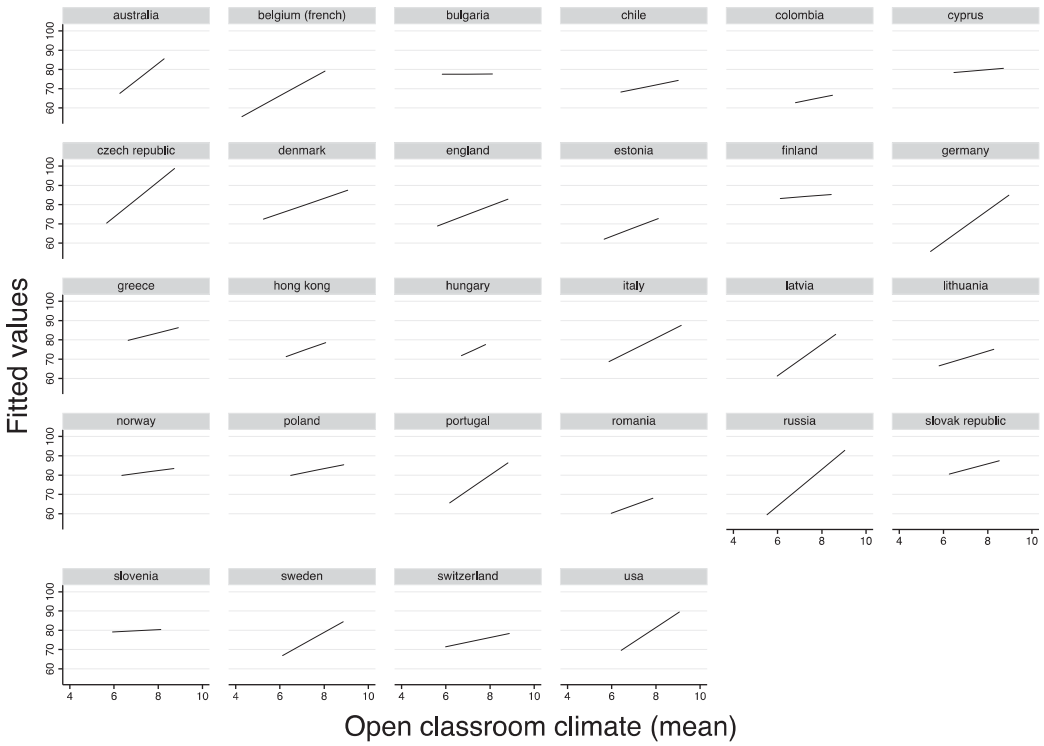

Figure 1. The effects of an open-classroom climate in 28 countries, CivEd 1999.

climate, it is of great importance that more students can experience this kind of classroom environment rather than less successful teacher-centered styles of teaching. The beneficial effects of an open classroom climate are indeed an important insight that should be seriously considered not only by researchers but also by educational policy makers, school managements, and teachers.

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Technical Appendix: Descriptive Statistics

Table 1. Descriptive Statistics, Panel Study

	n	Mean	Standard deviation	min	max
Civic knowledge (T1)	512	73.38	27.04	0	100
Civic knowledge (T2)	513	77.36	27.45	0	100
Political knowledge (T1)	516	30.67	23.22	0	100
Political knowledge (T2)	518	41.00	27.57	0	100
Classroom climate	518	8.14	.58	6.16	9.09
Individual perception of classroom climate	491	5.86	1.33	0	8.25
Male	509	4.09	4.92	0	10
Books at home	508	7.29	2.4	0	10
Expected education	499	4.83	2.08	0	10

Table 2. Results from Factor Analysis: Open-Classroom Climate Indicators, Panel Study

Items	Factor Loading (Principal Components)
Students feel free to disagree openly with their teachers about political and social issues during class	0.7599
Students are encouraged to make up their own minds about issues	0.8219
Teachers respect our opinions and encourage us to express them during class	0.7860
Students feel free to express opinions in class even when their opinions are different from most of the other students	0.6546
Teachers encourage us to discuss political or social issues about which people have different opinion	0.7298
Teachers present several sides of an issue	0.7906

Note. Responses are measured on a 4-point scale.

Table 3. Results from Factor Analysis: Civic Knowledge, Panel Study

Items	Factor Loading (Principal Components) T1	Factor Loading (Principal Components) T2
Which of the following is an accurate statement about laws?	0.7081	0.6687
"Laws forbid or require certain actions" (1)		
"Laws are made by the police" (0)		
"Laws are valid only if all citizens have voted to accept them" (0)		
"Laws prevent criticism of the government" (0)		
Which of the following is a political right? The right . . .	0.5492	0.5465
"of pupils to learn about politics in school" (0)		
"of citizens to vote and stand for [run for] election"(1)		
"of adults to have a job" (0)		
"of politicians to have a salary" (0)		
A woman who has a young child is interviewed for a job at a travel agency. Which of the following is an example of discrimination [injustice]? She does not get the job because . . .	0.6313	0.5021
"she has no previous experience" (0)		
"she is a mother" (1)		
"she speaks only one language" (0)		
"she demands a high salary" (0)		
In a democratic political system, which of the following ought to govern the country?	0.7477	0.7066
"Moral or religious leaders" (0)		
"A small group of well-educated people" (0)		
"Popularly elected representatives" (1)		
"Experts on government and political affairs" (0)		
What is the major purpose of the United Nations?	0.7062	0.7005
"Safeguarding trade between countries" (0)		
"Maintaining peace and security among countries" (1)		
"Deciding where countries' boundaries should be" (0)		
"Keeping criminals from escaping to other countries" (0)		

Table 4. Results from Factor Analysis: Factual Political Knowledge, Panel Study

Items	Factor Loading (Principal Components) T1	Factor Loading (Principal Components) T2
Which political commission has Anders Borg? (Minister of finance, Sweden)	0.7888	0.7534
Which political commission has Gordon Brown? (Prime minister, UK)	0.6903	0.6741
What body enacts laws in Sweden? (Riksdagen)	0.7334	0.7160
How many parties are currently in the Government of Sweden? (4)	0.5506	0.5777
Is Spain a member of the EU? (Yes)	0.3781	0.2822

Table 5. Descriptive Statistics, CivEd Sweden 1999

	n	Mean	Standard deviation	min	max
Civic knowledge	3061	73.82	23.90	0	100
Classroom climate	3073	7.62	.59	6.12	9.47
Individual perception of classroom climate	2904	0.00	1.32	–5.54	3.73
Male	3032	4.81	4.99	0	10
Books at home	3021	7.23	2.57	0	10
Expected education	2998	4.26	2.37	0	10

Table 6. Descriptive Statistics, CivEd 28 Countries 1999

	n	Mean	Standard deviation	min	max
Civic knowledge	93396	74.54	22.65	0	100
Classroom climate	93882	7.35	.45	4.29	9.15
Individual perception of classroom climate	90242	0.00	1.43	–5.83	4.51
Male	93096	4.86	5.00	0	10
Books at home	92903	6.45	2.73	0	10
Expected education	92463	4.58	2.83	0	10

Table 7. Results from Factor Analysis: Open-Classroom Climate Indicators, CivEd

Items	Factor Loading (Principal Components) Sweden 1999	Factor Loading (Principal Components) 28 countries 1999
Students feel free to disagree openly with their teachers about political and social issues during class	0.7273	0.6591
Students are encouraged to make up their own minds about issues	0.7836	0.7325
Teachers respect our opinions and encourage us to express them during class	0.7528	0.7314
Students feel free to express opinions in class even when their opinions are different from most of the other students	0.6464	0.6809
Teachers encourage us to discuss political or social issues about which people have different opinion	0.6742	0.6602
Teachers present several sides of an issue when	0.7103	0.6242

Note. Responses are measured on a four point scale.

Table 8. Results from Factor Analysis: Civic Knowledge, CivEd

Items	Factor Loading (Principal Components) Sweden 1999	Factor Loading (Principal Components) 28 countries 1999
Which of the following is an accurate statement about laws?	0.6203	0.5781
"Laws forbid or require certain actions" (1)		
"Laws are made by the police" (0)		
"Laws are valid only if all citizens have voted to accept them" (0)		
"Laws prevent criticism of the government" (0)		
Which of the following is a political right? The right . . .	0.6184	0.3556
"of pupils to learn about politics in school" (0)		
"of citizens to vote and stand for [run for] election"(1)		
"of adults to have a job" (0)		
"of politicians to have a salary" (0)		
A woman who has a young child is interviewed for a job at a travel agency. Which of the following is an example of discrimination [injustice]? She does not get the job because . . .	0.5562	0.2324
"she has no previous experience" (0)		
"she is a mother" (1)		
"she speaks only one language" (0)		
"she demands a high salary" (0)		
In a democratic political system, which of the following ought to govern the country?	0.4942	–0.0336
"Moral or religious leaders" (0)		
"A small group of well-educated people" (0)		
"Popularly elected representatives" (1)		
"Experts on government and political affairs" (0)		
What is the major purpose of the United Nations?	0.6098	0.6512
"Safeguarding trade between countries" (0)		
"Maintaining peace and security among countries" (1)		
"Deciding where countries' boundaries should be" (0)		
"Keeping criminals from escaping to other countries" (0)		