CIVIC EFFECTS OF EDUCATION MODELS

By

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Chapter 1

Civic Engagement and Education Models

Why do some people engage in civic life more than others? Scholars have long argued that schools teach students to be politically engaged and more years in school means more engagement but the evidence for this is mixed. Some find that education increases political engagement (Dee 2004; Henderson 2018; Mayer 2011; Sondheimer and Green 2010) while others find that the relationship is spurious (Berinsky and Lenz 2011; Kam and Palmer 2008; Marshall 2018; Tenn 2007). Throughout the literature, scholars focus on levels of education based on the assumption that schools nurture active citizens by teaching civics. I provide an alternative perspective of education's civic relevance by viewing education as a social experience that shapes political self-conceptions. Education happens in social settings among teachers and peers, and I argue that individuals learn politically relevant self-conceptions from the nature of social interactions in school. To understand the relationship between education and civic engagement, we need to recognize that education models shape such social dynamics in classrooms and consequently, how students engage with their political community beyond school.

I distinguish teacher-centered and student-centered education models to provide a theory of the civic effects of education as a social experience. Under teacher-centered models, with hierarchical ties between teachers and students, teachers dominate decision-making and deliver knowledge to students. Under student-centered models, with horizontal student-teacher relations, students participate in decision-making and collectively construct knowledge. These two education models place individuals in either roles that shape class content or roles that receive knowledge from

authority figures, which matters for their political self-conceptions. I argue that by making students constructors of collective knowledge in the classroom, student-centered education models lead individuals to view themselves as efficacious members of their community who hold communal views of their interests. Consequently, those learning in student-centered education models become more active in collective issues and civic behavior than their peers.

In this chapter, I situate my work in the context of prior research on civic engagement, political socialization, and education. I then develop a theory of the civic effects of education models, drawing civic implications of student-centered education. I test these implications in subsequent chapters using data from three education surveys and original data from a natural experiment setting.

Civic implications of education models

Political scientists have long argued that education is the "universal solvent" for political engagement, where those with more formal education are more likely to discuss politics, pay attention to civic issues, and take part in political activities (Almond and Verba 1963; Converse 1972). Yet evidence has been mixed. One way to resolve this conflict is to move beyond the literature's focus on levels of education and look into the content of education. Along this line, scholars have examined whether the content delivered in civics classes (Green et al. 2011; Langton and Jennings 1986; Litt 1963; Neundorf et al. 2016; Niemi and Junn 1998), social science classes (Hillygus 2005; Paterson 2009), and specialized curricula matter for political engagement (Holbein 2017; Persson 2012; Van de Werfhorst 2017).

What all of this scholarship misses is the fact that schools shape citizens even when they are not teaching civics and civic skills. We learn and acquire self-concepts not only by being taught but

also by observing and experiencing social interactions (Hernik and Shamsudheen 2017; Rote and Smetana 2015; Turiel 1983). Political science scholarship on political socialization and the participatory theory of democracy have applied these perspectives to study the civic effects of social interactions in non-political settings – hierarchical relations within schools and families create submissive self-concepts and shapes political orientations, and horizontal relations within the workplace that grant individuals voice in decision-making create more politically participatory citizens (Almond and Verba 1963; Bowles and Gintis 1976; Elden 1981; Pateman 1970; Sobel 1993). I argue that political learning in schools is not an exception. Schools are a place of profound social experiences and individuals are shaped through teacher-student and peer interactions, independent of what is explicitly communicated during these interactions. To understand the relationship between education and political engagement, we need to recognize that education models shape such social dynamics and consequently, how students engage with their political community beyond school.

A handful of scholars have investigated certain aspects of the social experience of education, including work on civic implications of disciplinary experiences with school authorities, group-focused teacher practices, and interactions with wealthy peers (Algan et al. 2013; Bruch and Soss 2017; Mendelberg et al 2021). Yet no work distinguishes the general nature of social interactions in school and derive civic implications. John Dewey wrote in 1916 that the kind of education where teachers lecture at passively listening students creates docile citizens who are keen to "take orders from the few set in authority" (Dewey 1916, 421). In contrast, the kind of learning where students

actively participate creates engaged and independent-thinking citizens. I provide a theory of the civic effects of such types of education models, conceptualized as teacher-centered and student-centered.[1]

The first extreme of the continuum is a model of learning with hierarchical ties between teachers and students, where the teacher is responsible for the delivery of knowledge to students. Teacher-centered models build on an empiricist view of knowledge: to learn is to be transmitted knowledge that exists independent of individuals, just as to perceive is to receive sensory data input from objects that exist independent of the perceiver. Consequently, learning in teacher-centered models is achieved by teachers lecturing students and students understanding and memorizing the content delivered by teachers.

The other extreme of student-centered education is a model of learning with horizontal teacher-student ties, where students participate in the construction of knowledge. In student-centered models, transmission of pre-existing knowledge is not learning. Consistent with constructivist theories of cognitive development, learning entails individuals constructing their own understanding of the world. That is, knowledge cannot be simply passed on. So, student-centered models of education focus on discussion and student participation rather than lectures as the mode of instruction (Table 1).

[1] Jackson (1986), Granger et al. (2012); Mascolo (2009); Sadovnik et al. (2013), Schweisfurth (2013), Vavrus et al. (2011), Wu and Huang (2007). Alternative labels for student-centered education include active learning, inquiry-based education, learner-centered education, progressive education, and flipped classrooms.

Table 1. Two ideal models of education

	Teacher-centered	**Student-centered**
Theory of knowledge	Empiricist	Constructivist
Theory of learning	Teacher transmission	Student construction
Instructional focus	Lectures Memorization	Discussion Student participation
Student role	Receiver of knowledge	Constructor of knowledge
Teacher-student ties	Hierarchical	Horizontal

My conceptualization of education models departs from some prior work on student-centered education. Student-centered education is not well defined in the literature and is invoked for various, at times conflicting concepts (Hoidn and Klemenčič 2020; Lattmier 2015; Schweisfurth 2013). One strand of work conceptualizes student-centered education models as those that aim to increase reasoning skills rather than knowledge of facts, which is best achieved through group work and real-life applications (Bietenbeck 2014; Korbel and Paulus 2018; Lavy 2016; Zemelman et al. 2005). Another strand of work conceptualizes student-centered education as models that actively engage students in their learning (Beom et al. 2018; Bosio and Origo 2020; Cordero and Gil-Izquierdo 2018; Deslauriers et al. 2019). Both ways of conceptualizing student-centered education are consistent with the constructivist approach that learning happens when individuals "transform existing knowledge into higher-order modes of thinking" (Mascolo 2009, 4).

Here, rather than focusing on high-order thinking as the defining characteristic of student-centered education, I instead conceptualize student-centered education models as those where the learners take part in creating classroom discourse, as a function of horizontal teacher-student ties. I include any form of discussion that do so as student-centered practices and do not qualify student-centered practices to, for example, higher-level discussions that build reasoning skills or high levels of student engagement. Similarly, I also consider group projects, presentations, and other forms of student activities in class that shape what is learned in class as student-centered education

practices, even if these activities are necessarily cognitively complex exercises. The important qualifier here is that activities are only considered student-centered in my conceptualization if they shape class content and discourse. For example, if a class regularly has its students presenting and taking part in group activities but the nature of these activities is to summarize what either has already been taught by the teacher or what is predetermined to be taught by the teacher, I consider activities to be teacher-centered rather than student-centered.

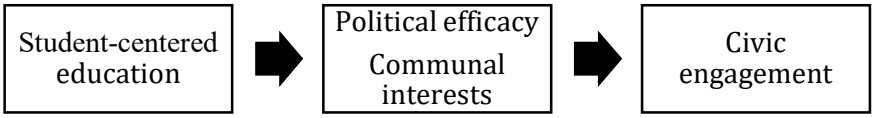
My conceptualization of student-centered education models is also distinct from the notion of democratic or open classroom climates. Democratic or open classroom climate refers to classroom settings where controversial and/or political issues are openly discussed, and has been associated with higher levels of civic knowledge and engagement (Campbell 2008; Ehman 1980; Willeck and Mendelberg 2022). While student-centered education may be easier to implement for certain content or subjects than others, it can be implemented for a wide range of subjects including classes that do not deal with civics. I deliberately choose a minimalist conceptualization of student-centered education that focuses on the structure of student-teacher relations because the crux of my theory is that even without high-level debate, student engagement, or civic content, the social structure of student-teacher relations within classrooms can shape civic engagement.

I argue that by making students constructors of class content, the social structure of student-centered education models lead to two mechanisms that increase civic engagement: political efficacy and communal interests. First, individuals in student-centered education settings experience affecting change in their school as they fulfil and observe their roles as a constructor of knowledge and an active participant in classroom discussions. I argue that repeated exposure to such practices in school lead individuals to see themselves as efficacious citizens who can shape outcomes in communities outside their school as well. If more horizontal practices in the workplace

can extend to a stronger sense of efficacy in one's political community (Elden 1981), analogous practices in the classroom with enhanced student voice under student-centered education models should also strengthen political efficacy. I argue that even outside of classes dealing specifically with civics issues, student-centered education models incorporating more horizontal learning practices such as discussion enhance students' political efficacy and by doing so, increase levels of civic engagement.

A second mechanism through which education models affect civic engagement is by forming communal interests. In teacher-centered models, the student's role is to listen and receive knowledge transmitted by teachers with minimal peer interactions, which compares with student-centered models where students are tasked with using their voice to collectively construct knowledge in the classroom with their peers. I argue that by taking part in collective discussions with their peers and teachers, individuals learning in student-centered models come to identify themselves as a community member and see their interests in those of their community's more so than those learning in teacher-centered models. This mechanism is analogous to one of the main claims of the Participatory Theory of Democracy, which posits that discussion and decision-making in public life have an integrative function: individuals who participate acquire self-conceptions that they are a member of a community whose welfare is linked to that of their community's (Pateman 1970, 33). Likewise, I argue that even in non-political contexts such as classrooms, taking part in collective discourse develops communal identities that link one's own interests to those of their community's. In sum, I argue that learning in student-centered education models makes individuals more likely to view themselves as efficacious members of a community they have stakes in.

Figure 1. Theoretical framework



Lastly, I test whether the effect of education models is heterogeneous across types of individuals. Civic effects of student-centered education may be especially pronounced among those with less exposure to using their voice outside their school. Previous work on the 'compensation hypothesis' find that education affects civic attitudes and behavior more strongly among those with lower socioeconomic status, because these individuals would not otherwise be exposed to alternative pathways to increase skills and motivations for civic engagement (Almond and Verba 1963; Campbell 2008; Langton and Jennings 1968; Neundorf et al. 2016). This may also be the case for education model's civic effects. For those who are already taking part in discussions and using their voice at home or in other environments outside school, exposure to classroom discussions and school decision-making may not further boost efficacy and notions of communal self-interests. On the other hand, it may alternatively be that an 'acceleration effect' takes place, where those with "a foundation of familiarity with [discussion and decision-making] gain more from [these practices at school] because they are more likely to be called upon by teachers to contribute" (Campbell 2006, 442).

Roadmap

In the following chapters, I use data from three education surveys and a natural experiment to assess my theory. Collectively, the data allow me to assess whether student-centered education matters for civic engagement across countries, in the long run, and in a setting where individuals are not able to

choose their education model. I first use data from the 2018 round of Program for International Student Assessment (PISA) to assess whether individuals around the world who learn in student-centered education models are more engaged citizens. PISA is a triennial international study that evaluates education systems worldwide by testing and surveying nationally representative samples of 15-year-old students who are attending school. Along with testing students' performance, PISA also conducts student, parent, teacher, and principal questionnaires to gather data on students' learning environments. I use data from the student questionnaire, the parent questionnaire, and the student's PISA reading test to test my argument in a large global population.

Recognizing that people may select into education models, I use data from the 2006 round of the Progress in International Reading Literacy Study (PIRLS) to assess the civic effect of student-centered education within schools. PIRLS 2006 primarily aims to gauge reading skills among fourth grade students around the world. As with PISA, PIRLS also administers questionnaires to participants, parents, teachers, and schools. Unlike PISA, PIRLS randomly samples one or more intact classrooms (rather than students) within each school and administers questionnaires to both students and teachers in each sampled classroom. This allows me to compare students within schools and assess the degree to which within-school variation in student-centered education predicts civic engagement.

PISA and PIRLS cover a wide range of countries but only provide a snapshot of the relationship between student-centered education and civic engagement at a given point in time. With data from the Korean Education Longitudinal Survey (KELS), I investigate whether student-centered models matter for long-term civic activity. KELS is a study commissioned by the South Korean Ministry of Education to understand local education experiences, contexts, and post-education trajectories. It has followed a nationally representative cohort since 2005 who were 12- to 14-year-old first year middle school students at the start of the study. When participants were in middle school, they were

asked about the types of instruction in their classroom. Later on when participants reached the local voting age, they were asked about their participation in different types of civic activity such as voting, signing petitions, and discussing political issues. This allows me to assess whether the education model individuals are exposed to in adolescence matters for civic activity in the long run.

I address self-selection in a second way in chapter 4. I identified a natural experiment setting in South Korea and fielded an original survey in school districts that randomly assigns education models to middle school students. I explain the local education reforms that created this natural experiment setting, detail my fieldwork procedures, and analyze the data from my survey to compare individuals who were randomly assigned to more student-centered schools to those who were not.

Across my various empirical tests, I consistently find that student-centered education makes more active citizens. I find that individuals are more likely to be engaged in public discourse on social issues when they are exposed to student-centered education. Further, these individuals grow up to be more active citizens, most robustly in terms of being active in discussions of social issues but also to varying degrees in voting, protesting, and signing petitions. I have mixed findings for mechanisms – in chapter 3 using panel data, I find that a significant part of the civic effects of student-centered education is mediated through political efficacy and perceptions that a community's interests are aligned with one's own interests, but I do not find consistent results in chapter 4 using data from an original survey. While the mechanisms require future research, my findings suggest that it is not only how much education or what curricula but also the model of learning used within the length and scope of the education that matters for schools' civic outcomes.

Chapter 2

Civic Effects of Student-centered Education Across Countries

Heads of State and education policy leaders around the world gathered in 2022 at the United Nations Transforming Education Summit. In the wake of the pandemic's massive disruptions in education, the summit called for leaders to reshape the purpose and content of education so that schools better prepare individuals for the 21st century. Among the key messages were that education should move away from static rote learning to student-centered models and that it should strive to nurture active, responsible citizens.[2] In this chapter, I ask whether these two goals move together in various contexts around the world – that is, does student-centered education make more active citizens?

I use data from two international education surveys to test the civic effect of student-centered education: the Program for International Student Assessment (PISA) and the Progress in International Reading Literacy (PIRLS). Each survey includes information on teaching practices that range from student-centered to teacher-centered education and collectively, the data allow me to assess the civic relevance of education models in diverse populations around the world. I first use PISA 2018 to assess whether individuals who learn in more student-centered education models are more engaged citizens. PISA covers nationally representative 15-year-old students in over 70 countries, a sample that allows me to investigate patterns in a large global population.

A limitation of using only PISA data is that I cannot distinguish between active citizens choosing to attend student-centered schools and student-centered schools making active citizens. Recognizing

[2] United Nations 2023a; United Nations 2023b.

that people may select certain types of schools, I use data from PIRLS 2006 for within-school comparisons. PIRLS covers a smaller number of countries than PISA, but its sampling frame allows me to compare individuals learning in varying degrees of student-centered education within the same school. As opposed to PISA where each participating school surveyed a random sample of students, over one in three participating schools in PIRLS surveyed two randomly selected intact classrooms and administered a survey to both students and teachers in each sampled classroom. This allows me to use teacher responses to measure education models in each PIRLS classroom while I can only rely on student responses in the PISA-based analyses. With the structure of the PIRLS data, I assess whether individuals learning in more student-centered classrooms (as measured by classroom-level teacher questionnaire data) are more engaged citizens than their peers within the same school (as measured by individual-level student questionnaire data).

PISA and PIRLS both contain information on teaching practices that reflect the distinguishing philosophies and social dynamics in student-centered education compared to those in teacher-centered education: students' active role in constructing class content independently and with their peers versus receiving knowledge from their teachers and learning materials. Using these measures of education models, I assess my theory of the civic effects of student-centered education developed in Chapter 1. Under teacher-centered models, teachers dominate decision-making and knowledge, placing students in roles that follow decisions made by authority figures. Under student-centered models, students participate in making decisions and knowledge so that they are placed in roles that shape classroom discourse. I argue that by becoming constructors of class content, those learning in student-centered education models take ownership of collective matters and become active citizens in their community beyond school.

In this chapter, I use data on individuals around the world to test a core implication of the theory: student-centered education makes more active citizens. I find that individuals are more likely to read news, take part in public discussions, and hold communal views of their peers when they are exposed to more student-centered education. I first show these patterns in a diverse and large group of countries using PISA data. I then use PIRLS data to show that the correlation between student-centered education and civic engagement is not attributable to active citizens choosing to attend more student-centered schools.

Data and measurements

I use data from PISA and PIRLS to assess my argument in diverse populations around the world. Only a handful of international surveys measure both education models and civic engagement. Trends in International Mathematics and Science Study (TIMSS) asks about education models in up to 70 countries but not civic engagement.[3] Individuals in 54 countries have participated in the Teaching and Learning International Survey (TALIS), but this study also only includes information on teaching practices and not civic engagement.[4] The International Civic and Citizenship Education Study (ICCS) and Civic Education Study (CivEd) are both international surveys that include measures for education models and extensive measures for civic engagement.[5] However, the scope of coverage of these two studies is narrower than PISA and PIRLS. While PISA 2018 surveyed nationally representative 15-year-olds in 60 countries and PIRLS 2006 included participants from 40 countries, 23 countries

[3] https://www.iea.nl/studies/iea/timss

[4] https://www.oecd.org/education/talis/

[5] https://www.iea.nl/studies/iea/iccs; https://www.terpconnect.umd.edu/~jtpurta/

participated in ICCS 2022 and 28 participated in CivEd (1999/2000). The one other round in PISA that includes measures of both education models and civic engagement is PISA 2009. 65 countries participated in PISA 2009 but only 14 of them included parent questionnaires that provide measures of household socioeconomic status which is a key control I use in my analyses. PIRLS data is available for 2001, 2006, 2011, 2016, and 2021 but only the first two rounds included a behavioral measure of civic engagement – reading newspapers. I use PIRLS 2006 because it includes more comprehensive measures of teaching practices than PIRLS 2001. I describe the coverage of PISA 2018 and PIRLS 2006 in more detail in Appendix A.

PISA 2018 selected its participants by first randomly sampling schools within each country and then randomly selecting 35-42 students within each school.[6] Participants took a two-hour test on reading, science, mathematics, global competence, and financial literacy. Along with these tests, PISA also administered background questionnaires on participating students, their parents, teachers, and schools to understand students' learning environments. I use data from the student survey, parent survey, and reading test to assess whether individuals who are learning in student-centered schools tend to be more active citizens. PIRLS follows a similar format that combines both reading tests and student, teacher, parent, and school surveys.[7] PIRLS also similarly randomly sampled schools within countries in the first stage of sampling but unlike PISA, then sampled one or more intact classrooms within participating schools and surveyed both students and reading teachers in each sampled classroom. To compare students within schools, I restrict my analysis of PIRLS data to a subset of

[6] PISA 2018 was administered to 600,000 15-year-old students that are representative of 79 countries and economies.

[7] Approximately 215,000 4th grade students in 40 countries took part in PIRLS 2006.

participating schools that sampled two or more classrooms and fit fixed-effects regression models with school fixed effects.[8] This allows me to control for school-level characteristics and estimate the causal effect of classroom-level education models on civic engagement among individuals attending the same school.

Both PISA 2018 and PIRLS 2006 include information on teaching practices that exemplify student-centered and teacher-centered education. Student-centered education models derive from constructivist theories of knowledge whereas teacher-centered models are based on an empiricist view of knowledge. While individuals are often not explicitly aware of such philosophical underpinnings of their education, they do observe teaching practices that are manifested in one philosophy over the other. Given an understanding of learning as acquiring knowledge that exists outside the learner, teacher-centered education models focus on class-wide lectures and comprehension of learning materials. Conversely, student-centered education models emphasize student participation, discussion, and group work, since learning is achieved by learners constructing their knowledge.

[8] 35.2% of schools participating in PIRLS 2006 sampled two or more classrooms. 50.1% of students in PIRLS 2006 were included in these schools. Participating schools were not required to sample more than one classroom. However, in cases where the country's average class size was sufficiently small so that sampling one classroom from each sampled school would not satisfy the target national student sample of 4,000 students, two or more classrooms were sampled. Even when this were not the case, some countries chose to sample more than one classroom in participating schools to include more students or better understand school-level differences.

I measure education models with these teaching practices. I use the degree of group work and student participation as measures of student-centered teaching and I use the extent to which teachers lecture, teach to the class as a whole, and focus on comprehension of class materials as teacher-centered practices (Table 1).[9] The student-centered model measures map onto a single underlying factor and teacher-centered model measures onto another, indicating that these measures reflect distinct, contrasting types of teaching practices (Appendix B). To create a measure of education models ranging from teacher-centered to student-centered, I construct a Student-centered Education Index ranging from 0 to 1 where student-centered education teaching practices load positively onto the index and teacher-centered education practices load negatively onto the index. Appendix B shows the iterated principal factor analysis and loadings used to construct the student-centered index in each survey.

[9] Items in PISA are from the student questionnaire and the items in PIRLS are from the teacher questionnaire.

Table 1. Component questions of the student-centered education index

Education model	Data	Question wording
Student-centered education	PISA (2018)	How often does the following occur in your reading class?[10] The teacher… • encourages students to express their opinion about a text • poses questions that motivate students to participate actively
	PIRLS (2006)	In a typical school week, what percentage of your time in class with students do you devote to the following activities?[11] • Working with individual students or small groups After students have read something, how often do you ask them to do the following?[12] • Write something about or in response to what they have read • Talk with each other about what they have read • Do a project about what they have read
Teacher-centered education	PISA (2018)	How often does the following occur in your reading class?[13] The teacher… • tells students what they have to learn • asks questions to check whether students understand what was taught
	PIRLS (2006)	In a typical school week, what percentage of your time in class with students do you devote to the following activities?[14] • Teaching the class as a whole After students have read something, how often do you ask them to do the following? • Answer reading comprehension questions in a workbook or on a worksheet about what they have read • Answer oral questions about or orally summarize what they have read • Take a written quiz or test about what they have read

[10] Response options include never or hardly ever, in some lessons, in most lessons, and in all lessons.

[11] Respondents wrote a number between 0 and 100 to indicate the relevant percentage.

[12] Response options include never or almost never, once or twice a month, once or twice a week, and every day or almost every day.

[13] Response options include never or hardly ever, in some lessons, in most lessons, and in all lessons.

[14] Respondents wrote a number between 0 and 100 to indicate the relevant percentage.

To illustrate how the index corresponds to its component items, I plot the index values along the average of the two student-centered teaching practice measures in PISA 2018 in Figure 1. I do the same with the teacher-centered education measures in Figure 2. The index is positively correlated with student-centered practices while negatively correlated with teacher-centered practices. It is also significantly more driven by student-centered than teacher-centered practices in the sense that student-centered practices load on much more strongly to the index than teacher-centered practices. To address this issue of biased loading, I supplement my main analysis by adding a robustness check where I replace the index with measures for each education model.

For my outcome, I measure civic engagement with news consumption and public discussion participation. As part of an effort to understand individual circumstances outside the classroom, PISA 2018 and PIRLS 2006 asked participants how often they consume news. PISA 2018 further asks about participation in public group discussions. Table 2 shows the question wording for each item and Figure 3 shows the distribution of responses that range from 0 (never or almost never) to 4 (several times a week) for newspaper consumption in PISA 2018 and to 3 (at least once a day) for the remaining three items. Summary statistics for all items are available in Appendix C. Overall, three in five participants in both surveys indicate that they consume news on at least a monthly basis. The majority do not take part in public group discussions but over two in five say that they do so at least several times a month.

Figure 1. Student-centered Education Index and average of student-centered practices

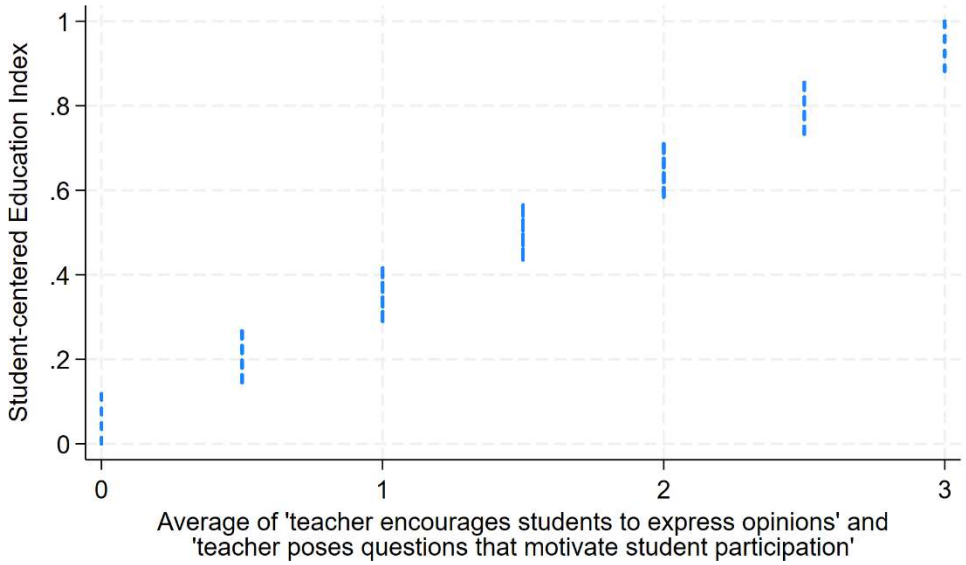


Figure 2. Student-centered Education Index and average of teacher-centered practices

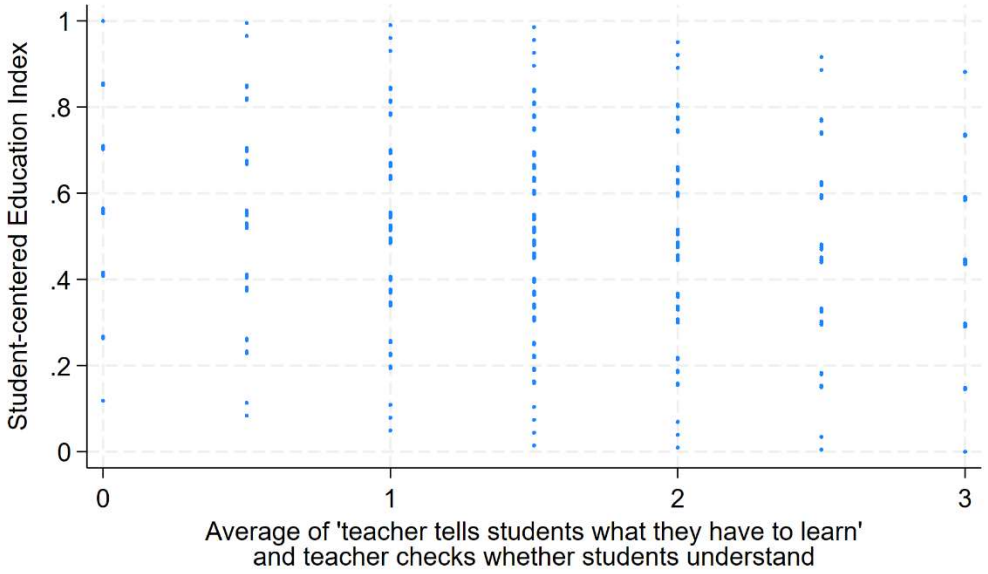


Table 2. Civic engagement measures

Data	Civic engagement	Question wording
PISA (2018)	Newspaper consumption	How often do you read these materials because you want to?[15] • Newspapers
	Online news consumption	How often are you involved in the following reading activities?[16] • Reading online news
	Public group discussion	How often are you involved in the following reading activities?[17] • Taking part in online group discussions or forums
PIRLS (2006)	Newspaper consumption	How often do you read these things outside of school?[18] • I read newspapers

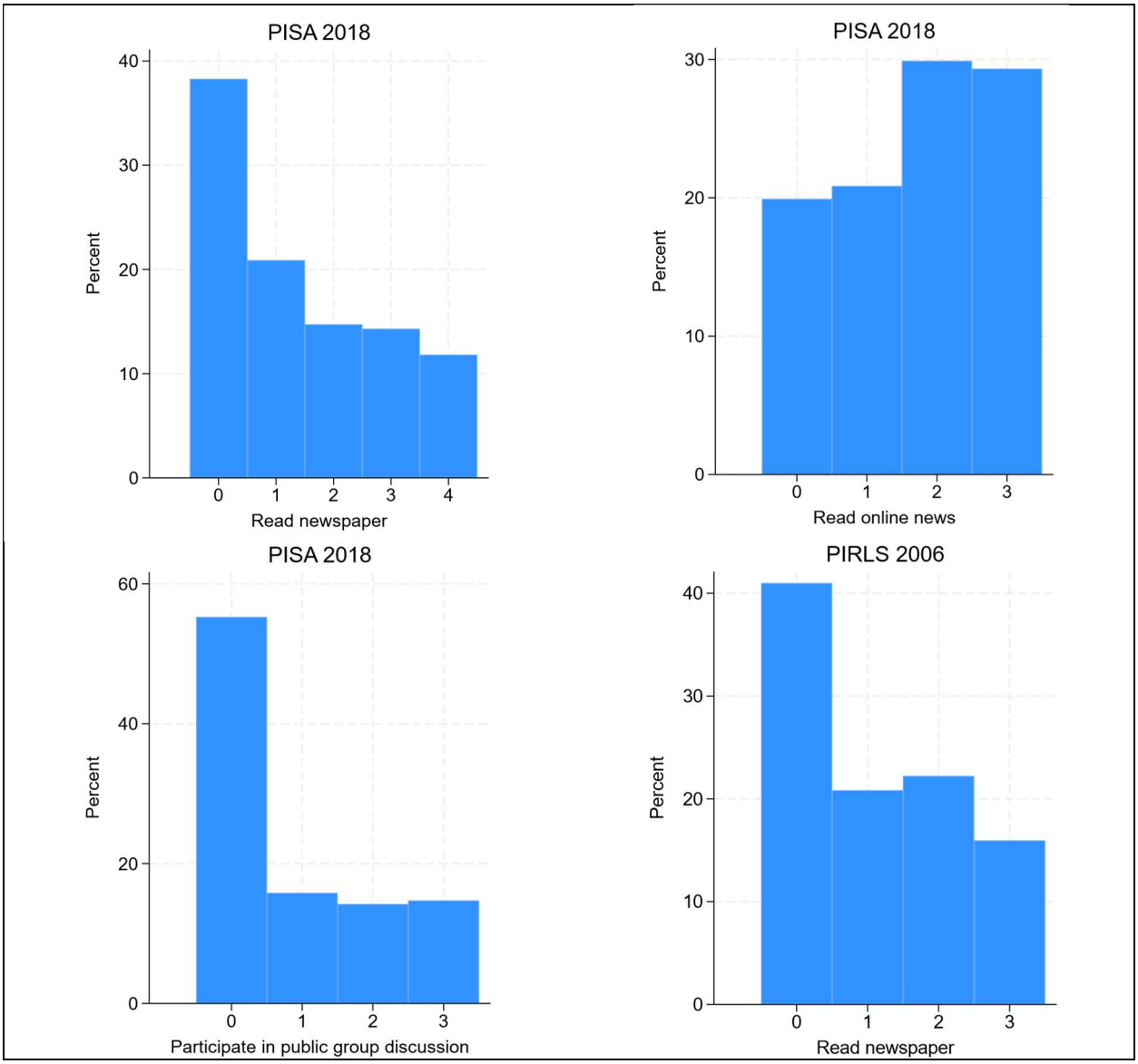
[15] Response options include never or almost never, a few times a year, about once a month, several times a month, and several times a week.

[16] Response options include I don't know what it is, never or almost never, several times a month, several times a week, and several times a day. I group the first two responses together.

[17] Response options include I don't know what it is, never or almost never, several times a month, several times a week, and several times a day. I group the first two responses together.

[18] Response options include never or almost never, once or twice a month, once or twice a week, and every day or almost every day.

Figure 3. Distribution of civic engagement items



Civic effects of student-centered education across countries

PISA's respondents are nested in schools, which are nested in countries. To account for the fact that individuals in the same school and those in the same country are more alike, I estimate multilevel models with random intercepts. This allows levels of civic engagement to vary by schools and by

countries. I predict how frequently the respondent reads newspapers, reads online news, and takes part in public group discussions with the student-centered education index.[19] I control for gender, socioeconomic status, and reading scores in all models.[20]

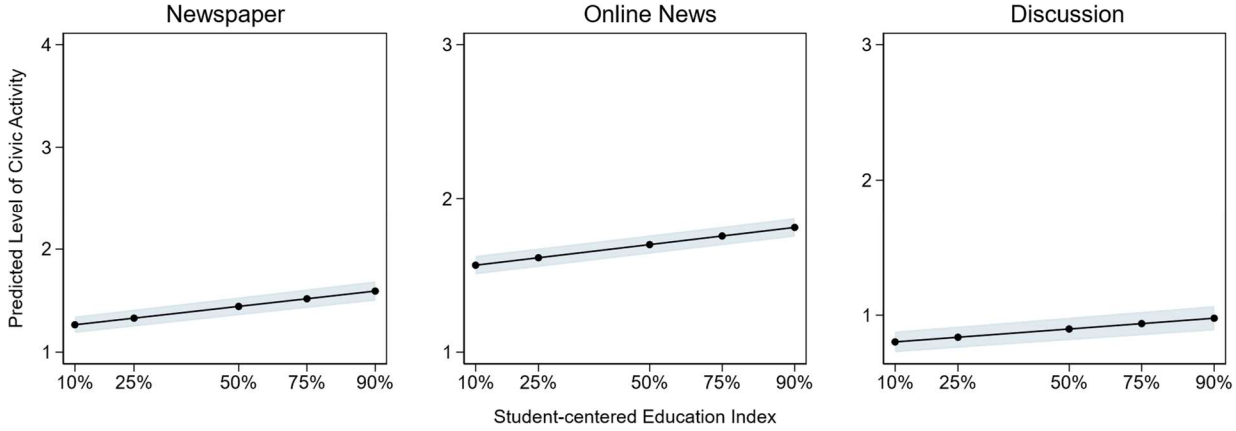
I find that across the board, student-centered education predicts higher levels of reading news and taking part in public group discussions (Appendix D1). A one-unit increase in the student-centered education index which ranges from 0 to 1 predicts 0.50 higher levels of reading newspapers which ranges from 0 to 4 (a little over one-third of a standard deviation), and 0.26 higher levels of taking part in public group discussions which ranges from 0 to 3 (a little over one-fifth of a standard deviation). Moving from the bottom quartile in the student-centered education

[19] Frequency of reading newspapers is measured with the question: "How often do you read these materials because you want to? Newspapers", to which respondents could answer never or almost never, a few times a year, about once a month, several times a month, and several times a week. Frequency of reading online news and taking part in public group discussions are each measured with the items: "How often are you involved in the following activities? Reading online news / Taking part in online group discussions or forums." Response options include I don't know what it is, never or almost never, several times a month, several times a week, and several times a day. I combine the first and second response categories to a single category of "never or almost never."

[20] To measure reading skills, I use the log of the respondent's score on the PISA 2018 reading test. I use PISA's index of Economic, Social, and Cultural Status (ESCS) to measure socioeconomic status. The index is a composite score based on the respondent's highest parental occupation, parental education, and possessions at home (desk, books, computer, art, etc.). I rescale the index to range from 0 to 1.

index to the top quartile is associated with an approximately 0.19 increase in reading newspapers, 0.14 increase in reading newspapers, and a 0.10 increase in taking part in public group discussions (Figure 4). These effect sizes are substantively large, given that an inter-quartile increase in student-centered education boosts news consumption more than gender.

Figure 4. Effects of student-centered education on civic activity, PISA 2018



Note: Multilevel regression estimates with robust standard errors shown along percentiles of the student-centered education index, which ranges from 0 to 1. 10% is at 0.23, 25% is at 0.36, 50% is at 0.59, 75% is at 0.74, and 90% is at 0.89. Outcome is frequency of each civic activity. Civic activity level ranges from 0 (Never or almost never) to 4 (several times a week) for newspaper and to 3 (several times a day) for online news and public discussions.

Results are robust to predicting civic engagement with separate measures for student-centered education and teacher-centered education rather than a single index that combines both education models. Here, I measure student-centered education with the mean of responses to how often teachers encourage student participation and discussion in their classes and I measure teacher-centered education with the mean of responses to how often teachers lecture to students and check understanding of class material by either questioning or tests.[21] Each measure ranges from 0 to 3, corresponding to the component items' original scale ranging from 0 "never or hardly

[21] Cronbach's alpha is 0.74 for student-centered education and 0.66 for teacher-centered education.

ever" to 3 "in all lessons." I include both student-centered education and teacher-centered education in place of the student-centered education index to predict levels of civic engagement. Consistent with Figure 4, student-centered education predicts higher levels of news consumption and public discussion (Table 3). While teacher-centered education also predicts more civic engagement, the estimated civic effect of teacher-centered education is significantly weaker than that of student-centered education. A one-unit increase in teacher-centered education predicts 0.2-0.5 higher levels of civic engagement - approximately 14-55% of student-centered education's estimated civic effects. These differences between the student-centered and teacher-centered education coefficients are statistically significant ($p = 0.00$) for each act of civic engagement.

Table 3. Predicting civic engagement with separate measures for each education model

	(1) Newspaper	(2) Online News	(3) Public Discussions
Student-centered Education	0.14*	0.09*	0.07*
	(0.01)	(0.00)	(0.01)
Teacher-centered Education	0.02*	0.05*	0.03*
	(0.01)	(0.00)	(0.00)
Girl	-0.19*	-0.04*	-0.16*
	(0.02)	(0.01)	(0.01)
Socioeconomic Status	1.17*	1.34*	1.27*
	(0.12)	(0.06)	(0.09)
Reading score, logged	-0.17*	0.37*	-0.52*
	(0.07)	(0.03)	(0.03)
Constant	1.54*	-1.69*	3.16*
	(0.45)	(0.21)	(0.20)
Observations	507,377	500,814	502,324
Number of countries	72	72	72

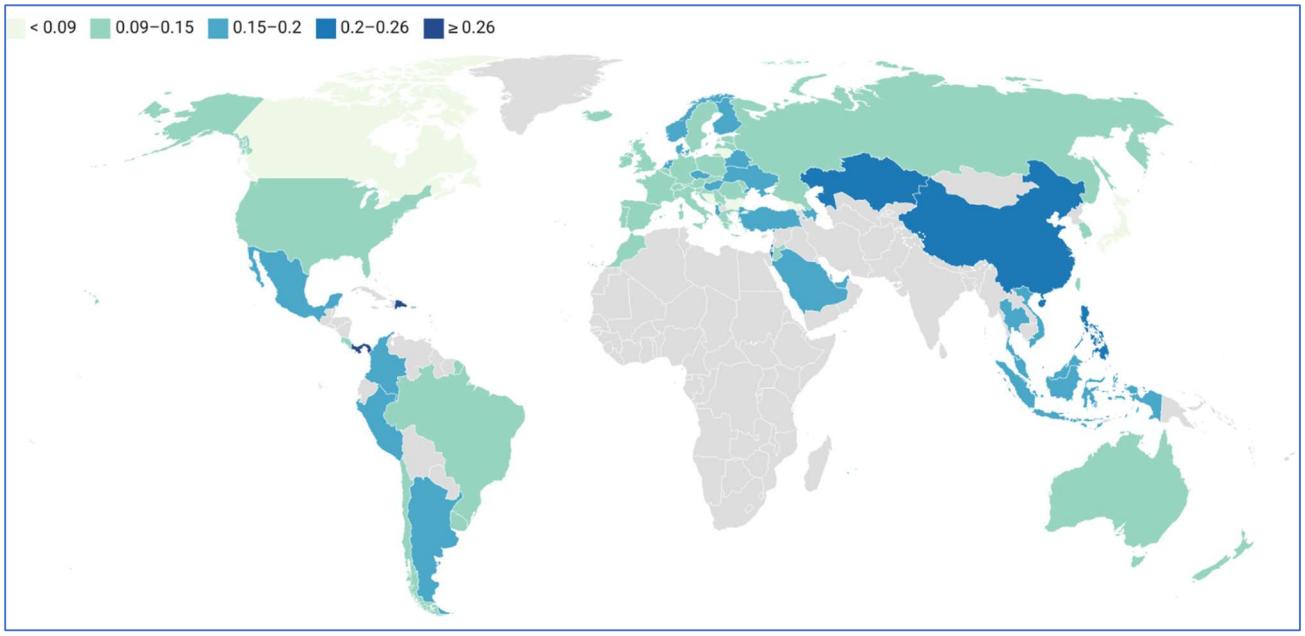
Note: Multilevel regression estimates with robust standard errors shown in parentheses. Student-

and teacher-centered education ranges from 0 to 3. Outcome is frequency of each civic activity. Civic activity level ranges from 0 (Never or almost never) to 4 (several times a week) for newspaper and to 3 (several times a day) for online news and public discussions. * $p<0.05$

These results mostly hold when looking at the civic effect of each education model within countries. Except for a handful of countries that include Bosnia and Herzegovina, Germany, Greece, Japan, and Uruguay, individuals in each country who are learning in more student-centered models are more attentive to news and public discussions. This is the case in a wide range of countries that include varying levels of democracy and income. Figures 5, 6, and 7 show each country shaded according to its estimated size of the civic effect of student-centered education – darker shades indicate larger effect sizes and gray indicates missing data. The civic effect of student-centered education as measured in Table 3 range from 0.04 to 0.31 for newspapers, 0 to 0.20 for online news, and 0 to 0.21 for group discussions. In contrast, the estimated civic effect of teacher-centered education is modest and not as consistent (Appendix D2). While student-centered education predicts higher levels of reading news in all 73 countries except Japan and Germany, those learning in teacher-centered models are more attentive to news and public discussions in less than half of the countries.[22] In sum, both across the board and within countries, those who are learning in student-centered models are more likely to be active citizens to a larger extent than those learning in teacher-centered models.

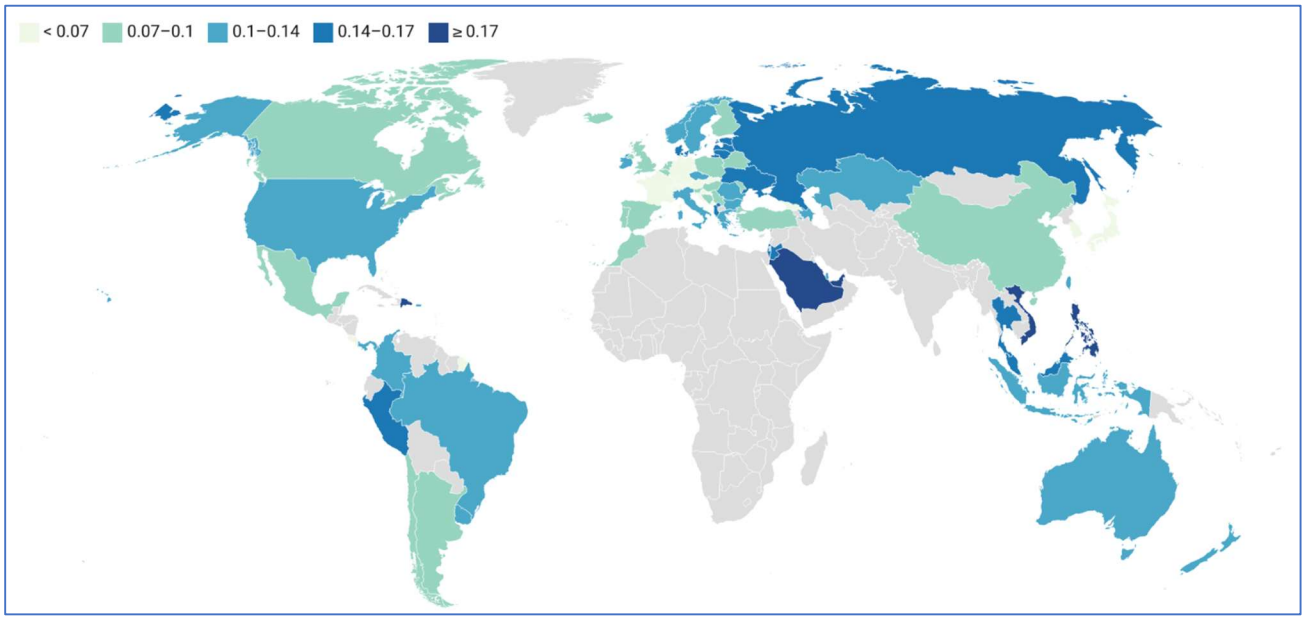
[22] These countries are Australia, Brazil, Brunei Darussalam, China, Colombia, Croatia, Denmark, Dominican Republic, Hungary, Indonesia, Ireland, Israel, Italy, Kazakhstan, Jordan, Malaysia, Malta, Mexico, New Zealand, Peru, Philippines, Poland, Qatar, Saudi Arabia, Singapore, Slovenia, Sweden, Thailand, Taiwan, Turkey, United Arab Emirates, United Kingdom, and United States.

Figure 5. Effects of Student-centered Education on Reading Newspapers by Country



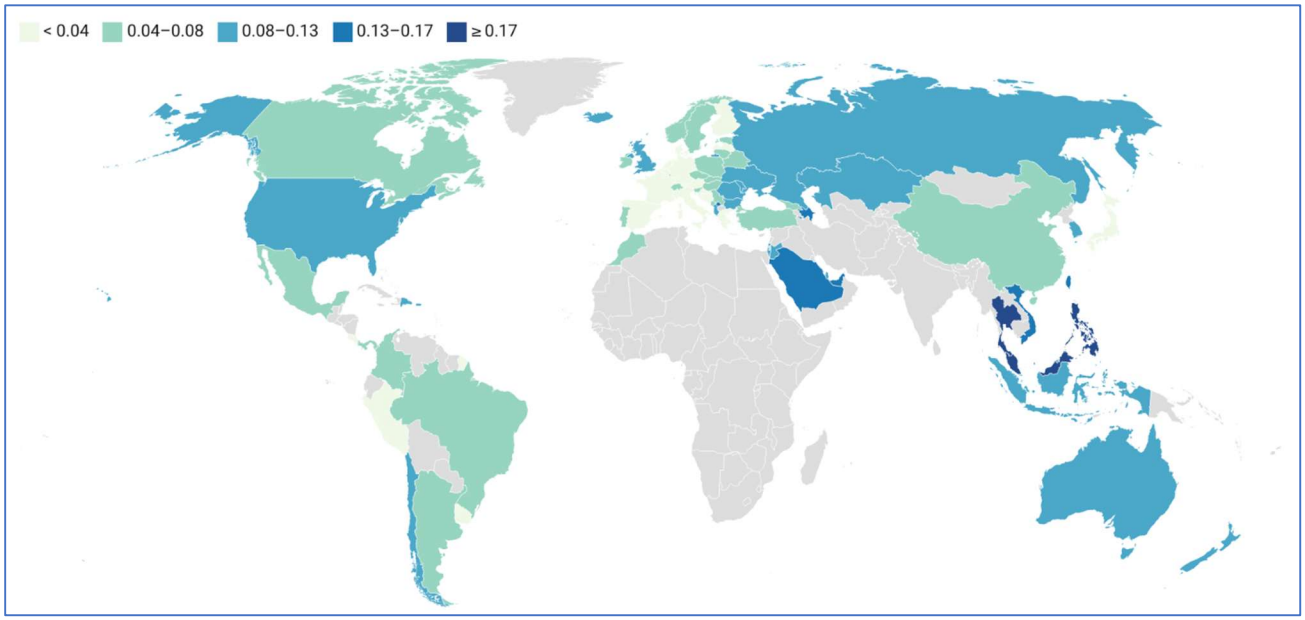
Note: Countries shaded by estimated effect sizes when predicting frequency of reading newspapers with student-centered education. Darker shades indicate larger effect sizes. Estimates for all countries except Japan are statistically significant at p<.05.

Figure 6. Effects of Student-centered Education on Reading Online News by Country



Note: Countries shaded by estimated effect sizes when predicting frequency of reading online news with student-centered education. Darker shades indicate larger effect sizes. Estimates for all countries except Germany are statistically significant at p<.05.

Figure 7. Effects of Student-centered Education on Discussion by Country



Note: Countries shaded by estimated effect sizes when predicting frequency of taking part in online group discussions with student-centered education. Darker shades indicate larger effect sizes. Estimates for all countries except for Bosnia and Herzegovina, Germany, Greece, Japan, and Uruguay are statistically significant at p<.05.

Comparing classrooms within schools

With PISA data I find that those who learn in student-centered models are significantly more active citizens who more frequently engage with civic issues in public spheres. Although this is consistent with my argument that student-centered models matter for civic outcomes, there is a potential issue: individuals who are predisposed to being active citizens may choose to go to schools that offer more voice to their students. Those who enjoy expressing their opinions in group settings may choose to attend student-centered schools where students have more voice during class and in school matters. If this were the case, then even if we observe that individuals learning in student-centered models are more engaged citizens, this correlation would be spurious. Rather than showing the civic effect of student-centered education, a positive correlation between student-

centered education and civic activity would simply be an artifact of certain types of people choosing to go to certain schools.

One way to address such sorting is to compare students within schools. Individuals can choose what school to attend, but education models vary across classes within schools as well as across schools. I use data from the 2006 round of PIRLS to compare students within schools. Unlike PISA which randomly selects participants from a list of all students in each of their sampled schools, PIRLS randomly selects one or more intact classes of students from each participating school. In approximately 35% of schools included in PIRLS 2006, two or more classrooms were sampled and teachers who taught reading for each classroom were asked about their teaching practices.[23] This allows me compare students within schools to assess whether whether students learning in more student-centered classes within their school are more engaged citizens than their peers.

As with the PISA 2018 analysis, I use the Student-centered Education Index to predict civic engagement as measured with levels of newspaper consumption.[24] The PIRLS 2006 student questionnaire asked participants how often they read various forms of texts outside of school. To assess impacts on engagement with civic issues distinct from engagement with reading in general, I estimate the effect of student-centered education on reading newspapers and compare this to other non-civic forms of reading, such as reading non-fiction texts, novels, and comic books.[25]

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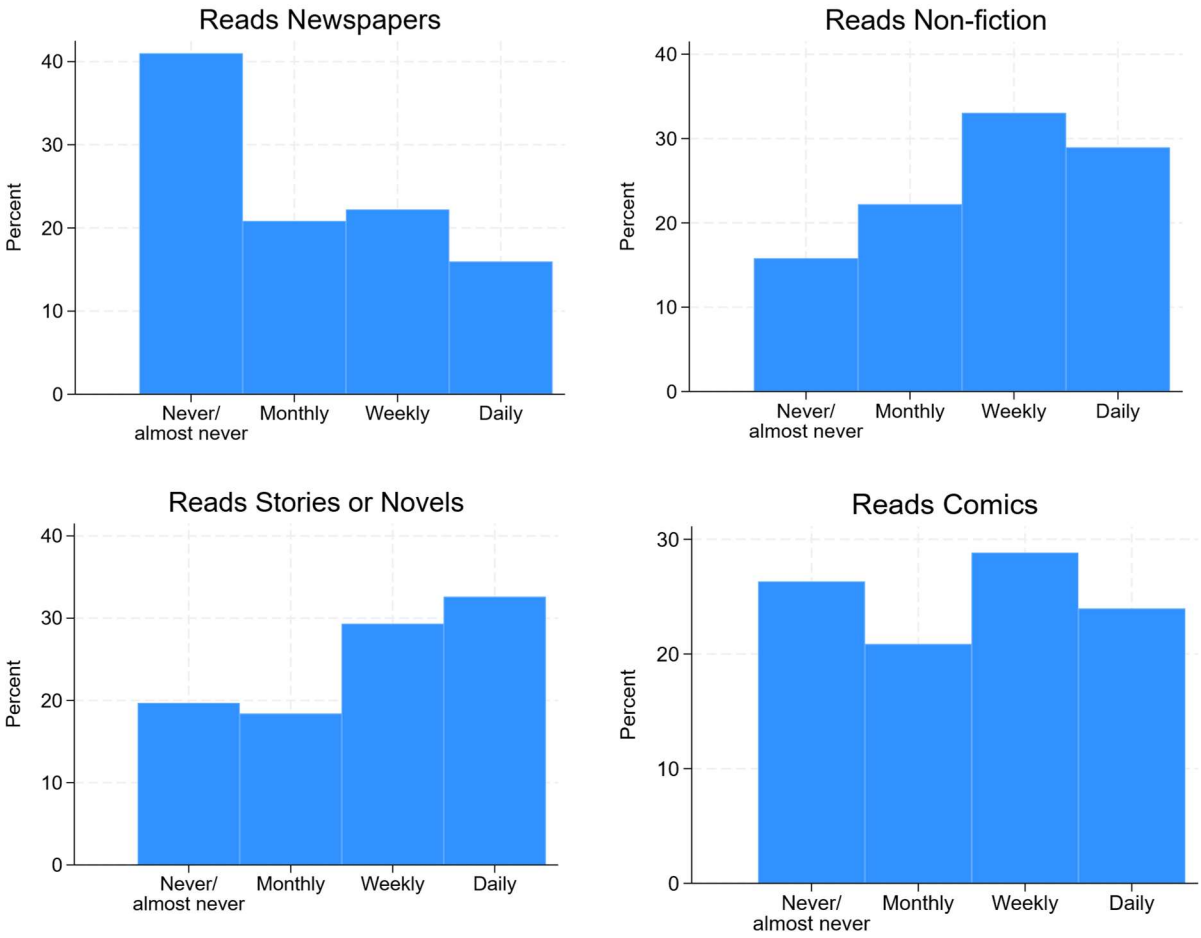
[23] Approximately 50.05% of students in PIRLS 2006 were included in these schools.

[24] Unlike PISA 2018, PIRLS 2006 did not include questions on online news consumption or taking part in public discussions so I cannot include these measures of civic engagement here.

[25] Respondents chose between "Never or almost never", "Once or twice a month", "Once or twice a week", and "Every day or almost every day."

Newspapers are, unsurprisingly, the least popular reading material within my sample of fourth grade students. A little over one in three read newspapers at least once a week, compared to over one in two who read non-fiction, novels, or comic books weekly (Figure 8). [26]

Figure 8. Distribution of reading newspapers and other materials



I predict student responses to these items with the Student-centered Education Index. To estimate within-school effects of education models, I restrict the analysis to schools that included

[26] I omit the figure for reading magazines here since it closely follows that for reading comics.

two or more classrooms and fit fixed-effects regression models with school fixed effects. This allows me to control for school-level characteristics and estimate the causal effect of classroom-level education models on civic engagement among individuals attending the same school.[27] I control for the student's gender, reading performance, and parents' level of education. In effect, I am testing the degree to which classroom-level variation in education models (as measured with the classroom's reading teacher questionnaire) shapes individual-level civic engagement (as measured with student questionnaires) while controlling for factors that may affect both school choice and civic engagement.

Consistent with the PISA 2018 analysis, the Student-centered Education Index predicts higher engagement with news – a maximal increase in the index from 0 to 1 predicts 0.16 higher levels of newspaper consumption (one-tenth of a standard deviation), which ranges from 0 "Never or almost never" to 3 "Every day or almost every day" (Table 4, model 1). That is, comparing individuals within the same school, those who are learning in more student-centered classrooms are more likely to seek out news about their community. Is this simply a byproduct of student-centered education raising interest in reading? Student-centered education may increase news consumption

[27] The subset of schools with two or more classrooms has similar mean levels of student-centered education and newspaper consumption as the full PIRLS 2006 sample – 0.29 and 1.13 respectively for the subset and 0.24 and 1.19 respectively for the full sample. The main analysis results in Table 4 mostly replicate when using the full sample and fitting a multilevel regression model without school fixed effects, with the one inconsistency being that in addition to newspaper consumption, the Student-centered Education Index also predicts higher levels of reading novels rather than non-fiction (Appendix E1).

because it makes individuals more interested in reading than teacher-centered education. It may be that newspapers are one among a variety of things individuals read when they enjoy reading, rather than something that individuals turn to when they are interested in civic issues. I find that this is unlikely to be the case. In models 2 to 5 in Table 4, I estimate the effect of the Student-centered Education Index on the frequency of other, non-civic forms of reading such as non-fiction (model 2), stories or novels (model 3), comic books (model 4), and magazines (model 5). Student-centered education does not predict higher engagement with most of these forms of reading other than non-fiction. That is, individuals learning in student-centered models are more active citizens who seek out information about their community, rather than being more voracious readers who generally read more than their peers.

Results are robust to using separate measures for student-centered and teacher-centered education rather than a single index of education models. Here, I measure student-centered education with the percentage of time teachers spend working with groups and teacher-centered education with the percentage of time teachers spend teaching to the class as a whole.[28] When I include both measures in place of the Student-centered Education Index and otherwise replicate

[28] I rescale these items to range from 0 to 1 rather than 0 to 100. While I also included three addition items on post-reading activities for each education model to construct the Student-centered Education Index, I omit these items here due to low internal consistency. Cronbach's alpha for all four items on student-centered education practices for PIRLS 2006 in Table 1 is 0.54 and is 0.45 for the four teacher-centered education practice items. The three items on post-reading activities also have low internal consistency – for student-centered education practices, Cronbach's alpha is 0.57 and for teacher-centered practices, it is 0.49.

the Table 4 analysis, results do not substantively change (Table 5). Student-centered education predicts higher engagement with news – increasing the percentage of student-centered education from 0 to 100 predicts 0.17 higher levels of newspaper consumption, equivalent to approximately a tenth of a standard deviation. I do not detect a civic effect of teacher-centered education, and the coefficient on student-centered education is significantly higher than the coefficient on teacher-centered education ($p = 0.02$). Neither education models predict higher levels of reading materials other than newspapers.

Table 4. Within-school estimates of the civic effect of education models

	(1) News	(2) Non-fiction	(3) Novels	(4) Comics	(5) Magazines
Student-centered Education Index	0.16*	0.13*	0.12	0.00	0.05
	(0.01)	(0.02)	(0.06)	(0.97)	(0.36)
Girl	0.03*	0.05*	0.41*	-0.29*	0.32*
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Parents' education	-0.01*	-0.01	0.05*	0.01*	-0.02*
	(0.02)	(0.08)	(0.00)	(0.00)	(0.00)
Reading score, logged	0.00	-0.00*	0.00*	-0.00	0.00
	(0.07)	(0.00)	(0.00)	(0.72)	(0.12)
Class size	0.00	0.00	0.00	-0.00	0.00
	(0.18)	(0.21)	(0.30)	(0.64)	(0.99)
Teacher experience	-0.00	0.00	-0.00	-0.00	0.00
	(0.30)	(0.31)	(0.22)	(0.42)	(0.37)
Constant	1.07*	1.88*	0.47*	1.66*	1.26*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	72,543	73,552	73,762	74,136	73,244
Within-school R-squared	0.00	0.00	0.06	0.02	0.02

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is how often the student reads newspapers (model 1), books that explain things (model 2), stories or novels (model 3), comic books (model 4), and magazines (model 5). Reading score is the respondent's score on the PIRLS 2006 test. Parents' education is the highest level of education attained by either/both parents (lower secondary or less, upper secondary, post-secondary, BA, or graduate degree). Class size is the number of students in the respondent's class and teacher experience is the number of years that the respondent's teacher has worked as a teacher. Robust standard errors clustered at the school level in parentheses. * $p<0.05$.

Table 5. Within-school estimates of the civic effect of education models using separate measures for each education model

	(1) News	(2) Non-fiction	(3) Novels	(4) Comics	(5) Magazines
Student-centered education	0.17*	0.09	0.14	0.02	-0.00
	(0.04)	(0.23)	(0.12)	(0.81)	(1.00)
Teacher-centered education	0.03	-0.02	0.02	0.03	-0.03
	(0.67)	(0.74)	(0.79)	(0.68)	(0.67)
Girl	0.02*	0.05*	0.41*	-0.29*	0.32*
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Parents' education	-0.01*	-0.01	0.05*	0.01*	-0.02*
	(0.03)	(0.06)	(0.00)	(0.00)	(0.00)
Reading score, logged	0.00	-0.00*	0.00*	-0.00	0.00
	(0.09)	(0.00)	(0.00)	(0.64)	(0.20)
Class size	0.00	0.00	0.00	-0.00	0.00
	(0.38)	(0.21)	(0.39)	(0.81)	(0.88)
Teacher experience	-0.00	0.00	-0.00	-0.00	0.00
	(0.24)	(0.26)	(0.19)	(0.56)	(0.31)
Constant	1.07*	1.90*	0.47*	1.63*	1.30*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	73,921	74,947	75,160	75,540	74,623
Within-school R-squared	0.00	0.00	0.06	0.02	0.02

Note: Fixed-effects regression coefficients shown with school fixed effects. Both student-centered and teacher-centered education range from 0 to 1. Outcome is how often the student reads newspapers (model 1), books that explain things (model 2), stories or novels (model 3), comic books (model 4), and magazines (model 5). Reading score is the respondent's score on the PIRLS 2006 test. Parents' education is the highest level of education attained by either/both parents (lower secondary or less, upper secondary, post-secondary, BA, or graduate degree). Class size is the number of students in the respondent's class and teacher experience is the number of years that the respondent's teacher has worked as a teacher. Robust standard errors clustered at the school level in parentheses. * $p<0.05$.

Why does student-centered education increase civic engagement? I argue that individual perceptions of the nature of their community drive the civic effect of student-centered education.

While those who learn in more student-centered models are not any more connected to friends nor any more likely to view their school and teachers favorably (Table 6), they are significantly more likely to perceive that their peers at school respect, care for, and help each other (Table 7). These findings are consistent with student-centered models shaping beliefs that their community is one where individuals are invested in the welfare of others, and step in to help. Then as members of such a community, individuals learning in student-centered models are motivated to actively learn about community issues through means such as reading the news.

I observe these differences across classrooms within the same school – individuals learning in more student-centered classrooms are more likely than their peers learning in the same school to believe that their school community beyond their classroom is one where individuals help each other out. That is, when individuals are asked about the same group of students, those who are learning in a more horizontal education model hold more communal views of their peers. It is notable that education models that vary at the classroom level shape more general perceptions of schoolmates outside the individuals' own classroom. And the fact that student-centered education predicts higher levels of interest in news about their community beyond their school implies that individuals take their experiences in class to form beliefs about not only their school community beyond the classroom, but also their political community beyond their school.

Table 6. Education models, social connections, and perceptions of school and teacher

	(1) Talk with friends[29]	(2) Chat with friends[30]	(3) Perception of school[31]	(4) Perception of teachers[32]
Student-centered Education Index	0.09	0.02	0.08	0.04
	(0.16)	(0.81)	(0.22)	(0.39)
Girl	0.20*	0.07*	0.31*	0.15*
	(0.00)	(0.00)	(0.00)	(0.00)
Parents' education	0.00	0.01	-0.01*	-0.01*
	(0.44)	(0.06)	(0.00)	(0.03)
Reading score, logged	0.00*	-0.00*	0.00	0.00*
	(0.01)	(0.00)	(0.77)	(0.00)
Class size	0.00	0.00	0.00	-0.00
	(0.11)	(0.93)	(0.59)	(0.55)
Teacher experience	-0.01*	0.01*	-0.00*	-0.00
	(0.01)	(0.04)	(0.04)	(0.09)
Constant	1.11*	1.43*	2.17*	2.23*
	(0.00)	(0.00)	(0.00)	(0.00)
Observations	73,498	73,191	73,888	70,473
Within-school R-squared	0.01	0.00	0.03	0.01

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is how often the student talk or chat with friends (models 1-2), perceptions of their school (model 3), and

[29] I use responses to how often the individual talks with friends about what they reading. Responses include never or almost never, once or twice a month, once or twice a week, and every day or almost every day. I code these responses to range from 0 to 3.

[30] I use responses to how often the individual uses the Internet to chat, e-mail, or instant message with friends. Responses include never or almost never, once or twice a month, once or twice a week, and every day or almost every day. I code these responses to range from 0 to 3.

[31] I use agreement with the statement "I like being in school." Responses include disagree a lot, disagree a little, agree a little, and agree a lot. I code these responses to range from 0 to 3.

[32] I use agreement with the statement "I think that teachers in my school care about me." Responses include disagree a lot, disagree a little, agree a little, and agree a lot, coded to range from 0 to 3.

perceptions of their teachers (model 4), which all range from 0 to 3. Robust standard errors clustered at the school level in parentheses. * p<0.05.

Table 7. Student-centered education and perceptions of peers

	(1) Peers are respectful[33]	(2) Peers care about each other[34]	(3) Peers help each other[35]
Student-centered Education Index	0.14*	0.18*	0.20*
	(0.03)	(0.01)	(0.00)
Girl	0.06*	0.11*	0.11*
	(0.00)	(0.00)	(0.00)
Parents' education	-0.02*	-0.01*	-0.02*
	(0.00)	(0.01)	(0.00)
Reading score, logged	-0.00*	-0.00*	-0.00*
	(0.00)	(0.00)	(0.00)
Class size	0.00	0.00	0.00*
	(0.30)	(0.15)	(0.05)
Teacher experience	-0.00	-0.00	-0.00
	(0.13)	(0.17)	(0.46)
Constant	2.23*	2.12*	2.18*
	(0.00)	(0.00)	(0.00)
Observations	73,143	72,946	73,484
Within-school R-squared	0.01	0.01	0.01

[33] I use agreement with the statement "Students in my school show respect to each other." Responses include disagree a lot, disagree a little, agree a little, and agree a lot. I code these responses to range from 0 to 3.

I use agreement with the statement "Students in my school care about each other." Responses include disagree a lot, disagree a little, agree a little, and agree a lot. I code responses to range from 0 to 3.

[35] I use agreement with the statement "Students in my school help each other with their work." Responses include disagree a lot, disagree a little, agree a little, and agree a lot. I code responses to range from 0 to 3.

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is perception of peers at their school respecting each other (model 1), caring for each other (model 2), and helping each other (model 3). Robust standard errors clustered at the school level in parentheses. * $p<0.05$.

Correlates of student-centered education

Using data from PIRLS and PISA, I find that individuals learning in student-centered models are more active, engaged citizens who hold more communal views of their peers. The causal leverage of the PIRLS over PISA analysis is that I can compare classrooms within schools. Within-school comparisons allow me to factor out the possibility of my estimates being an artifact of individuals selecting into certain types of schools that are either more student- or teacher-centered. Even so, I need to assume that certain types of students are not systematically sorted into different classrooms within schools that may differ in its education model. Does this assumption hold? I can test whether it does by checking for differences in student characteristics that plausibly matter for adopting one education model over the over.

As with the preceding analysis in Tables 5-7, I restrict the analysis to schools that included two or more classrooms and fit fixed-effects regression models with school fixed effects to estimate within-school effects. I rescale the Student-centered Education Index to range from 0 to 100 to facilitate interpretation and predict the rescaled index with preschool attendance, primary language at home, home resources, reading performance, and disorderly behavior.[36] It may be, for

[36] I use responses from the parent survey to measure their child's preschool attendance, primary language, and home resource. Preschool attendance is a binary variable of whether the student attended preschool and primary language is an indicator of whether the student engaged with various activities at home (read books, sing songs, play with toys, talk about things they did, etc.) in the test language before attending the current level of education. Home resources are measured

example, that high-performing and good behavior students are grouped together in elite advanced classes. Teachers may find it easier to adopt student-centered models in such classrooms and high-performing students may hold a more positive view of their schoolmates because of their higher status, rather than because of the education model they are learning in. I find that contrary to this scenario, student-centered classrooms are not distinguishable in terms of these student characteristics (Table 8). This is the case whether I measure disorderly behavior with bullying (model 1), stealing (model 2), or hurting peers (model 3). Results hold when I measure home resources with perceptions of household wealth rather than the number of books at home.[37] In sum, I do not find evidence of certain types of students being systematically sorted into different education models within their school.

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with the number of books at home – respondents chose between 0-10, 11-25, 26-100, 101-200, and more than 200. I code these responses to range from 0 to 4. Reading performance is the student's score on the PIRLS 2006 reading test. Disorderly behavior is measured with student responses to whether they were bullied, thieved, or injured by another student in the last month.

[37] This analysis is shown in Appendix E2. PIRLS 2006 did not ask its respondents about income but did ask about perceptions of respondents' perceptions of their household wealth levels with the question: "Compared with other families, how well-off do you think your family is financially?" Respondents could choose between not at all well-off, not very well-off, average, somewhat well-off, and very well-off. I code these responses to range from 0 to 4. In Appendix E2, I use this item to measure home resources.

Table 8. Predicting student-centered education with student characteristics

	(1)	(2)	(3)
Preschool attendance	0.03	0.03	0.03
	(0.83)	(0.82)	(0.81)
Primary language	-0.17	-0.16	-0.16
	(0.25)	(0.26)	(0.27)
Home resources	0.03	0.04	0.03
	(0.28)	(0.26)	(0.30)
Reading performance	-0.00	-0.00	-0.00
	(0.58)	(0.67)	(0.64)
Disorder: bullying	-0.14		
	(0.12)		
Disorder: stealing		-0.04	
		(0.66)	
Disorder: violence			-0.02
			(0.81)
Constant	28.87*	28.77*	28.78*
	(0.00)	(0.00)	(0.00)
Observations	74,458	74,846	74,595
Within-school R-squared	0.00	0.00	0.00

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is the Student-centered Education Index rescaled to range from 0 to 100. Model 1 measures disorderly behavior with bullying, model 2 does so with stealing, and model 3 does so with violence. Robust standard errors clustered at the school level in parentheses. * p<0.05.

If student characteristics do not shape education models, what does? I repeat the analysis in Table 8 but this time using teacher and classroom characteristics as predictors.[38] I find that teachers with

[38] All items are from the teacher survey. Experience is measured as years of teaching experience (0-54). Female teacher is a binary indicator for whether the teacher chose "Female" to the question

recent training in teaching methods are more likely to adopt student-centered education models (Table 9).[39] This implies that student-centered teaching is an acquired practice. It is not the case that teachers with certain fixed qualities are more likely to choose one education model over another. It is also not the case that the profile of their students, the size of their classes, or the amount of teaching time dictate which education model to adopt. Rather, teachers who are exposed to more messages and training on instructional methods are more likely to practice student-centered education.

"Are you female or male?" Education level is measured with the highest level of formal education completed by the teacher. Training is measured with the number of hours the teacher spent in "in-service/professional development workshops or seminars that dealt directly with reading or teaching reading (e.g., reading theory, instructional methods)" in the past two years. Respondents could choose among none, less than 6 hours, 6-15 hours, 16-35 hours, and 35+ hours. Class size is the number of students in the classroom. Instruction time is measured with three items: the number of hours the teacher spends on language instruction and/or activities with students (0-15), the number of hours in reading instruction and/or activities with students (0-20), and how frequently students receive reading instruction. For the third item, respondents chose between fewer than three days a week, 3-4 days a week, and every day.

[39] Results hold when I substitute teacher experience with the teacher's age (Appendix E3). Teachers chose between under 25, 25-29, 30-39, 40-49, 50-59, and 60+ to indicate their age. I code these responses to range from 0 to 5.

Table 2. Predicting student-centered education with teacher and class characteristics

	(1)	(2)	(3)
Teacher experience	-0.03	-0.03	-0.02
	(0.42)	(0.27)	(0.45)
Female teacher	0.65	0.76	0.69
	(0.49)	(0.41)	(0.44)
Teacher education level	0.39	0.13	0.24
	(0.36)	(0.76)	(0.55)
Teacher training	0.67*	0.76**	0.70**
	(0.01)	(0.00)	(0.01)
Class size	-0.16	-0.14	-0.14
	(0.11)	(0.13)	(0.15)
Instruction time for language (duration)	-0.18		
	(0.33)		
Instruction time for reading (duration)		0.04	
		(0.71)	
Instruction time for reading (frequency)			0.05
			(0.92)
Constant	31.65*	30.04*	29.84*
	(0.00)	(0.00)	(0.00)
Observations	81,105	83,998	86,915
Within-school R-squared	0.01	0.01	0.01

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is the Student-centered Education Index rescaled to range from 0 to 100. Model 1 measures instruction time with the number of hours teachers meet with students for language instruction. Model 2 does so with the number of hours for reading instruction, and model 3 does so with the number of days per week teachers meet with students for reading instruction. Robust standard errors clustered at the school level in parentheses. * $p<0.05$.

Overall, in this chapter I find that those who are learning in student-centered models are more engaged citizens who are attentive to news and public discourse. I find this to be the case across countries, within countries, and within schools. In the next chapter, I examine whether education

models also matter for long-term outcomes. As civic acts such as voting are exclusively available for adults in many countries, it is difficult to assess civic effects of education with data from only a particular point in time. To address the time gap between exposure to education models and civic activity, I test my theory with panel data that tracks individuals from middle school to adulthood in the next chapter.

Appendix A. PISA 2018 and PIRLS 2006

PISA 2018

PISA 2018 was administered to 600,000 15-year-old students in 79 countries and economies. Schools were randomly sampled within each country and each school randomly sampled 35-42 students who took a two-hour test on reading, science, mathematics, global competence, and financial literacy. Along with these tests, PISA 2018 also administered background questionnaires on participating students, their parents, teachers, and schools.

I exclude non-country territories such as Hong Kong and Macao, and also exclude North Macedonia which did not ask about student-centered education. Remining 74 countries in PISA are: Albania, Baku (Azerbaijan), Argentina, Australia, Austria, Belgium, Bosnia and Herzegovina, Brazil, Brunei Darussalam, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Dominican Republic, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Kosovo, Japan, Kazakhstan, Jordan, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Moldova, Montenegro, Morocco, Netherlands, New Zealand, Norway, Panama, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Serbia, Singapore, Slovak Republic, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Ukraine, United Arab Emirates, Ukraine, United Kingdom, United States, Uruguay, and Vietnam.

Within these countries, 85% of sampled schools (with replacements) participated in PISA 2018 except for the United States (76%) and at least 80% of sampled students participated except for Portugal (76%).

	Mean	Range
Number of schools per country	280.38	44 – 1,089
Number of students per school	26.31	1 – 483
Total number of students	542,051	

PIRLS 2006

Approximately 215,000 4th grade students in 40 countries took part in PIRLS 2006. Along with assessing participants' reading skills, PIRLS also administered student, teacher, parent, and school questionnaires as with PISA 2018. In PIRLS 2006, at least 130 schools were randomly sampled within countries in the first stage of sampling, and then one or more intact classrooms (4,100+ students in each country) were sampled within schools. At least 86% of sampled schools participated (with replacements) and 99-100% of sampled classrooms participated in PIRLS 206. 89% or more of sampled students in selected schools participated in each country.

I restrict the analysis to a subset of participating schools that sampled two or more classrooms. 35.2% of schools participating in PIRLS 2006 sampled two or more classrooms. 50.1% of students in PIRLS 2006 were included in these schools. Participating schools were not required to sample

more than one classroom. However, in cases where the country's average class size was sufficiently small so that sampling one classroom from each sampled school would not satisfy the target national student sample of 4,000 students, two or more classrooms were sampled. Even when this were not the case, some countries chose to sample more than one classroom in participating schools to include more students or better understand school-level differences. The 33 countries I analyze include: Austria, Belgium, Bulgaria, Canada, Denmark, England, France, Georgia, Hungary, Iceland, Italy, Kuwait, Latvia, Lithuania, Luxembourg, Moldova, Netherlands, New Zealand, Norway, Poland, Qatar, Romania, Scotland, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Taiwan, Trinidad and Tobago, North Macedonia, and United States.

	Mean	Range
Number of schools per country	67.6	1 – 177
Number of classrooms per school	2.2	2 – 7
Number of students per classroom	19.4	1 – 49
Total number of students	107,104	

Appendix B. Factor analysis for Student-centered Education Index

1) PISA 2018

Factor analysis using iterated principal factors

Factor	Variance	Difference	Proportion
Factor 1	1.16	0.15	0.53
Factor 2	1.02	1.00	0.46
Factor 3	0.01	-	0.01

Rotated factor loadings (varimax)

Education model	Item	Factor		Uniqueness
		1	2	
Student-centered	The teacher encourages students to express their opinion about a text	0.73	0.20	0.43
	The teacher poses questions that motivate students to participate actively	0.73	0.26	0.40
Teacher-centered	The teacher tells students what they have to learn	0.21	0.78	0.62
	The teacher asks questions to check whether students understand what was taught	0.21	0.58	0.35

Scoring coefficients for education model index based on rotated factors (Factor 1)

Education model	Item	Coefficients
Student-centered	The teacher encourages students to express their opinion about a text	0.48
	The teacher poses questions that motivate students to participate actively	0.49
Teacher-centered	The teacher tells students what they have to learn	-0.02
	The teacher asks questions to check whether students understand what was taught	-0.11

2) PIRLS 2006

Factor analysis using iterated principal factors

Factor	Variance	Difference	Proportion
Factor 1	1.69	0.13	0.52
Factor 2	1.56	1.33	0.48
Factor 3	0.23	0.16	0.07

Rotated factor loadings (varimax)

Education model	Item	Factor		Uniqueness
		1	2	
Student-centered	Percentage of time teacher works with individual students or small groups	0.02	0.94	0.11
	Students write something about what they read	0.63	0.06	0.60
	Students talk with each other about what they read	0.52	0.10	0.72
	Students do a project about what they read	0.47	0.08	0.78
Teacher-centered	Percentage of time teacher teaches class as a whole	0.01	-0.81	0.35
	Students answer reading comprehension questions about what they read	0.52	-0.07	0.73
	Students orally summarize what they read	0.60	-0.03	0.64
	Students take a test about what they read	0.42	-0.12	0.81

Scoring coefficients for education model index based on rotated factors (Factor 2)

Education model	Item	Coefficients
Student-centered	Percentage of time teacher works with individual students or small groups	0.78
	Students write something about what they read	0.01
	Students talk with each other about what they read	0.01
	Students do a project about what they read	0.01
Teacher-centered	Percentage of time teacher teaches class as a whole	-0.21
	Students answer reading comprehension questions about what they read	-0.02
	Students orally summarize what they read	-0.02
	Students take a test about what they read	-0.02

Appendix C. Summary statistics

1) PISA 2018

Variable	Mean	Standard Deviation	Range	Observations	Notes
Student-centered Education Index	0.55	0.24	0-1	516,956	
Newspaper consumption	1.41	1.42	0-4	537,313	0 = Never / Almost never 1 = Few times a year 2 = About once a month 3 = Several times a month 4 = Several times a week
Online news consumption	1.69	1.10	0-3	530,215	0 = Never or almost never 1 = Several times a month 2 = Several times a week 3 = Several times a day
Public group discussion	0.88	1.13	0-3	531,836	
Girl	0.51	0.50	0/1	542,051	0 = boy
Household socioeconomic status	0.65	0.09	0-1	542,051	0 = Lower secondary or less 1 = Upper secondary 2 = Post-secondary 3 = University or more
Reading score	461.89	105.41	54.674-887.692	536,701	Score on PISA 2018 reading test

2) PIRLS 2006

Variable	Mean	Standard Deviation	Range	Observations	Notes
Student-centered Education Index	0.29	0.16	0-1	91,797	
Newspaper consumption	1.13	1.12	0-3	103,05	0 = Never / Almost never 1 = Monthly 2 = Weekly 3 = Daily
Students respect	1.87	0.96	0-3	103,626	0 = Disagree a lot 1 = Disagree a little 2 = Agree a little 3 = Agree a lot
Students care	1.85	0.95	0-3	103,316	
Students help	2.02	0.92	0-3	104,196	
Girl	0.50	0.50	0/1	107,095	0 = boy
Parent's highest education level	1.73	1.05	0-3	87,111	0 = Lower secondary or less 1 = Upper secondary 2 = Post-secondary 3 = University or more
Reading score	519.703	90.34	5-813.14	107,104	Score on PIRLS 2006 reading test
Class size	24.34	6.40	1-71	100,479	Number of students in class

Teacher experience	16.99	10.90	0-54	100,894	Teacher's years of teaching

Appendix D. Additional analyses for PISA 2018

D1. Full Model Results for Figure 4

	(1) Newspaper	(2) Online News	(3) Group Discussions
Student-centered Education Index	0.50*	0.37*	0.26*
	(0.02)	(0.01)	(0.02)
Girl	-0.19*	-0.04*	-0.16*
	(0.02)	(0.01)	(0.01)
Socioeconomic Status	1.16*	1.32*	1.26*
	(0.12)	(0.06)	(0.09)
Reading score, logged	-0.17*	0.37*	-0.53*
	(0.07)	(0.03)	(0.03)
Constant	1.55*	-1.59*	3.23*
	(0.45)	(0.21)	(0.20)
Observations	507,377	500,814	502,324
Number of countries	72	72	72

Note: Multilevel regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools in countries. The Student-centered Education Index ranges from 0 to 1. Outcome is frequency of each civic activity. Civic activity level ranges from 0 (Never or almost never) to 4 (several times a week) for newspaper and to 3 (several times a day) for online news and public discussions.

D2. Estimated Civic Effect of Teacher-centered Education by Country

	Newspaper	Online News	Group Discussions
Albania	0.05	0.06	0.04
	(0.03)	(0.02)	(0.03)
Azerbaijan	0.01	0.06*	0.04
	(0.03)	(0.02)	(0.02)
Argentina	0.03	0.06*	0.02
	(0.02)	(0.01)	(0.01)
Australia	0.04*	0.07*	0.07*
	(0.01)	(0.01)	(0.01)
Austria	0.06*	0.04*	0.01
	(0.02)	(0.02)	(0.01)
Belgium	0.00	0.04*	0.00
	(0.02)	(0.02)	(0.01)
Bosnia and Herzegovina	-0.01	0.03	0.01
	(0.02)	(0.02)	(0.02)
Brazil	0.04*	0.04*	0.03*
	(0.02)	(0.01)	(0.01)
Brunei Darussalem	0.05*	0.06*	0.08*
	(0.02)	(0.02)	(0.02)
Bulgaria	-0.03	0.08*	0.03
	(0.02)	(0.02)	(0.02)
Chile	0.03	0.08*	0.04*
	(0.02)	(0.02)	(0.01)
China	0.14*	0.09*	0.06*
	(0.02)	(0.01)	(0.01)
Colombia	0.07*	0.07*	0.05*
	(0.02)	(0.01)	(0.01)
Costa Rica	0.01	0.05*	0.03*
	(0.02)	(0.02)	(0.01)
Croatia	0.05*	0.06*	0.04*
	(0.02)	(0.02)	(0.01)
Czech Republic	0.06*	0.07*	0.02
	(0.02)	(0.01)	(0.02)
Denmark	0.06*	0.07*	0.03*
	(0.02)	(0.01)	(0.01)
Dominican Republic	0.12*	0.14*	0.10*
	(0.03)	(0.02)	(0.02)
Estonia	0.04	0.09*	0.03
	(0.02)	(0.02)	(0.02)

D2. Estimated Civic Effect of Teacher-centered Education by Country (continued)

	Newspaper	Online News	Group Discussions
Finland	0.04	0.05*	0.04
	(0.02)	(0.01)	(0.01)
France	0.03	0.04	-0.02
	(0.02)	(0.02)	(0.01)
Georgia	-0.04	0.06*	-0.01
	(0.02)	(0.02)	(0.02)
Germany	-0.01	0.02	-0.00
	(0.02)	(0.02)	(0.01)
Greece	0.03	0.06*	-0.00
	(0.02)	(0.01)	(0.01)
Hungary	0.12*	0.04*	0.06*
	(0.02)	(0.02)	(0.02)
Iceland	0.01	0.05	0.00
	(0.03)	(0.03)	(0.03)
Indonesia	0.05*	0.07*	0.03*
	(0.02)	(0.01)	(0.02)
Ireland	0.05*	0.09*	0.07*
	(0.02)	(0.02)	(0.02)
Israel	0.07*	0.10*	0.06*
	(0.02)	(0.02)	(0.02)
Italy	0.03*	0.07*	0.02*
	(0.01)	(0.01)	(0.01)
Kosovo	0.03	0.07*	0.07*
	(0.03)	(0.02)	(0.03)
Japan	0.04	0.04*	-0.01
	(0.02)	(0.02)	(0.01)
Kazakhstan	0.08*	0.10*	0.03*
	(0.01)	(0.01)	(0.01)
Jordan	0.03*	0.06*	0.05*
	(0.02)	(0.01)	(0.02)
Korea, Republic of	0.01	0.03	0.03*
	(0.02)	(0.02)	(0.01)
Latvia	0.05	0.07*	0.02
	(0.02)	(0.02)	(0.02)
Lithuania	0.02	0.10*	0.06*
	(0.02)	(0.02)	(0.02)

D2. Estimated Civic Effect of Teacher-centered Education by Country (continued)

	Newspaper	Online News	Group Discussions
Luxembourg	0.00	0.03	-0.02
	(0.02)	(0.02)	(0.02)
Malaysia	0.11*	0.06*	0.10*
	(0.02)	(0.02)	(0.02)
Malta	0.06*	0.06*	0.09*
	(0.02)	(0.02)	(0.02)
Mexico	0.11*	0.07*	0.06*
	(0.02)	(0.01)	(0.02)
Moldova	0.04	0.06*	0.04
	(0.02)	(0.02)	(0.02)
Montenegro	0.00	0.04*	0.03
	(0.02)	(0.01)	(0.02)
Morocco	0.05*	0.03	0.00
	(0.02)	(0.01)	(0.02)
Netherlands	0.00	0.05*	0.01
	(0.03)	(0.02)	(0.02)
New Zealand	0.06*	0.06*	0.07*
	(0.02)	(0.02)	(0.02)
Norway	0.04	0.06*	0.04*
	(0.02)	(0.02)	(0.02)
Panama	0.05*	0.05*	0.02
	(0.02)	(0.02)	(0.02)
Peru	0.05*	0.08*	0.03*
	(0.02)	(0.02)	(0.02)
Philippines	0.09*	0.14*	0.13*
	(0.02)	(0.02)	(0.02)
Poland	0.05*	0.04*	0.05*
	(0.02)	(0.02)	(0.02)
Portugal	0.04	0.07*	0.03*
	(0.02)	(0.02)	(0.02)
Qatar	0.05*	0.08*	0.06*
	(0.02)	(0.01)	(0.01)
Romania	-0.00	0.04	0.04*
	(0.02)	(0.02)	(0.02)
Russia	0.04	0.07*	0.07*
	(0.02)	(0.02)	(0.02)

D2. Estimated Civic Effect of Teacher-centered Education by Country (continued)

	Newspaper	Online News	Group Discussions
Saudi Araia	0.04	0.08*	0.09*
	(0.02)	(0.02)	(0.02)
Serbia	0.02	0.06*	0.03
	(0.02)	(0.02)	(0.02)
Singapore	0.09*	0.09*	0.06*
	(0.02)	(0.01)	(0.02)
Slovak Republic	0.03	0.05*	0.04*
	(0.02)	(0.02)	(0.02)
Slovenia	0.06*	0.05*	0.03*
	(0.02)	(0.02)	(0.01)
Spain	0.01	0.03*	0.02*
	(0.01)	(0.01)	(0.01)
Sweden	0.08*	0.06*	0.04*
	(0.02)	(0.02)	(0.02)
Switzerland	0.02	0.04*	0.02
	(0.02)	(0.02)	(0.01)
Taiwan	0.08*	0.08*	0.07*
	(0.02)	(0.01)	(0.01)
Thailand	0.06*	0.06*	0.08*
	(0.02)	(0.01)	(0.02)
United Arab Emirates	0.04*	0.09*	0.05*
	(0.01)	(0.01)	(0.01)
Turkey	0.09*	0.05*	0.04*
	(0.02)	(0.02)	(0.02)
Ukraine	0.05	0.10*	0.04*
	(0.02)	(0.02)	(0.02)
United Kingdom	0.05*	0.07*	0.07*
	(0.01)	(0.01)	(0.01)
United States	0.04*	0.08*	0.08*
	(0.02)	(0.02)	(0.02)
Uruguay	0.03	0.06*	0.02
	(0.02)	(0.02)	(0.02)
Vietnam	0.07*	0.10*	0.03
	(0.03)	(0.02)	(0.02)

Note: Multilevel regression estimates with robust standard errors shown in parentheses. Each cell shows estimates for teacher-centered education in a model that predicts the column's civic activity while controlling for gender, socioeconomic background, and reading scores within each country. Teacher-centered education ranges from 0 to 3. Outcome is frequency of each civic activity. Civic activity level ranges from 0 (Never or almost never) to 3, which corresponds to several times a week for newspapers and several times a day for online news and group discussio

Appendix E. Additional analyses for PIRLS 2006

E1. Table 4 with full PIRLS 2006 sample

	(1) Newspaper	(2) Non-fiction	(3) Novels	(4) Comics	(5) Magazines
Student-centered Education Index	0.07*	0.05	0.11*	-0.00	-0.03
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Girl	0.02	0.05*	0.36*	-0.26*	0.29*
	(0.02)	(0.01)	(0.02)	(0.03)	(0.02)
Parents' education	-0.01	0.00	0.05*	0.01*	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Reading score, logged	-0.00	-0.00*	0.00*	-0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Class size	0.00*	0.00*	0.00*	0.00	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Teacher experience	-0.00	0.00*	0.00	0.00	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	1.14*	1.78*	0.74*	1.75*	1.30*
	(0.08)	(0.07)	(0.15)	(0.07)	(0.08)
Observations	144,685	146,849	147,311	148,197	146,261
Number of countries	46	46	46	46	46

Note: Multilevel regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools in countries. Student-centered Education Index ranges from 0 to 1. Outcome is frequency of reading the respective form of text. Frequency of reading ranges from 0 (Never or almost never) to 3 (daily).

E2. Predicting student-centered education with student characteristics
(Using perceptions of wealth to measure home resources, rather than book ownership)

	(1)	(2)	(3)
Preschool attendance	0.05	0.05	0.05
	(0.75)	(0.73)	(0.72)
Primary language	-0.12	-0.12	-0.12
	(0.40)	(0.43)	(0.43)
Home resources	-0.04	-0.03	-0.03
	(0.43)	(0.52)	(0.53)
Reading performance	-0.00	-0.00	-0.00
	(0.66)	(0.70)	(0.68)
Disorder: bullying	-0.10		
	(0.28)		
Disorder: stealing		-0.08	
		(0.45)	
Disorder: violence			-0.01
			(0.91)
Constant	29.11*	29.05*	29.04*
	(0.00)	(0.00)	(0.00)
Observations	70,806	71,172	70,944
Within-school R-squared	0.00	0.00	0.00

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is the Student-centered Education Index rescaled to range from 0 to 100. Model 1 measures disorderly behavior with bullying, model 2 does so with stealing, and model 3 does so with violence. Robust standard errors clustered at the school level in parentheses. * $p<0.05$.

E3. Predicting student-centered education with teacher and class characteristics
(Teacher age instead of teacher experience)

	(1)	(2)	(3)
Teacher age	-0.14	-0.17	-0.03
	(0.62)	(0.53)	(0.92)
Female teacher	0.65	0.78	0.69
	(0.48)	(0.40)	(0.44)
Teacher education level	0.47	0.23	0.36
	(0.26)	(0.58)	(0.37)
Teacher training	0.67*	0.76**	0.70**
	(0.01)	(0.00)	(0.00)
Class size	-0.15	-0.14	-0.13
	(0.13)	(0.13)	(0.15)
Instruction time for language (duration)	-0.20		
	(0.27)		
Instruction time for reading (duration)		0.05	
		(0.66)	
Instruction time for reading (frequency)			0.16
			(0.76)
Constant	31.49*	29.80*	29.06*
	(0.00)	(0.00)	(0.00)
Observations	81,495	84,308	87,383
Within-school R-squared	0.01	0.01	0.01

Note: Fixed-effects regression coefficients shown with school fixed effects. Outcome is the Student-centered Education Index rescaled to range from 0 to 100. Model 1 measures instruction time with the number of hours teachers meet with students for language instruction. Model 2 does so with the number of hours for reading instruction, and model 3 does so with the number of days per week teachers meet with students for reading instruction. Robust standard errors clustered at the school level in parentheses. * $p<0.05$.

Chapter 3

Long-term Effects of Student-centered Education

In this chapter, I assess whether the civic effects of education models persevere over time. Does exposure to student-centered education only temporarily move one's civic engagement or does it affect long-term dispositions and behaviors? Previous work have found that school, family, peer, and media experiences influence political participation and knowledge in the long run. Education interventions during childhood that increase psychosocial skills increase turnout in adulthood (Holbein 2017), family income shocks during young adolescence increase turnout as adults for those from low-socioeconomic status (Akee et al. 2020), seeing more female legislators in office during young adulthood increases political knowledge among women later in adulthood (Dassonneville and McAllister 2018), and exposure to political discussion from parents, peers, school, and media during adolescence predicts political participation in young adulthood (Quintelier 2015). I ask whether the civic effects of student-centered education that individuals are exposed to during young adolescence similarly last into adulthood.

Civic engagement is highly stable within adults across time so that it "behaves like a central element of political identity, not like a frequently updated attitude" (Prior 2010, 763). One key civic activity in democracies, turning out to vote, is highly stable across individuals so that most people are either consistent voters or consistent non-voters (Gerber et al. 2003; Green and Shachar 2000; Plutzer 2002). Earlier work in political science have found that recalled participation in school discussions predicts higher levels of political efficacy among adults, and also that involvement with school government during high school is a strong predictor of adult civic engagement (Almond and Verba 1963; Verba et al. 1995; Youniss et al. 1997). These studies suggest that an important part of understanding variation in civic

engagement entails understanding pre-adult sources of political learning, in places such as the family and school.

In chapter 2, I used data from international surveys to show that across and within schools in a wide variety of contexts around the world, individuals who learn in more student-centered models are more engaged citizens who pay attention to civic issues and take part in public group discussions. But these analyses only provide a snapshot of certain points in time since both education models and civic engagement were measured at the same time when individuals were children or adolescents. In effect, I cannot assess whether student-centered education has only a temporary boost in civic engagement or whether it molds individuals to more active citizens for the long run. This limits my assessment of civic effects because civic acts that are central to the workings of democracy such as voting are exclusively available for adults in many countries. In this chapter, I use panel data and utilize the South Korean context to assess the long-term civic effects of student-centered education, mechanisms that account for this relationship, and heterogenous effects across individuals from different family and education backgrounds.

I find that student-centered education is consequential in the long term, most robustly for making individuals more active in discussing social issues. To a lesser extent, individuals who learned in more student-centered models as kids also grow up to be more active voters and take part in protests and petitions. I find mixed support for mechanisms depending on the civic activity in question – political efficacy and communal interests mediate the civic effect of student-centered education on discussing social issues (and less consistently, on taking part in petitions and protests) but not voting. Finally, I find that student-centered education affects individuals from different family and education backgrounds differently – those who grew up in households that encouraged using their voice at home and those who

were not exposed to high levels of countervailing teacher-centered education outside of school are more likely to reap the civic benefits of student-centered education than their peers.

Data and the case of South Korea

To investigate long-term civic effects, mechanisms, and heterogenous effects of student-centered education, I use panel data from the Korean Education Longitudinal Study (KELS). KELS is a study commissioned by the South Korean Ministry of Education to understand local education experiences, contexts, and post-education trajectories. It is one of the core data collection efforts by the Korean Educational Development Institute and has followed a nationally representative cohort since 2005 who were 12- to 14-year-old middle school students at the start of the study (grades 7-9) to young adulthood.[40] At the start of the study, KELS randomly sampled 150 schools and within each school, randomly sampled 50 students per school. Participation rate was high at 98.93% in 2005, totaling 6,908 individuals representative of the country's 703,914 7th grade students that year. Participants were surveyed once a year for the first seven years and then have been surveyed biennially since 2012. In the first three years of the study (2005-2007) when participants were in middle school, they were asked about the types of instruction in their classroom. Later on from 2011 when participants started to reach the local voting age, they were asked about their participation in different types of civic activity such as voting, signing petitions, and discussing political issues. This allows me to assess whether the education

[40] The Korean Educational Development Institute (KEDI) is a public research institute commissioned and funded by the South Korean government to develop the nation's education policies. KEDI works for the Ministry of Education and is a government-affiliated institution under the Prime Minister's Office for Government Policy Coordination.

model individuals are exposed to in adolescence matters for being active citizens as adults.

I choose to use KELS data in this chapter because it has the most coverage among panel surveys in South Korea that include measures of both education models and civic activity. While there are other local panel surveys such as the Gyeonggi Education Longitudinal Study that also measure my variables of interest across time, these alternatives only include individuals within a single state or metropolitan area. There are panel surveys on national populations outside of Korea such as Germany's National Educational Panel Study (NEPS) that would also allow me to analyze the long-term civic effect of education models, but I choose the Korean context because it is a particularly useful case to assess my theory for two reasons. First, while I argue that education models have civic implications independent of the content and duration of education, curricular content can shape civic knowledge and inclinations (Campbell 2008; Greene et al. 2011; Kahne and Sporte 2008; Lee 2023). Then, if education models and content simultaneously change, I cannot empirically disentangle the civic effect of education models from that of curricular content. Assessing the civic effect of education models in South Korea mitigates this concern, given that relative to other contexts, Korea enforces a highly specified and standardized curriculum on its K-12 schools (Lee 2013; So and Kang 2014).

Second, using the case of Korea allows me to assess the civic consequences of a large-scale education reform that has profoundly changed how citizens in the country learn. While many areas around the world are shifting from teacher-centered education models to more student-centered education, the shift has been particularly pronounced and fast-paced in Korea. One of the most prominent local education reforms in recent years has been to transition from the nation's traditional lecture and rote-memorization based teacher-centered education to a student-centered model of education focused on student participation and democratic school cultures (Korea Institute for Curriculum and Evaluation 2018). Local governments enacted policies such as the Innovation School Policy, which provided direct

funding and training for schools to implement their move towards student-centered education (Gyeonggi Provincial Office of Education 2015). In turn, Korea transformed from having the least student-centered education among all countries surveyed by PISA in 2009 to ranking in the middle of the pack in 2018 (Figure 1).[41] In sum, South Korea is a particularly useful and consequential case to investigate the civic implications of education models, and in this chapter I use data from KELS, the most comprehensive panel study in Korea that measures my variables of interest.

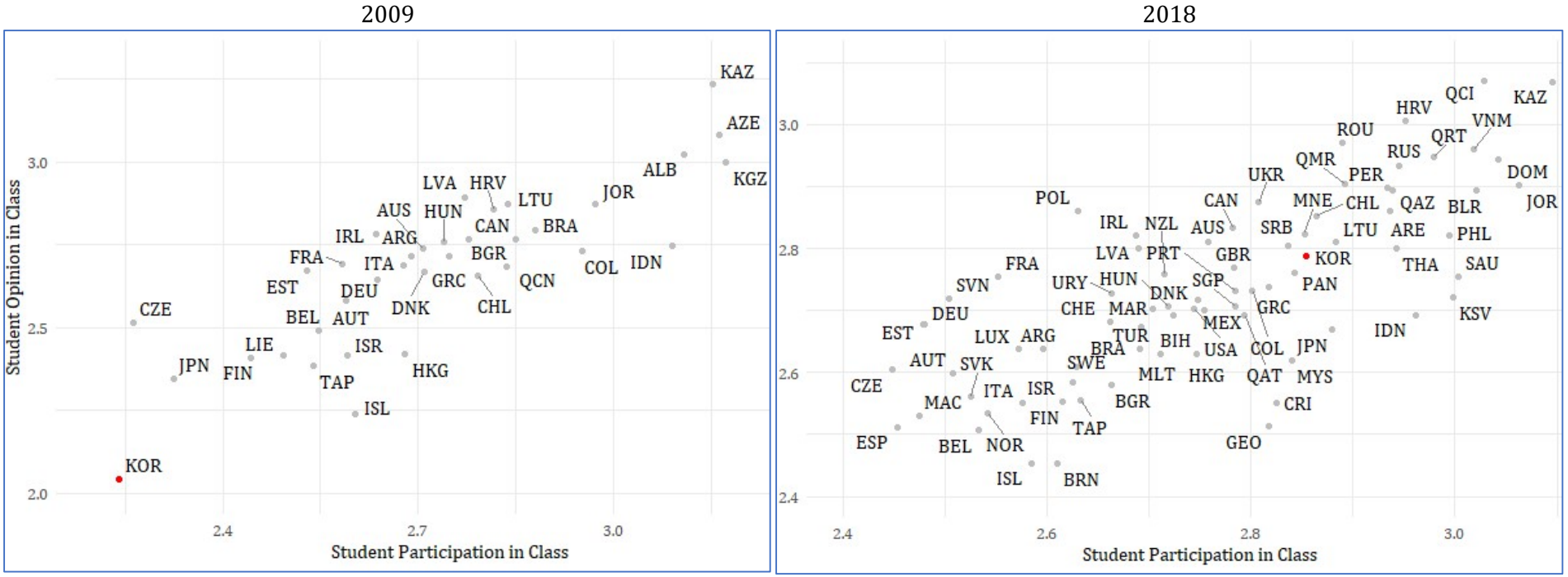
Measurements and analysis

To test whether student-centered education matters for civic activity in the long run, I estimate the effect of student-centered education during middle school (grades 7-9, when respondents were 12-17 years old) on civic activity during young adulthood, at ages 18-27. The items I use to measure student-centered education are from a module in the student questionnaires from the first three waves of KELS in 2005, 2006, and 2007 on instruction in reading, English, and math classes. I use four questions in this module that asks whether the teacher accommodates and incorporates student participation in class, such as asking questions and expressing their thoughts.[42] The module opens with the prompt "The following questions ask about classes and teaching methods in your school. Please mark your answer for each subject." The prompt is followed by the questions in Table 1 for reading, English, and math classes.

[41] I used the 2009 and 2018 PISA student questionnaire data because they are the two PISA rounds that include measures of education models and students' civic engagement.

[42] While I included measures of teacher-centered education to measure education models in chapter 2, I am unable to do that here because KELS did not include questions gauging teacher-centered education like PISA or PIRLS did.

Figure 1. Student-centered education across countries in 2009 and 2018



Note: Country-level averages of how often teachers motivate students to actively participate in class and encourage students to express their opinions about a text in reading class. Response options range from 1 (Never or hardly ever) to 4 (In all classes). Left panel shows averages in 2009 and the right panel shows averages in 2018. Data: OECD Programme for International Student Assessment, Student Questionnaire.

Table 3. Measuring student-centered education

Question wording	Response options
My teacher actively incorporates students' questions	Never / Almost never / Sometimes / Often / Very often (respectively for reading classes, English classes, and math classes)
My teacher checks if students have questions	
My teacher encourages students to think	
My teacher gives students opportunities to express their thoughts	

I choose these four items because as with the questions I use in chapter 2, they reflect the distinguishing characteristic of social dynamics in student-centered education compared to those in teacher-centered education: students' active role in constructing class content with their peers rather than receiving knowledge from their teacher. Classroom practices that encourage individuals to think for themselves, express their thoughts, and reflect these thoughts in class content embody the horizontal nature of student-teacher interactions where both students and teachers take part in shaping class content. This is in contrast to vertical student-teacher interactions during instruction by lectures where teachers deliver knowledge to students.

I create a Student-centered Education index by calculating the average of the standardized (mean 0, variance 1) values for these four questions for each of the three years education model is measured, and then rescaling values to range from 0 to 1 where a higher value on the index indicates a more student-centered education with higher levels of student participation and opinion expression in class. To calculate the respondents' total exposure to student-centered education throughout middle school, I take the mean value of the index for these three years. These items are highly consistent across each other – Cronbach's alpha ranges between 0.81 to 0.84 for each subject and each year – and principal component factor analyses show that for each year, these four items for each subject all load onto a single dimension in roughly equal proportions (Factor 1 Eigenvalue: 2.53 ~ 2.82, Factor 2 Eigenvalue: 0.48 ~ 0.62), lending confidence that the items can be used to construct an index that measures a common concept.

I use this Student-centered Education Index to predict civic activity 5-11 years after middle school, after respondents reached the local voting age. During this period in 2012, 2014, 2016, and 2018, respondents were asked whether they voted, took part in party activities, signed petitions on social issues, attended protests, and discussed social issues online during the past year.[43] For my first look at long-term trends, I use responses to these questions to predict the probability that the respondent participated in party activities, petitions, protests, and social discussions at any point during this entire period and for turnout, I predict the probability that the respondent voted in all four years.[44] I then look at each year separately. In all models, I control for the respondent's gender by including an indicator for whether the respondent identified as a girl at the first wave of KELS, and I control for household income by including the log of the respondent's average monthly household income at the first wave of KELS in 2005.[45] I also control for two group-level attributes: whether the school the respondent attended at the start of the study is a private school or not, and the approximate size of the respondent's class.[46] I

[43] Respondents were 18-20 years old in 2011 and 25-27 years old in 2018.

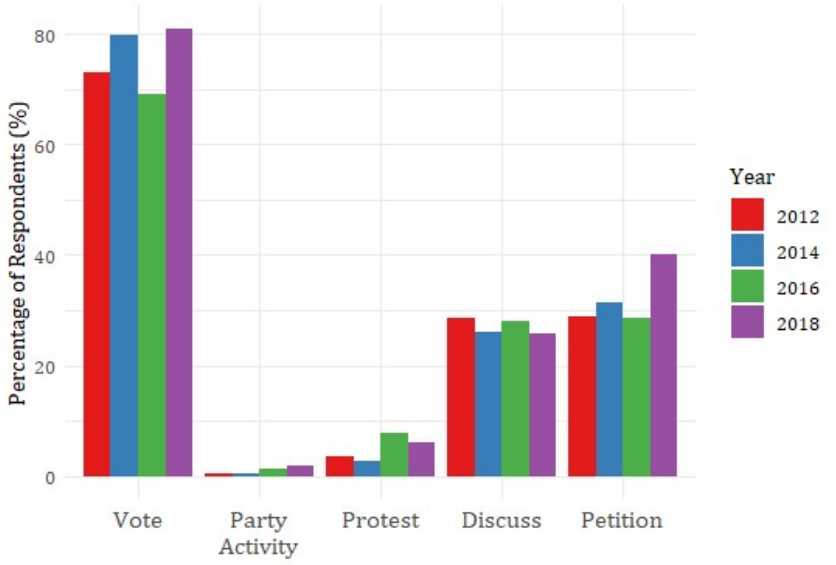
[44] As most citizens vote in any given year, measuring turnout the same way as the other activities produces little variation: only 2% of respondents did not vote at all during the entire period. The elections covered by each surveyed year are as follows. KELS 2012: National legislative election; KELS 2014: local election, by-election; KELS 2016: National legislative election; KELS 2018: 2017 presidential election, local election, by-election.

[45] Household income is measured in KELS 2005 with a question on the parent questionnaire about average monthly household income. Values range from 0 to 3,500 with a mean of 353.62 and standard deviation of 227.84 (in 10,000 KRW, equivalent to $9).

[46] Private school status is measured in KELS 2005 with an item from the school administrator questionnaire, which asks the administrator of the school that the respondent was attending to indicate whether the school is a private or public school. Class size is also measured with items from the KELS

estimate multilevel models with random intercepts where individuals are nested in schools (which they were attending at the start of KELS in 2005) to account for similarities between individuals in the same school. Appendix A provides summary statistics for each variable.

Figure 2. Frequency of civic activity by year



Note: Figure shows the percentage of respondents who participated in each civic act in each year. Data: KELS 2012-2018.

Consistent with chapter 2, I find that student-centered education predicts higher levels of civic engagement, but notably, not for all civic acts. Student-centered education in adolescence predicts higher probabilities of taking part in protests and discussing social issues as adults, yet that is not the case with party activity, voting, and signing petitions (Appendix B1). I plot the predicted probabilities of taking part in social discussions and protests as adults along percentiles of the student-centered education index in Figure 3. Those who were exposed to highly student-centered education as adolescents (top quartile of the Student-centered Education Index) are 4% more likely to engage in

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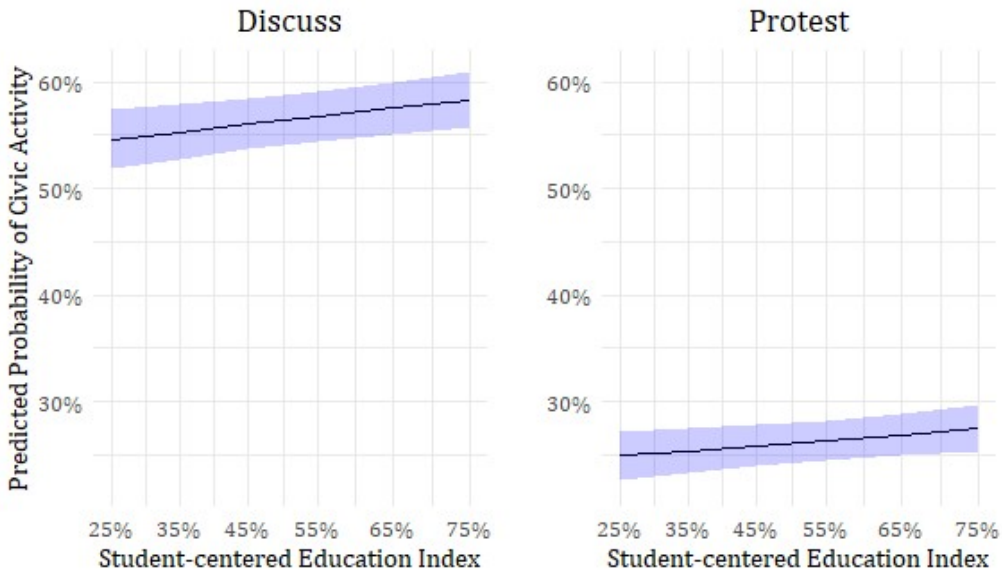
2005 school administrator questionnaire. While administrators were not asked about the respondent's class size, I calculate the approximate size by dividing the total number of first-year students in the school with the number of first-year classes in the school, both of which are given by the school administrator.

social discussions and 3% more likely to take part in protests and demonstrations as adults compared to individuals who were not (bottom quartile of the Student-centered Education Index) in middle school. The long-term civic effect of student-centered education on these civic acts are substantively large, given that they are comparable to increasing household monthly income from the tenth percentile to the ninetieth percentile in each model.

Figure 3. Predicting civic activity with education model



Note: Predicted probabilities of taking part in social discussions (left panel) and protests or demonstrations (right panel) at ages 18-26 across levels of student-centered education at ages 13-16. See Appendix B1 for full models.

One way to interpret my mixed findings across different civic acts is that student-centered education is more effective at increasing motivations and skills for taking part in collective grassroots activity compared to inclinations for top-down, institutionalized forms of civic acts. I find results contrary to this interpretation when I look at outcomes for each year. Here in this second set of analyses, I predict each civic activity for each year rather than an indicator of whether there was any participation in each act throughout the 2012-2018 period. I omit party activity from this analysis given the lack of variation when looking at participation for each year – the participation rate in party activity for each year ranges from less than 1 percent in 2014 to, at most, 2.4 percent in 2018 (Figure

2). Table 2 shows that for three (2014, 2016, and 2018) of the four years, individuals who learned in more student-centered education models as adolescents are more likely to have voted. The coefficient on student-centered education is positive and statistically significant for all years when I look at whether the individual discussed social issues in each year, and this is the case for two of the four years when I look at protesting and signing petitions (Appendix B2-B4). That is, when looking at outcomes for each year, education models matter for engaging in social discussions, voting, and although less consistently, for signing petitions and protesting as well.

Table 4. Predicting voting for each year with student-centered education

	(1) 2012	(2) 2014	(3) 2016	(4) 2018
Student-centered Education Index	-0.08 (0.29)	0.91* (0.36)	1.15* (0.32)	1.03* (0.38)
Girl	-0.71* (0.08)	0.01 (0.09)	0.06 (0.08)	0.13 (0.10)
Household income	0.05 (0.07)	0.18* (0.08)	0.12 (0.07)	-0.04 (0.09)
Class size	0.02* (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Private school	-0.10 (0.12)	0.11 (0.12)	0.12 (0.10)	-0.05 (0.12)
Constant	0.43 (0.48)	-0.63 (0.56)	-0.85 (0.46)	0.63 (0.62)
Observations	3,661	2,992	3,022	3,037
Number of groups (schools)	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools. Student-centered Education Index ranges from 0 to 1. Outcome is whether the individual voted in the recent year noted in the column heading. * $p<0.05$

Attrition across years

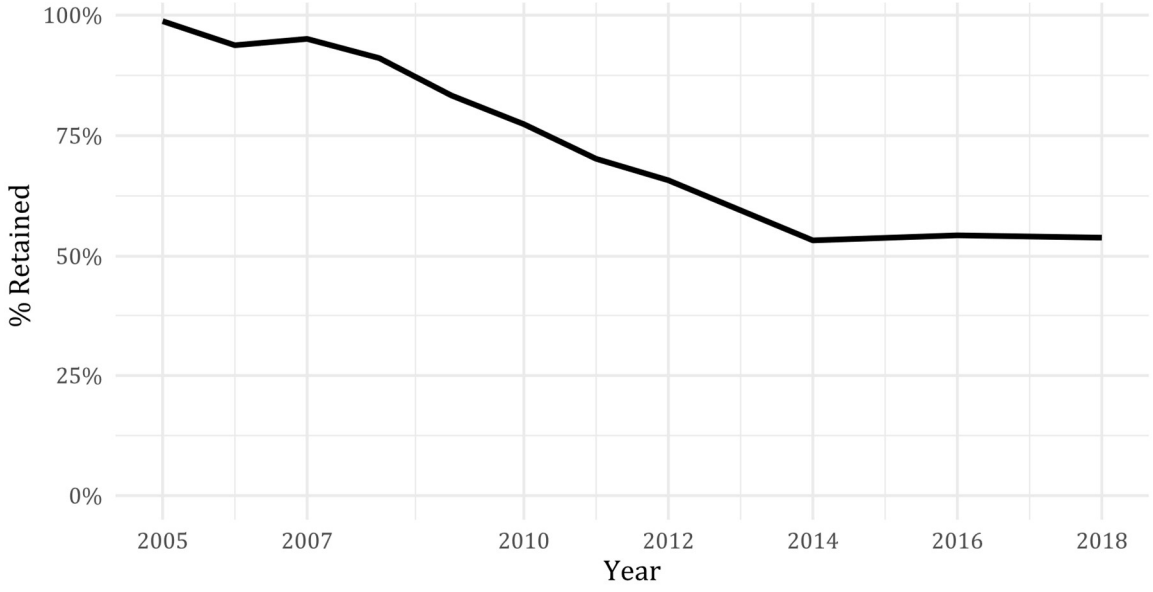
Does attrition across time drive my findings? Among the 6,908 individuals included in the sample at the first wave of KELS in 2005, 53.85% stayed in the study for the full duration of 2005-2018,

and the remaining dropped out of the study either because they opted out or were unreachable. 4.9% of the KELS 2005 sample dropped out by the third year of the study in 2007, when participants were in their last year of middle school. An additional 17.7% dropped out by 2010, when most participants were in their last year of high school. By 2012 and 2014, an additional 11.7% and 12.5% dropped out, respectively. Additional attrition was minimal in 2016 and 2018. Table 3 shows the attrition rate by year, and Figure 4 illustrates the percentage of KELS 2005 respondents that stayed in the study across time.

Table 5. Attrition across years

Year	Wave	Attrition (% of 2005 sample)
2007	3	4.92
2008	4	8.92
2009	5	16.68
2010	6	22.61
2011	7	29.79
2012	8	34.25
2014	9	46.71
2016	10	45.67
2018	11	46.15

Figure 4. Retention across years



For large-scale panel surveys, a certain degree of attrition is inevitable. Attrition can be problematic for drawing causal inferences in my case if individuals that dropped out of the study were those that learned in less student-centered education settings and were also those who were likely to be active citizens. In this scenario, such individuals would not be observed because they opted out of the study and this would introduce a bias to the KELS data that is favorable for finding supportive evidence for my argument. Then even if I find that student-centered education significantly predicts higher levels of civic activity in the available data, it is possible that student-centered education would not predict higher civic activity if there were no attrition. I find that this is unlikely to be the case.

While individuals exposed to less student-centered education did drop out of the study at a significantly higher rate, these individuals are not likely to be active citizens. Here, I predict whether a respondent opted out of the study in 2012, 2014, 2016, and 2018 with individual and household characteristics as measured in 2005, at the first wave of KELS, along with the Student-centered Education Index, which was measured in 2005-2007. I measure initial levels of academic performance with 6th grade grades,[47] and I measure household income and parental education levels with items in the parental background survey.[48] As with the previous analyses, I estimate multi-level models where students are nested in the schools they were attending in 2005.

I find that the Student-centered Education Index predicts lower levels of opting out of the study for most years (Table 4). I also find that academic performance consistently predicts lower levels of

[47] Grade 6 grades were originally reported on a 9-point scale from low to high by participants (who were in 7th grade at the time). The three lowest response options respectively included only 1.3, 2.7, and 5.4% of responses, so I recode the variable to a 7-point scale that combines these three options.

[48] KELS asked participants' parents about their highest level of education, for the mother and father respectively. I code the responses to include the following categories: did not graduate from high school, graduated from high school, graduated from a 2-year college, and graduated from a 4-year college.

non-participation in the survey. That is, the individuals that are not included in the KELS data for the entire duration of the study are more likely to be those who received less student-centered education in middle school and had lower grades prior to the first wave of the study. As higher academic performance should position individuals to have more resources for civic activity later in life, it is unlikely that the individuals with less student-centered education who dropped out are highly active citizens, which would confound my results. I also note here that for 2012 and 2014, men were more likely to opt out of the study than women. This is likely because of men enlisting in the armed forces. Men with citizenship in South Korea are mandated to serve in the military, typically for 18 months, and most enlist in their early 20s (Kim 2013). This coincides with the 2012-2014 period for my sample, which would explain why men were more likely to opt out of the study in these waves.

Table 6. Predicting attrition with student-centered education and initial characteristics

	(1) 2012	(2) 2014	(3) 2016	(4) 2018
Student-centered Education Index	-0.24 (0.28)	-0.67** (0.24)	-0.73** (0.25)	-0.67** (0.25)
Girl	-0.16* (0.06)	-0.31* (0.06)	0.08 (0.06)	0.04 (0.06)
Household Income	0.09 (0.07)	0.06 (0.06)	0.04 (0.06)	-0.00 (0.06)
6th grade grades	-0.10* (0.02)	-0.13* (0.02)	-0.14* (0.02)	-0.16* (0.02)
Highest Level of Parents' Education	0.07 (0.04)	0.08 (0.04)	0.01 (0.04)	-0.05 (0.04)
Constant	-0.86* (0.40)	0.24 (0.32)	0.28 (0.35)	0.64 (0.34)
Observations	4,933	4,933	4,933	4,933
Number of groups (schools)	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Outcome is whether the respondent opted out of the study in the 2012, 2014, 2016, or 2018 waves of KELS. 6th grade grades is the grade the respondent received in 6th grade, as reported by respondents at the first wave of the study in 2005, when they were in the 7th grade. Household income is the log of

household income and parents' education is the level of education attained by either/both parents (middle school, high school, 2-year college, 4-year college, graduate degree). Both were reported by the respondent's parent in the first wave of the study. * $p<0.05$.

Testing mechanisms: political efficacy and communal interests

I next turn to testing why student-centered education tends to make more active citizens. I assess whether the mechanism behind the civic effects of student-centered education relates to how individuals view the relationship between themselves and their community. In chapter 2, I found that individuals learning in more student-centered models are more likely to see their community members as caring and cooperative, suggesting that one of the ways that student-centered education makes active citizens is by shaping individuals' views of their fellow community members. Here, I test a different aspect of the individual-community relationship: one's views of their efficacy and interests in relation to their community. Learning in student-centered models can make people view themselves as efficacious agents who are able to make a difference in their society, because they have experienced shaping their immediate community, their school. And by repeatedly exposing individuals to group-based work in the classroom, student-centered education can shape perceptions to view the community's interests to be aligned with one's own interests.

I use mediation analysis to test the efficacy and communal interests mechanisms, which entails performing simulations based on estimations of two regression models – one that predicts the effect of education models on political efficacy or communal interests, and another that predicts the effect of education models and efficacy on civic activity.[49] I use these estimated coefficients to divide the total effect of student-centered education on civic activity into the effect mediated through changes in political efficacy or communal interests (mediation effect) and the effect from all other potential mechanisms

[49] Imai et al. (2011); Baker (2015), Bormann et al. (2019), and Fearon et al. (2015) among others have used mediation analysis to test mechanisms.

(direct effect). My outcomes of interest are those that were estimated to be affected by student-centered education in the preceding analyses: discussing social issues or taking part in protests at any point in 2012-2018, and voting, protesting, petitioning, and discussing social issues in certain years during this period.[50]

To measure political efficacy, I use responses to how much the respondent agrees that a good society can be created by citizen effort.[51] To measure communal interests, I use responses to how much the respondent believes that community development benefits them.[52] Both questions were asked when respondents were in Grade 12 – three years after I measure student-centered education and two years before I measure civic activity. In effect, I am using the timing of these measurements to assess the extent to which political efficacy in high school mediates the long-term civic effect of student-centered education.

I show the full results of this mediation analysis in Appendix C1-C2 and plot the estimated mediation effects in Figure 5 and Figure 6. A statistically significant part of the civic effect of student-centered

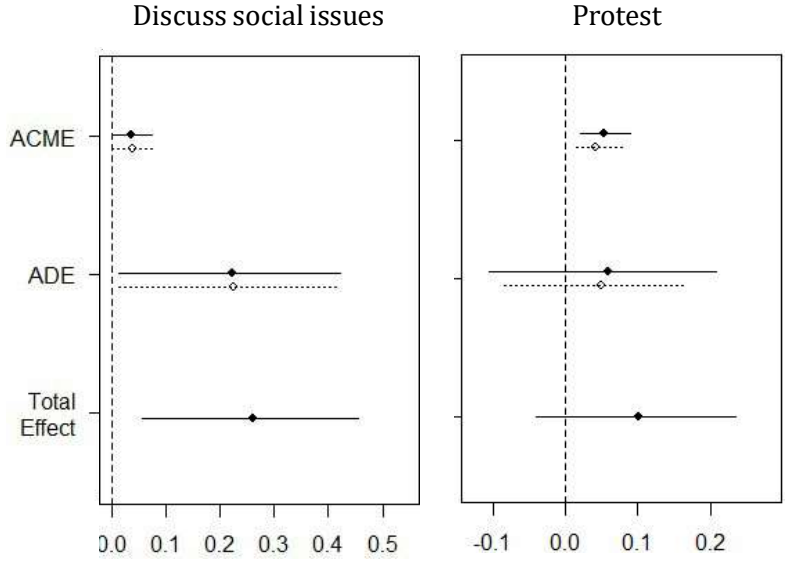
[50] For outcomes by year, I look at (1) voting in 2014, 2016, and 2018, (2) discussing social issues in all four years, (3) signing petitions in 2012 and 2014, and (4) protesting in 2012 and 2016. As Table 2 and Appendix B2-B4 show, these are the years for which the Student-centered Education Index predicted higher levels of each civic activity.

[51] The wording of this question was: "Read the following statements and check the response that is most applicable to you: A good society can be made by citizens' efforts." Response options included "Not at all," "No," "Sometimes," "Yes," and "Very much so." I rescale these responses to range from 0 to 1.

[52] The wording of this question was: "Read the following statements and check the response that is most applicable to you: I believe that my community's development helps me as well." Response options included "Not at all," "No," "Sometimes," "Yes," and "Very much so." I rescale these responses to range from 0 to 1.

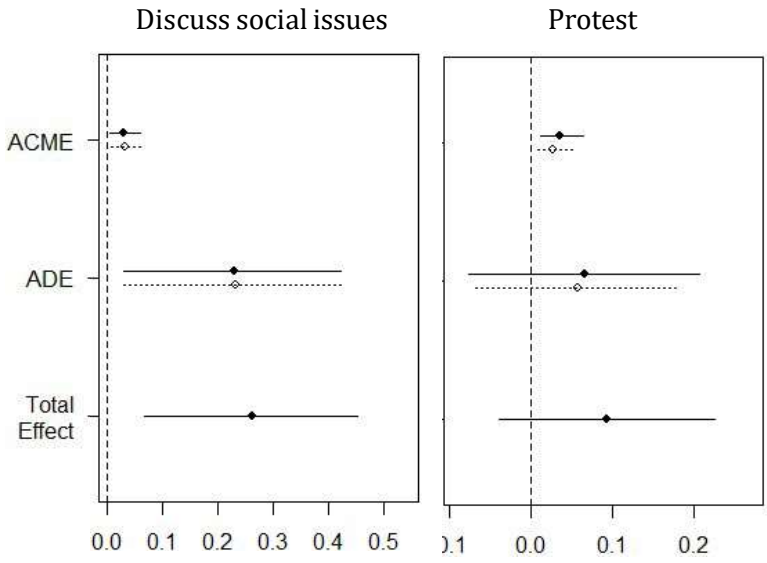
education on discussing social issues and protesting is mediated through political efficacy, ranging from 14-27% of the total effect. The left panel in Figure 5 illustrates the finding in Appendix C1 that student-centered education on average increases the likelihood of discussing social issues, and that 27% of this estimated total effect is mediated through higher levels of political efficacy. The mediation analyses for the communal interests mechanism echoes these findings (Figure 6 and Appendix C2).

Figure 5. Civic effects of student-centered education mediated by political efficacy



Note: Mediation analysis estimates for the average mediated effects (ACME), average direct effects (ADE), and total effects shown with 95% confidence intervals. ACME estimates are the estimated effect of a maximum change in student-centered education on the likelihood of discussing social issues at any point in 2012-2018 (left panel) and participating in protests in 2012-2018 (right panel), mediated by political efficacy.

Figure 9. Civic effects of student-centered education mediated by communal interests



Note: Mediation analysis estimates for the average mediated effects (ACME), average direct effects (ADE), and total effects shown with 95% confidence intervals. ACME estimates are the estimated effect of a maximum change in student-centered education on the likelihood of discussing social issues at any point in 2012-2018 (left panel) and participating in protests in 2012-2018 (right panel), mediated by communal interests.

Do these results hold when I look at outcomes for each year? I found earlier that student-centered education predicts higher likelihoods of discussing social issues in 2012-2018, signing petitions in 2012-2014, voting in 2014-2018, and protesting in 2012 and 2016. When I check whether these civic effects are mediated by political efficacy or communal interests, I find that both mechanisms are significant mediators for most years for discussing civic issues, consistent with Figure 5 and Figure 6.[53] Also lending support to my argument that student-centered education makes citizens more active because they have higher levels of political efficacy and more communal views of their interests, I find that political efficacy mediates the education model effect on signing petitions in 2012 (although not 2014), and communal interests is a significant mediator for signing petitions in both 2012 and 2014.

[53] For the mediation analysis using political efficacy as a mediator and discussing social issues in each year as the outcome, all years except 2016 are significant. For communal interests, all years except 2014 are significant.

I have mixed results for protesting – both mechanisms significantly mediate the civic effect on protest participation for 2016 but not 2012 – and voting stands out in that neither mechanism mediates the civic effect of student-centered education on voting in any of the three years where I find a significant association between student-centered education and casting a vote. Overall, then, the civic effect of student-centered education is most reliably mediated through political efficacy and communal interests when I predict discussion of social issues, and when I look at outcomes by year, in most cases for signing petitions as well. I find some supportive evidence for these mechanisms in explaining protest participation, but not much. Finally, I do not find evidence of either mechanism driving the civic effect of student-centered education on turnout, implying that the pathway from education models to turnout differs from the causal mechanisms for other forms of civic activities.

I note here that my findings suggest that individuals who learn in more student-centered education settings take part in discussions and petitions more because they perceive their own interests to be tied to those of their community, not because they become altruistic citizens who selflessly sacrifice their interests for others' interests. In addition to being asked about their political efficacy and communal view of interests, KELS 2010 participants were also asked if they put others ahead of themselves.[54] When I use responses to this item to test if altruism mediates the civic effect of student-centered education, I find that altruistic tendencies of putting others ahead of oneself does not mediate the civic effect of student-centered education on neither protesting nor discussing social issues, although student-centered education does predict higher levels of altruism (Table 5).

These analyses suggest that one pathway through which student-centered education makes individuals more active citizens is by shaping their perspective on their place in their community – one

[54] The wording of this question was: "Read the following statements and check the response that is most applicable to you: I put others ahead of myself." Response options included "Not at all," "No," "Sometimes," "Yes," and "Very much so." I rescale these responses to range from 0 to 1.

in which individuals come to view themselves as a capable force of change to further their interests, interests which align with those of their community. This complements my finding in chapter 2 that individuals learning in more student-centered models view their community members as more helpful and communal than their peers. Rather than viewing their community members as those in need or are distant, these individuals view their peers as cooperative members whose interests they share.

Table 7. Mediation analysis with altruism as the mediator

	Altruism	Discuss	Protest
Altruism		0.22	0.44
		(0.41)	(0.23)
Student-centered Education Index	0.28*	1.10*	0.85
	(0.00)	(0.01)	(0.14)
Girl	-0.00	0.67*	0.33*
	(0.80)	(0.00)	(0.02)
Household Income	0.01	0.13	0.04
	(0.17)	(0.14)	(0.76)
Private School	-0.01	-0.00	0.02
	(0.47)	(0.82)	(0.25)
Class Size	-0.00	-0.07	-0.14
	(0.08)	(0.57)	(0.44)
Constant	0.42*	-1.55*	-3.39*
	(0.00)	(0.01)	(0.00)
ACME		0.01	0.02
		(0.41)	(0.21)
Direct Effect		0.25*	0.10
		(0.01)	(0.14)
Total Effect		0.27*	0.12*
		(0.00)	(0.07)
Mediated (%)		0.05	0.13
		(0.08)	(0.76)
N	1,624	1,624	1,624

Note: Mediation analysis estimates shown with p-values in parentheses. Model 1 predicts altruism, model 2 predicts participation in discussions of social issues at any point in 2012-2018, and model 3 predicts participation in protests at any point in 2012-2018. ACME estimates are the estimated effect of a maximal

change in student-centered education on the likelihood of discussing social issues at any point in 2012-2018 (model 2) and participating in protests at any point in 2012-2018 (model 3), mediated by altruism. * $p<0.05$

Heterogenous effects by family and education environment

Lastly, I test whether the effect of education models varies across individuals from varying family and education circumstances. Civic effects of student-centered education may be especially pronounced among those with less exposure to using their voice outside their school. Previous work on the 'compensation hypothesis' finds that education affects civic attitudes and behavior more strongly among those with lower socioeconomic status, because these individuals would not otherwise be exposed to alternative pathways to increase skills and motivations for civic engagement (Almond and Verba 1963; Campbell 2008; Langton and Jennings 1968; Neundorf et al. 2016). This may also be the case for education model's civic effects. For those who are already taking part in discussions and using their voice at home, exposure to classroom discussions and school decision-making may not further boost efficacy and notions of communal self-interests. On the other hand, it may alternatively be that an 'acceleration effect' takes place, where those with "a foundation of familiarity with [discussion and decision-making] gain more from [these practices at school] because they are more likely to be called upon by teachers to contribute" (Campbell 2006, 442).

The South Korean context also provides a unique opportunity to assess whether teacher-centered education outside of school counteracts and moderates the civic effects of student-centered education in school. Korea is home to the world's highest rate of spending on private tutoring – in 2007 when the KELS cohort was in middle school, the average Korean household spent nearly 20% of their income on their children's private tutoring lessons (Chandler 2011). That same year, three in four middle school students in Korea received private tutoring of some sort (Korean Statistical Information Service 2007). Cram

schools, or "hagwons," are ubiquitous and by far the most common form of private tutoring in Korea,[55] serving predominantly to raise performance on standardized exams (Chandler 2011; Choe 2008; Lee 2023). Given this purpose, private tutoring lessons in Korea focus on lectures and rote memorization characteristic of teacher-centered education. Is teacher-centered education in the form of private tutoring a countervailing force on the civic effects of student-centered education in school? I test whether this is the case, along with whether more child-centered parenting at home moderates the boost student-centered education brings to civic activity.

To test whether student-centered education increases civic engagement more strongly among those with less exposure to using their voice at home, I use responses to three questions asked about participants' relationship with their parents in 2005, at the first round of the study: "How strongly do you agree with the following statements? 1) My parents respect my opinion and let me freely express them 2) My parents help me to take my own initiatives 3) My parents help me overcome my concerns or problems myself."[56] As with the Student-centered Education Index, I create a "child-centered parenting" index by calculating the average of the standardized sum for these three questions, and rescaling the values to range from 0 to 1.[57] A higher value on the index indicates a more child-centered (as opposed to a more parent-centered) home environment where the child is encouraged to form opinions, decisions, and solutions. Cronbach's alpha for the resulting index is 0.78, indicating that the three items I use are highly consistent across each other.

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[55] Cram school lessons accounted for 79.4% of private education among middle school students in 2007, followed by private tutoring at home, at 20.4% (Korean Statistical Information Service 2007).

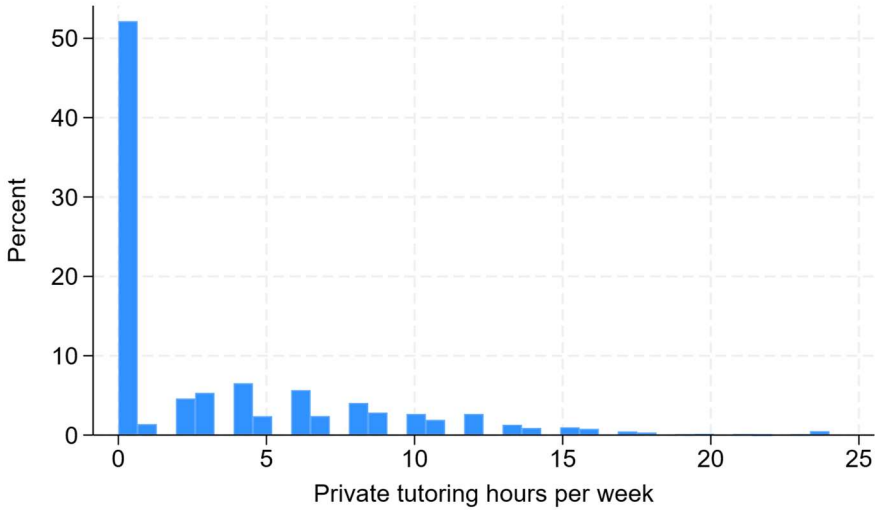
[56] Response options included "Not at all," "No," "Sometimes," "Yes," and "Very much so."

[57] These three questions are asked about both the respondent's mother and the father, resulting in six items. All items load onto a single dimension in roughly equal proportions (Factor 1 Eigenvalue: 4.2, Factor 2 Eigenvalue: 0.62).

To measure the second moderator, after-school private tutoring, I use responses to the question "Approximately how many hours per week, on average, do you take hagwon [cram school] or private one-on-one tutoring lessons?" asked in KELS 2008 when respondents were in their first year of high school. This question was asked respectively for reading, English, and math lessons. I use the total number of hours the respondents indicated across all three subjects as a proxy measure for the degree of after-school private tutoring during the period that I measure exposure to student-centered education, in middle school (2005-2007), because respondents were not ask about private tutoring hours prior to 2008. The distribution of private tutoring hours is heavily skewed – a little over one in two respondents indicated that they do not receive any private tutoring, with two in three among the remaining respondents reporting that they receive 3-10 hours of private tutoring per week (Figure 7).[58] Due to the concentration of respondents in the "0 hours" category, I recode responses from its original continuous measure to five categories: 0 hours, 3 hours or less, 4-6 hours, 7-10 hours, and more than 10 hours, which respectively includes 52.2%, 11.3%, 14.6%, 11.9% and 10.1% of respondents.

[58] This appears inconsistent with the Korean Statistical Information Service's data which shows that three in four middle school students in Korea received private tutoring of some sort in 2007 (Korean Statistical Information Service 2007). This gap is likely due to the Korean Statistical Information Service's measure which includes private tutoring in all areas (science, arts, sports, etc.), not just for the three subjects asked about in KELS 2008.

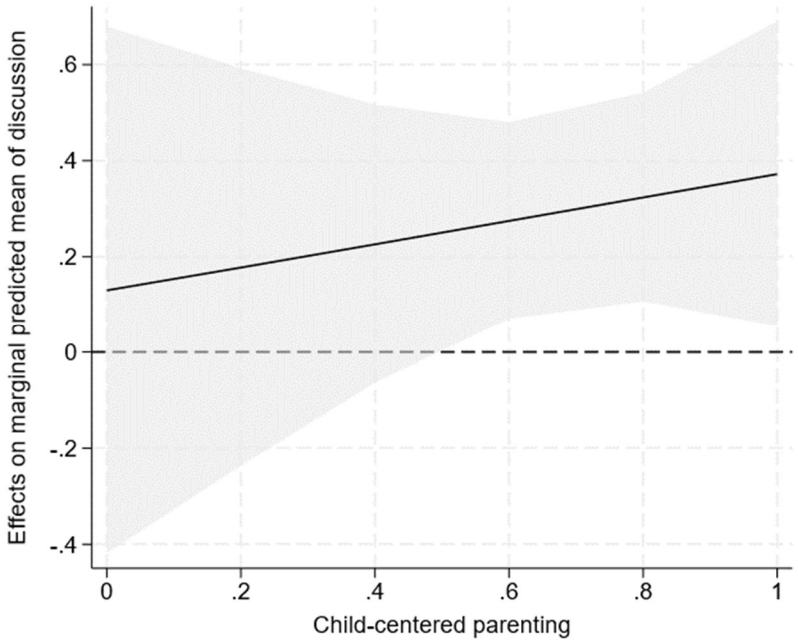
Figure 7. Private tutoring hours per week



I predict participation in each civic act with an interaction of the Student-centered Education Index and each moderator. All models are multilevel logistic regression models with individuals nested in their 2005 schools and include all controls as in my previous analyses. The estimates from both sets of analyses are shown in Appendix D1-D2. To assess whether the civic effect of student-centered education varies across levels of child-centered parenting and private tutoring, I plot the marginal effect of an interquartile change in the Student-centered Education Index along levels of each moderator.

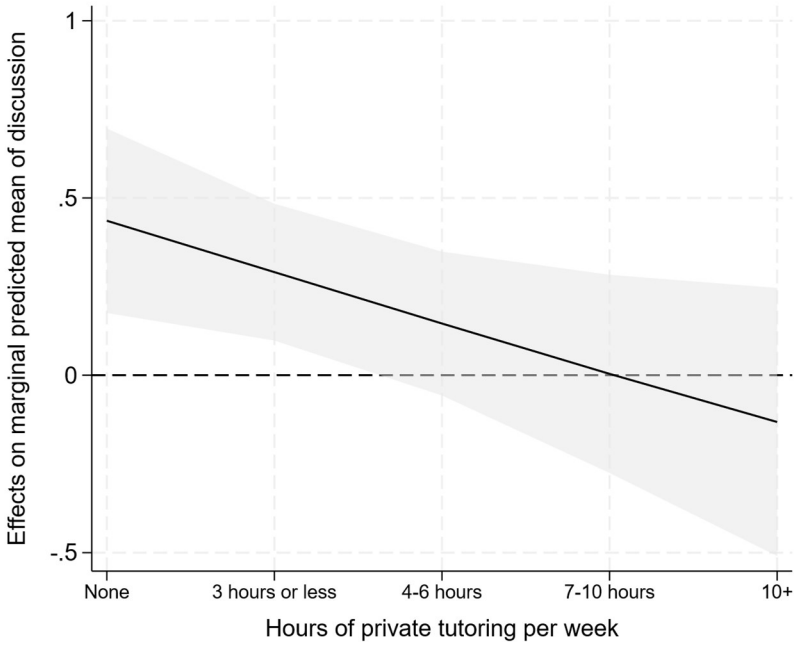
I find that only discussion of civic issues is moderated by either child-centered parenting or private tutoring. Figure 8 shows the plot for the marginal civic effect of student-centered education on discussing civic issues across levels of child-centered parenting, and Figure 9 shows the estimates across hours of after-school private tutoring per week. In the case of heterogeneous effects across family environments, I find a significant civic effect on social discussions only at higher levels of child-centered education. In the case of private tutoring hours, I find the opposite. It is only at lower levels of private tutoring, at 3 hours per week or less, that the marginal effect of student-centered education is statistically significant. That is, specifically for the case of discussing social issues, the civic effects of student-centered education is driven by individuals who come from homes that encourage their voice at home and those who are not exposed to high levels of countervailing teacher-centered education in settings outside of school.

Figure 8. Predicting discussion with student-centered education across family environment



Note: Plot shows the marginal effects of an inter-quartile change in the Student-centered Education Index on whether the respondent discussed social issues at any point in 2012-2018, across levels of child-centered parenting. 95% confidence intervals are shaded in grey. Multilevel logistic regression estimates shown with controls for whether the individual identified as a girl, household income, private school status, and class size.

Figure 9. Predicting discussion with student-centered education across after-school private tutoring



Note: Plot shows the marginal effects of an inter-quartile change in the Student-centered Education Index on whether the respondent discussed social issues at any point in 2012-2018, across hours of after-school private tutoring lessons per week. 95% confidence intervals are shaded in grey. Multilevel logistic regression estimates shown with controls for whether the individual identified as a girl, household income, private school status, and class size.

When I look at outcomes by year, however, I find supportive evidence for heterogenous effects in other civic acts as well. Student-centered education predicts higher likelihoods of signing petitions in 2012-2014, voting in 2014-2018, and protesting in 2012 and 2016 (Table 2 and Appendix B3-B4). When I replicate the analyses for heterogenous effects to predict civic activity in each of these years, I find that the civic effects of student-centered education on signing petitions is also conditional on child-centered parenting and lower levels of private tutoring. The Student-centered Education Index predicts higher likelihoods of signing petitions in both 2012 and 2014 only when the Child-centered parenting Index is 0.6 or higher or when private tutoring is at 6 or fewer hours (Appendix D5-D6). This is also the case for two of the three years (2014 and 2016) that student-centered education predicts higher levels of voting, although there are some differences in the cutoff for levels of child-centered parenting and hours of private tutoring (Appendix D7-D8). I do not find any evidence of heterogenous effects for taking part in protests.

In closing

In this chapter, I find that individuals who learned in more student-centered models as adolescents grow up to become more active citizens who vote, discuss, and advocate for civic issues at a significantly higher rate than their peers. My most robust finding is that student-centered education nurtures citizens who are more engaged in discussions of civic issues. Whether I look at participation in any such discussion throughout the duration of 2012-2018 or participation in discussion of social issues for each year, I consistently find that the bump that student-centered education brings to discussion of civic issues persists for the entire duration of 2012-2018. Despite ups and downs during this period in public debate

on domestic civic issues, individuals who learned in more student-centered education settings as adolescents are more likely to discuss civic issues as adults year after year.

My findings for voting, signing petitions, and protesting are more mixed. I do not find evidence of a civic effect of student-centered education on voting or signing petitions when I look at either voting in all four years I observe or when I look at whether an individual signed petitions at any point in 2012-2018. When I break down the outcomes by year to assess the effects of student-centered education on participation in civic activity for each year, I find evidence of a civic bump for three of the four years for voting, and two of the four years for either protesting or signing petitions. These findings suggest that education models exert civic effects under certain conditions.

To investigate the conditions under which student-centered education matters for civic outcomes, I analyzed effects across family and education environments. I find that in most of the years that I do detect a civic effect of student-centered education on voting or signing petitions, student-centered education boosts civic activity only under conditions of child-centered parenting and less exposure to countervailing teacher-centered education in the form of after-school private tutoring. I did not find evidence of heterogeneous effects for protesting, implying that student-centered education increases protest participation regardless of family and education environments.

My findings suggest that with the exception of protesting, those that grow up in child-centered parenting households and below-average levels of teacher-centered education outside of school tend to drive the civic boost that student-centered education brings to its learners. This also speaks to the scope conditions under which education models can exert civic effects – implementing more student-centered teaching practices in an education system will have limited civic effects if the individuals learning in these systems predominantly come from households that are more authoritarian, or if the individuals are otherwise exposed to education environments that are teacher-centered.

Appendix A. Summary statistics

1) Education model and civic activity

Variable	Mean	Standard Deviation	Range	N	Notes
Student-centered Education Index	0.57	0.12	0–1	5,883	Measured in 2005-2007
Vote	0.40	0.49	0/1	2,221	Indicator of whether participant voted in 2012, 2014, 2016, and 2018
Party activity	0.10	0.30	0/1	2,221	Indicator of whether participant took part in activity at any point in 2012-2018
Discussion	0.57	0.50	0/1	2,221	
Petition	0.63	0.48	0/1	2,552	
Protest	0.27	0.44	0/1	2,343	

2) Mediators (mechanisms) and moderators

Variable	Mean	Standard Deviation	Range	N	Notes
Political efficacy	0.68	0.23	0–1	5,294	Measured in 2010
Communal interests	0.68	0.19	0–1	5,321	
Child-centered parenting	0.67	0.21	0–1	6,598	Measured in 2005
After-school education	3.41	4.73	0–24	6,244	Measured in 2010. Unit is number of hours per week

3) Other variables (all measured in 2005)

Variable	Mean	Standard Deviation	Range	N	Notes
Girl	0.48	0.50	0/1	6,908	Indicator of whether participant identifies as a girl
Household income	5.70	0.60	2.30–8.10	6,195	Log of monthly household income reported by participant's parent
Grade 6 grades	3.02	1.77	0–6	6,646	7-point scale of self-reported grade 6 grades, ranging from low to high
Parents' level of education	1.51	0.87	0–3	6,310	Highest level of parents' education, ranging from less than high school graduation to 4-year college graduation
Private school	0.20	0.40	0/1	6,908	Indicator of whether the school is a private or public school
Class size	34.95	5.67	12 – 44.39	6,908	Approximated number of students in class

Appendix B. Additional analysis for the civic effects of student-centered education

B1. Full models for Figure 3

	(1) Vote	(2) Party activity	(3) Discuss	(4) Petition	(5) Protest
Student-centered Education Index	0.37	-0.79	1.03*	0.40	0.94*
	(0.40)	(0.83)	(0.39)	(0.45)	(0.45)
Girl	-0.28*	-0.55*	0.67*	1.45*	0.04
	(0.11)	(0.16)	(0.09)	(0.11)	(0.11)
Household income	0.06	0.02	0.11	0.08	0.17
	(0.08)	(0.16)	(0.09)	(0.10)	(0.09)
Class size	0.02	-0.04*	-0.00	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Private school	-0.08	-0.32	-0.03	-0.25*	0.02
	(0.12)	(0.19)	(0.12)	(0.12)	(0.11)
Constant	-1.47*	-0.15	-1.33*	-1.26	-2.87*
	(0.57)	(0.94)	(0.59)	(0.66)	(0.60)
Observations	1,812	1,904	1,812	1,812	2,086
Number of groups (schools)	150	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools. Student-centered Education Index ranges from 0 to 1. Model 1 predicts whether the respondent voted in all observed years 2012, 2014, 2016, and 2018. Models 2-5 predict whether the respondent participated in party activities, online social discussions, petitions, and protests in any of the observed years. * $p<0.05$.

B2. Predicting discussion for each year with student-centered education

	(1) 2012	(2) 2014	(3) 2016	(4) 2018
Student-centered Education Index	1.01*	1.23*	1.20*	1.20*
	(0.31)	(0.37)	(0.34)	(0.34)
Girl	0.89*	0.78*	0.59*	0.42*
	(0.08)	(0.09)	(0.09)	(0.10)
Household income	0.20*	0.10	0.19*	0.20*
	(0.07)	(0.09)	(0.07)	(0.07)
Class size	0.00	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Private school	0.04	0.02	0.11	-0.08
	(0.10)	(0.13)	(0.10)	(0.11)
Constant	-3.29*	-3.27*	-3.61*	-3.41*
	(0.49)	(0.58)	(0.48)	(0.56)
Observations	3,661	2,992	3,022	3,037
Number of groups (schools)	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools. Student-centered Education Index ranges from 0 to 1. Outcome is whether the individual took part in online discussions on social issues in the recent year noted in the column heading. * $p<0.05$

B3. Predicting petitions for each year with student-centered education

	(1) 2012	(2) 2014	(3) 2016	(4) 2018
Student-centered Education Index	1.22*	1.06*	0.31	0.58
	(0.34)	(0.42)	(0.36)	(0.35)
Girl	1.50*	1.60*	1.14*	1.23*
	(0.10)	(0.09)	(0.09)	(0.09)
Household income	0.31*	0.17*	0.19*	-0.02
	(0.07)	(0.08)	(0.08)	(0.08)
Class size	0.00	0.02*	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Private school	0.08	0.17	0.03	-0.10
	(0.10)	(0.12)	(0.12)	(0.10)
Constant	-4.56*	-4.11*	-3.31*	-1.73*
	(0.50)	(0.55)	(0.56)	(0.53)
Observations	3,661	2,992	3,022	3,037
Number of groups (schools)	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools. Student-centered Education Index ranges from 0 to 1. Outcome is whether the individual signed petitions on social issues in the recent year noted in the column heading.
* $p<0.05$

B4. Predicting protests for each year with student-centered education

	(1) 2012	(2) 2014	(3) 2016	(4) 2018
Student-centered Education Index	1.46*	0.43	1.40*	1.14
	(0.73)	(1.16)	(0.54)	(0.63)
Girl	0.54*	0.29	0.17	0.63*
	(0.19)	(0.25)	(0.15)	(0.15)
Household income	-0.09	0.23	0.22	0.23
	(0.16)	(0.22)	(0.13)	(0.12)
Class size	0.00	-0.02	0.03	0.00
	(0.02)	(0.02)	(0.01)	(0.01)
Private school	-0.00	0.01	0.09	0.09
	(0.23)	(0.29)	(0.18)	(0.17)
Constant	-4.07*	-4.81*	-5.49*	-5.03*
	(1.07)	(1.43)	(0.87)	(0.80)
Observations	3,661	2,992	3,022	3,037
Number of groups (schools)	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Individuals are nested in schools. Student-centered Education Index ranges from 0 to 1. Outcome is whether the individual participated in protests in the recent year noted in the column heading. * $p<0.05$

Appendix C. Mediation analysis

C1. Mediation analysis with political efficacy as the mediator

	(1) Political Efficacy	(2) Vote	(3) Party activity	(4) Discuss	(5) Petition	(6) Protest
Political Efficacy		-0.15	0.11	0.29*	0.21	0.60*
		(0.28)	(0.68)	(0.04)	(0.16)	(0.00)
Student-centered Education	0.35*	0.23	-0.34	0.60*	0.21	0.34
	(0.00)	(0.39)	(0.49)	(0.03)	(0.45)	(0.48)
Girl	0.01	-0.14*	-0.02	0.42*	0.91*	0.18*
	(0.36)	(0.03)	(0.88)	(0.00)	(0.00)	(0.02)
Household Income	0.01	0.10	-0.06	0.07	0.10	0.02
	(0.37)	(0.10)	(0.57)	(0.21)	(0.10)	(0.74)
Constant	0.42*	-0.75*	-1.32*	-1.02*	-0.96*	-1.82*
	(0.00)	(0.04)	(0.04)	(0.01)	(0.01)	(0.00)
ACME		-0.02	0.00	0.04*	0.02	0.05*
		(0.26)	(0.65)	(0.05)	(0.17)	(0.00)
Direct Effect		0.09	-0.04	0.23*	0.07	0.05
		(0.40)	(0.46)	(0.04)	(0.43)	(0.41)
Total Effect		0.07	-0.03	0.26*	0.10	0.10
		(0.52)	(0.49)	(0.02)	(0.30)	(0.15)
Mediated (%)		-0.12	-0.05	0.14	0.17	0.41
		(0.65)	(0.81)	(0.06)	(0.42)	(0.15)
N	1,599	1,599	1,599	1,599	1,599	1,599

Note: Mediation analysis estimates shown with p-values in parentheses. Model 1 predicts political efficacy, model 2 predicts voting in 2012, 2014, 2016, and 2018, and the remaining models predict participation in each civic activity at any point in 2012-2018. ACME estimates are the estimated effect of a maximum change in student-centered education on the likelihood of voting in all years (model 2) and taking part in each civic activity at any point (models 3-6), mediated by political efficacy. * $p<0.05$.

C2. Mediation analysis with communal interests as the mediator

	(1) Communal interests	(2) Vote	(3) Party activity	(4) Discuss	(5) Petition	(6) Protest
Communal interests		0.20	-0.06	0.41*	0.36*	0.70*
		(0.24)	(0.84)	(0.02)	(0.04)	(0.00)
Student-centered Education	0.21*	0.13	-0.28	0.62*	0.21	0.29
	(0.00)	(0.62)	(0.56)	(0.02)	(0.45)	(0.36)
Female	-0.01	-0.14*	-0.02	0.43*	0.92*	0.19*
	(0.53)	(0.03)	(0.89)	(0.00)	(0.00)	(0.02)
Household Income	0.02*	0.09	-0.06	0.07	0.09	0.02
	(0.03)	(0.11)	(0.60)	(0.24)	(0.12)	(0.83)
Constant	0.46*	-0.91*	-1.26	-1.09*	-1.04*	-1.88*
	(0.00)	(0.01)	(0.06)	(0.00)	(0.01)	(0.00)
ACME		0.02	-0.00	0.03*	0.03*	0.03*
		(0.26)	(0.81)	(0.01)	(0.04)	(0.00)
Direct Effect		0.05	-0.03	0.23*	0.08	0.06
		(0.60)	(0.53)	(0.03)	(0.42)	(-0.07)
Total Effect		0.07	-0.03	0.26*	0.10	0.09
		(0.50)	(0.50)	(0.01)	(0.27)	(0.96)
Mediated (%)		0.09	0.01	0.12*	0.18	0.27
		(0.62)	(0.93)	(0.01)	(0.29)	(0.20)
N	1,599	1,599	1,599	1,599	1,599	1,599

Note: Mediation analysis estimates shown with p-values in parentheses. Model 1 predicts communal views of one's interests, model 2 predicts voting in 2012, 2014, 2016, and 2018, and the remaining models predict participation in each civic activity at any point in 2012-2018. ACME estimates are the estimated effect of a maximum change in student-centered education on the likelihood of voting in all years (model 2) and taking part in each civic activity at any point (models 3-6), mediated by communal interests. * $p<0.05$.

Appendix D. Heterogenous effects

D1. Predicting civic activity with education model moderated by household environment

	(1) Vote	(2) Party activity	(3) Discuss	(4) Petition	(5) Protest
Student-centered Education Index	0.17	-5.12*	0.57	-1.49	0.76
	(1.38)	(1.69)	(1.24)	(1.16)	(1.45)
Child-centered parenting	0.12	-3.49*	-0.93	-1.55	0.26
	(1.15)	(1.36)	(0.97)	(0.97)	(1.19)
Student-centered education * Child-centered	0.16	6.49*	0.99	2.90	0.13
	(1.93)	(2.23)	(1.70)	(1.68)	(1.98)
Girl	-0.28*	-0.50*	0.69*	1.46*	0.06
	(0.11)	(0.16)	(0.09)	(0.11)	(0.11)
Household income	0.04	-0.02	0.14	0.11	0.17
	(0.08)	(0.17)	(0.09)	(0.11)	(0.09)
Private school	-0.08	-0.33	-0.03	-0.27*	0.06
	(0.12)	(0.21)	(0.12)	(0.12)	(0.12)
Class size	0.02	-0.04*	-0.00	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	-1.37	2.33	-0.95	-0.30	-3.03*
	(0.92)	(1.26)	(0.91)	(0.90)	(0.97)
Observations	1,768	1,859	1,768	1,768	2,030
Number of groups	150	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Outcome is whether the respondent voted in 2012, 2014, 2016, and 2018 for model 1, and whether the respondent participated in each civic activity at any point in 2012-2018 for models 2-5. *p<0.05

D2. Predicting civic activity with education model moderated by after-school education hours

	(1) Vote	(2) Party activity	(3) Discuss	(4) Petition	(5) Protest
Student-centered Education Index	0.65	-0.41	1.82*	0.95	1.13
	(0.56)	(1.08)	(0.57)	(0.62)	(0.64)
Private tutoring	0.25	0.22	0.46*	0.24	0.11
	(0.16)	(0.28)	(0.17)	(0.17)	(0.20)
Student-centered education * Private tutoring	-0.27	-0.30	-0.60*	-0.36	-0.15
	(0.27)	(0.49)	(0.29)	(0.30)	(0.33)
Girl	-0.30*	-0.57*	0.68*	1.46*	0.05
	(0.11)	(0.17)	(0.09)	(0.11)	(0.11)
Household income	-0.01	0.01	0.02	0.04	0.17
	(0.08)	(0.18)	(0.09)	(0.11)	(0.10)
Private school	-0.06	-0.33	-0.01	-0.22	0.02
	(0.11)	(0.19)	(0.11)	(0.12)	(0.12)
Class size	0.02	-0.04*	-0.00	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	-1.36*	-0.45	-1.34*	-1.40	-2.99*
	(0.60)	(1.04)	(0.66)	(0.73)	(0.71)
Observations	1,773	1,863	1,773	1,773	2,035
Number of groups	150	150	150	150	150

Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Outcome is whether the respondent voted in 2012, 2014, 2016, and 2018 for model 1, and whether the respondent participated in each civic activity at any point in 2012-2018 for models 2-5. *p<0.05

D3. Predicting year-by-year civic activity with education model moderated by household environment

	(1) Vote 2014	(2) Vote 2016	(3) Petition 2012	(4) Petition 2014
Student-centered Education Index	-1.62	0.20	-0.41	0.48
	(1.21)	(1.01)	(1.05)	(1.38)
Child-centered parenting	-1.74*	-0.56	-1.30	-0.55
	(0.93)	(0.83)	(0.86)	(1.08)
Student-centered education * Child-centered	3.55*	1.35	2.37	0.88
	(1.65)	(1.49)	(1.46)	(1.83)
Girl	0.00	0.07	1.52*	1.61*
	(0.09)	(0.09)	(0.10)	(0.09)
Household income	0.17*	0.11	0.31*	0.19*
	(0.09)	(0.07)	(0.07)	(0.09)
Private school	0.09	0.14	0.08	0.16
	(0.13)	(0.10)	(0.11)	(0.12)
Class size	0.01	0.00	0.00	0.02
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.64	-0.35	-3.69*	-3.81*
	(0.79)	(0.66)	(0.73)	(0.87)
Observations	2,919	2,942	3,555	2,919
Number of groups	150	150	150	150

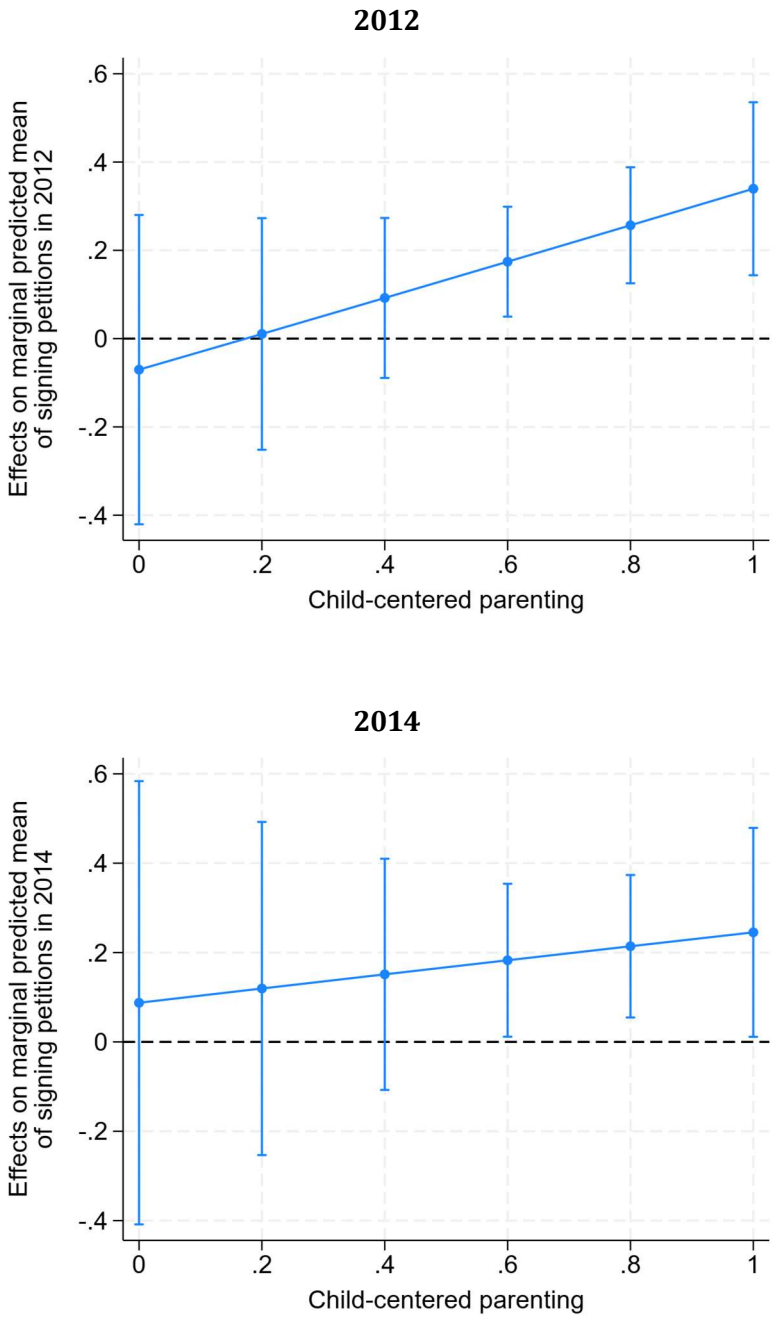
Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Outcomes for each model are indicated in the column title – model 1 predicts whether the respondent voted in 2014, model 2 predicts whether the respondent voted in 2016, models 3-4 predict whether the respondent signed petitions in 2012 (model 3) or in 2014 (model 4).
*p<0.05

D4. Predicting year-by-year civic activity with education model moderated by after-school education hours

	(1) Vote 2014	(2) Vote 2016	(3) Petition 2012	(4) Petition 2014
Student-centered Education Index	1.28*	1.19*	1.41*	1.23*
	(0.45)	(0.40)	(0.48)	(0.54)
Private tutoring	0.28*	0.13	0.20	0.11
	(0.15)	(0.12)	(0.16)	(0.15)
Student-centered education * Private tutoring	-0.30	-0.10	-0.22	-0.17
	(0.25)	(0.21)	(0.26)	(0.25)
Girl	0.03	0.04	1.53*	1.61*
	(0.09)	(0.08)	(0.10)	(0.09)
Household income	0.09	0.07	0.25*	0.16
	(0.09)	(0.07)	(0.08)	(0.08)
Private school	0.11	0.16	0.09	0.17
	(0.12)	(0.10)	(0.10)	(0.12)
Class size	0.01	0.00	0.00	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	-0.42	-0.62	-4.35*	-4.15*
	(0.57)	(0.48)	(0.54)	(0.59)
Observations	2,911	2,943	3,535	2,911
Number of groups	150	150	150	150

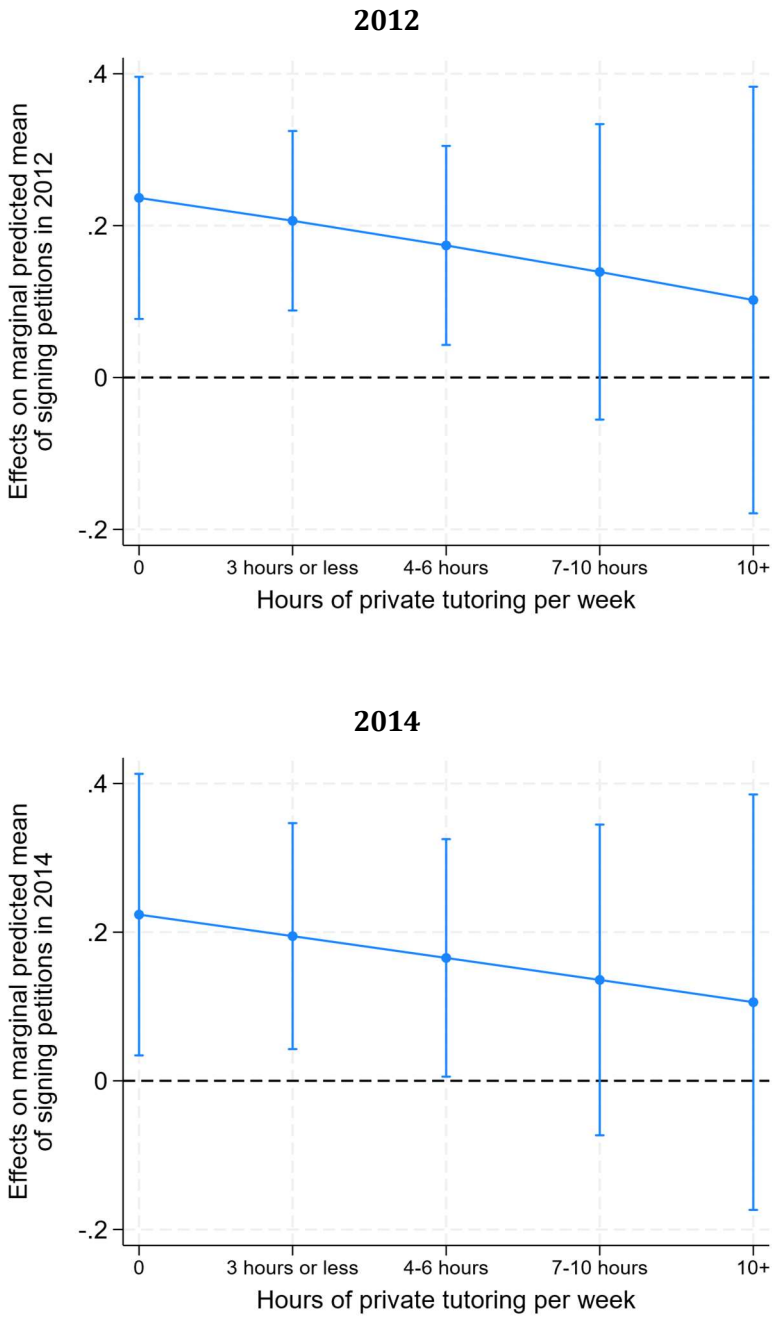
Note: Multilevel logistic regression estimates with robust standard errors shown in parentheses. Outcomes for each model are indicated in the column title – model 1 predicts whether the respondent voted in 2014, model 2 predicts whether the respondent voted in 2016, models 3-4 predict whether the respondent signed petitions in 2012 (model 3) or in 2014 (model 4).
*p<0.05

D5. Predicting petition participation in 2012 and 2014 with student-centered education across family environment



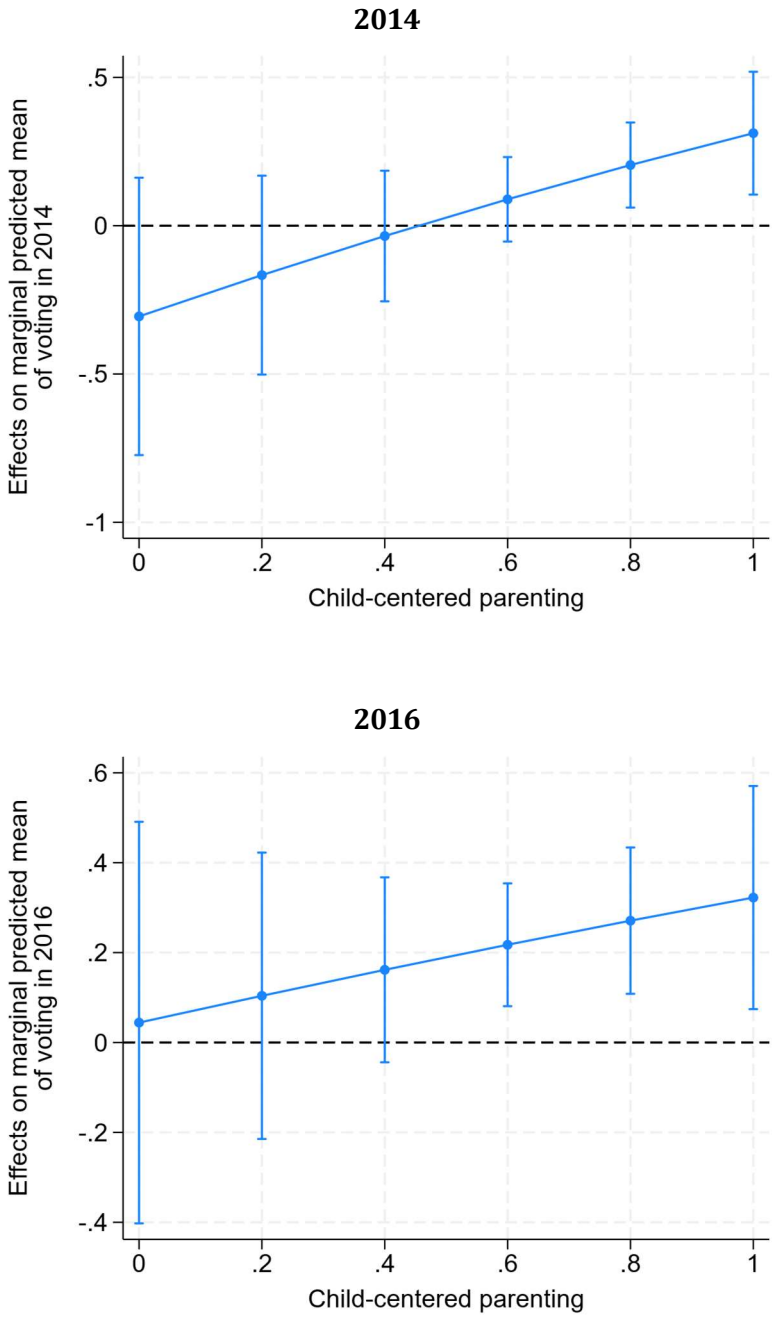
Note: Plots show the marginal effects of an inter-quartile change in the Student-centered Education Index on whether the respondent signed petitions in 2012 (upper panel) and in 2014 (lower panel), across levels of child-centered parenting. 95% confidence intervals are shaded in grey. Multilevel logistic regression estimates shown with controls for whether the individual identified as a girl, household income, private school status, and class size.

D6. Predicting petition participation in 2012 and 2014 with student-centered education across after-school private tutoring



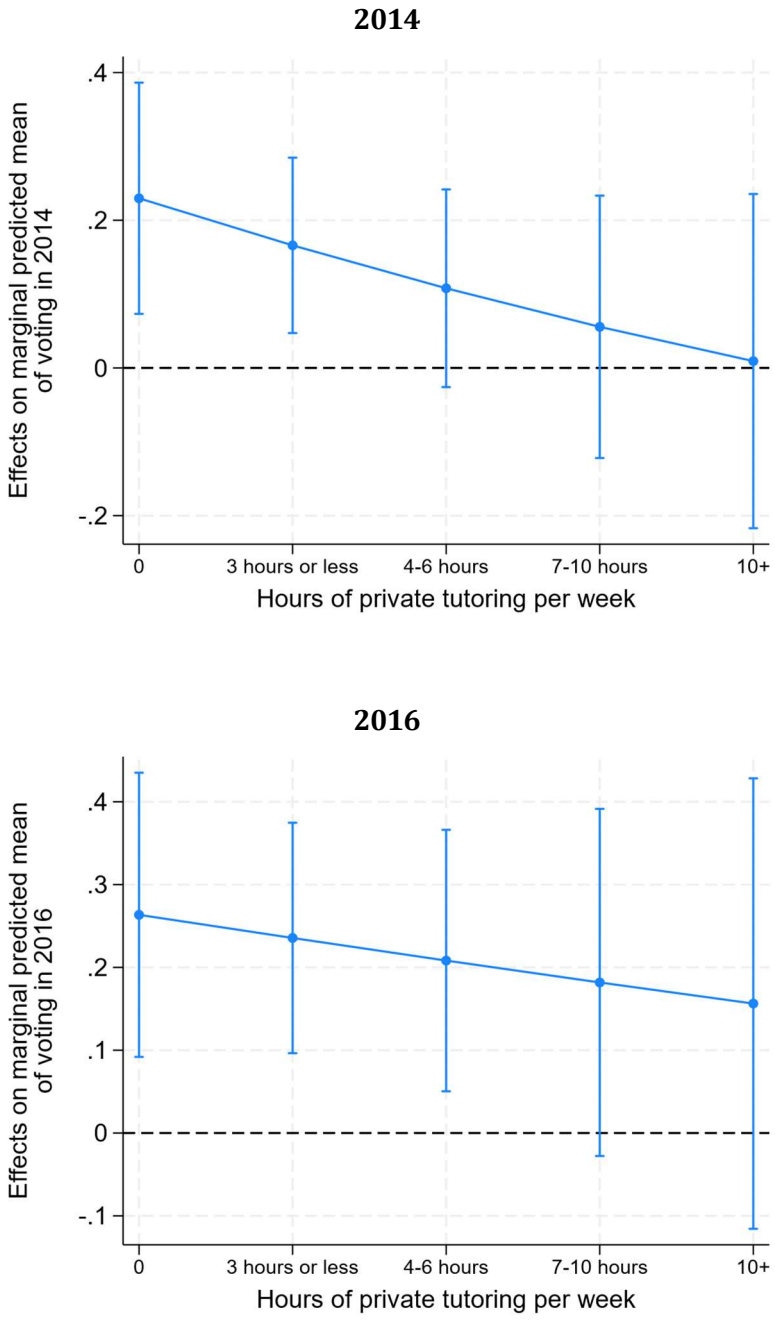
Note: Plot shows the marginal effects of an inter-quartile change in the Student-centered Education Index on whether the respondent signed petitions in 2012 (upper panel) and in 2014 (lower panel), across hours of after-school private tutoring lessons per week. 95% confidence intervals are shaded in grey. Multilevel logistic regression estimates shown with controls for whether the individual identified as a girl, household income, private school status, and class size.

D7. Predicting voting in 2014 and 2016 with student-centered education across family environment



Note: Plots show the marginal effects of an inter-quartile change in the Student-centered Education Index on whether the respondent voted in 2014 (upper panel) and in 2016 (lower panel), across levels of child-centered parenting. 95% confidence intervals are shaded in grey. Multilevel logistic regression estimates shown with controls for whether the individual identified as a girl, household income, private school status, and class size.

D8. Predicting voting in 2014 and 2016 with student-centered education across after-school private tutoring



Note: Plot shows the marginal effects of an inter-quartile change in the Student-centered Education Index on whether the respondent voted in 2014 (upper panel) and in 2016 (lower panel), across hours of after-school private tutoring lessons per week. 95% confidence intervals are shaded in grey. Multilevel logistic regression estimates shown with controls for whether the individual identified as a girl, household income, private school status, and class size.

A Natural Experiment in South Korea

An empirical challenge in testing my argument that education models matter for civic outcomes is that individuals who are already predisposed to being active citizens may choose to go to schools that offer more voice to their students. Those who enjoy expressing their opinions in group settings may choose to attend student-centered schools where students have more voice during class and in school matters. If this were the case, then even if we observe that individuals learning in student-centered models are more active citizens, this correlation would be spurious. Rather than showing the civic effect of student-centered education, a positive correlation between student-centered education and civic activity would simply be an artifact of certain types of people choosing to go to certain schools. How do we establish that the relation is causal and not spurious? One way is to use a setting where individuals cannot choose the education model they learn in.

I identified such a setting in South Korea where students are assigned education models by lottery. Korea is home to a unique school assignment system that has roots in an overly competitive admission system. A little over half a decade ago, the South Korean government enacted a lottery system that randomly assigns students to middle schools and high schools, to address problems arising from intense competition among students to attend elite schools. The lottery system has since been softened to accommodate regional circumstances and citizens' demands to have more choice in schools, but still dictates school assignment in some parts of the country.

In parts of South Korea's largest state, for example, if a middle school has too many applicants than it can admit, students are randomly chosen by lottery to either attend the school or be assigned another school in the district that does not have enough applicants. I identified middle school districts in such areas that have one popular school that receives significantly more applicants than they can admit, and one unpopular school. In these districts, students who apply to the popular school are

randomly schools. When schools vary in levels of student-centered education, a natural experiment setting arises where some students are randomly assigned a more student-centered education model than their peers. In June-July 2023, I fielded a self-administered online survey in four such districts to assess the civic effects of student-centered education.[59] In this chapter, I explain the natural experiment setting, how I identified this setting, and my fieldwork procedures to administer a survey to students and parents in my target school districts. I then present my findings that provide supportive evidence of a civic effect of student-centered education.

Lottery school assignment and student-centered education

South Korea has a unique education system that creates opportunities to identify natural experiment settings. The country, in some areas under certain circumstances, randomly assigns schools to students and has pushed for student-centered education to varying levels of success. When these two aspects of the Korean education system intersect, a school district will randomly assign education models to its students. I briefly explain here how the lottery school assignment and push for student-centered education arose from the country's politics, demographics, and social movements.

A few years after the Korean war in the late 1950s, the South Korean government made primary education mandatory for all citizens. This created a surge in Koreans attending primary school and in turn, demand for secondary education. But the number of secondary schools in the country stayed stagnant, driving up competition for admission to middle schools and high schools (Han 2013). During this period, the Korean government and schools administered nation-wide standardized exams to

[59] The study was approved by Vanderbilt University's IRB (#220254) and the Korean Public IRB (#P01-202207-01-024), and financially supported by the American Political Science Association and Vanderbilt University.

select which students would be admitted to middle schools (Kang 2004; Park 1999). Korean society revolved around elites who graduated from a short list of prestigious schools and the competition to perform for middle school entrance exams led to high levels of stress among children and their parents, stunted growth among children, child suicides, and financial burden for families paying for private tutoring lessons (Han 2013; Hwang 2013)

Against this backdrop, several incidents ignited public outcry and paved the road to the elimination of middle school entrance exams (Lee 2013). In one incident coined the "radish juice scandal," a question on the science exam for entrance into elite middle schools in Seoul listed the steps to make rice taffy and asked what you could substitute for one of the steps. The Ministry of Education declared that the answer was 'diastase', a digestive enzyme. This caused strong pushback from parents of children who instead answered 'radish juice' which contains diastase, and did not make the cut to elite middle schools. Indignant parents rushed to government offices and politicians with a pot of rice taffy made with radish juice to strongly protest and eventually, the Seoul High Court declared that both diastase and radish juice were correct (Lee 2013). Following the court ruling, students who were below the cut for their middle schools of choice because they answered radish juice were allowed admission into elite middle schools. During the chaos of this incident, several high-level politicians and other elites arranged for their children to also receive admission, which caused even more public uproar and forced the Presidential Secretary, Ministry of Education's Deputy Minister, and the Seoul education superintendent to step down.

In response to incidents like the radish juice scandal which brought to light problems in administering exams for school admissions as well as the extent of public tension, stress, and dissatisfaction with competition for school admissions, the Ministry of Education declared in 1968 that entrance exams would be eliminated for all middle schools, and admissions would instead be decided by lottery (Paik 2001). This was a radical change in education in Korea and was considered an education revolution that freed children and parents from 'admission hell' (Lee 2013; Park 1999).

The lottery system has since been softened to accommodate regional circumstances and citizen demands to have more choice in schools, but still dictates school assignment in parts of the country (Kim et al. 2008; Park 1999).

Independent of the lottery school assignments, local governments in Korea have pushed for student-centered education in its schools in the past decade. One key way that this was done was by funding pre-existing schools to become "Innovation schools" that adopt a participatory model of education focused on "voluntary, creative, autonomous, and democratic schooling" (KEDI 2018). Although there were regional differences in the specific implementation of Innovation Schools, one common theme running through all local variations of the Innovation School policy is their focus on building a school culture focused on democratic and autonomous norms. Pitted against the nation's traditional authoritarian culture and rote memorization in schools, innovation schools emphasize participation and self-initiative of its students (SMOE 2018, 8).

The Innovation school policy and, more broadly, Korea's recent education reforms towards student-centered education, has bottom-up origins in the New School movement (Jung 2015, 37-9; GOE 2017, 5). In the late 1990s and 2000s, teachers and parents from schools at threat of closures worked together to revive their schools. Many of the parents in this movement were activists who moved to districts in rural areas where schools faced closures because there were too few students in the area. To keep the schools running, the parent-activists transferred their children into these rural schools and teamed up with teachers who wanted to change how children in the country learn. Because these teachers were working in schools with a small number of students, they were free of burdensome administrative work, and were able to use this time and administrative leeway to innovate the curriculum in their schools (GOE 2013, 26-27). They eagerly took advantage of this opportunity since they were driven to change education in schools. With innovations such as the inclusion of more hands-on activities, flexibility in curriculum, and project (rather than subject) centered classes, the movement

evolved from one that focused on preserving debilitating schools to one that focused on reforming school models – the New School movement (Kang 119-120; Song 2018, 25-26).

The New School movement was accompanied by institutional and political developments. To facilitate schools around the country taking part in these education model reforms, the Small School Education Association was founded to build networks across schools in the New School movement (Song 2018, 25). The movement, however, was inherently confined to small schools facing closures and was irrelevant for the vast majority of schools in the country. Then, in 2007, this was no longer the case with the institution of direct elections for local education superintendents.

Education governance in South Korea is administered by the Ministry of Education at the national level, Metropolitan and Provincial Offices of Education at the province level, and Local Offices of Education at the district level (Kim et al. 2014; Korean Ministry of Education 2023). Education superintendents serve as the head of one of 17 Metropolitan and Provincial Offices in the country, and therefore are heavily influential in both province and district level education policies (Jun and Min 2017). In 2007, following periods of presidential and education board appointments, direct elections were institutionalized to select education superintendents for all 17 province-level regions in South Korea (Huang et al. 2024). In 2009 in Gyeonggi province, the largest and most populous province in the country, a liberal candidate for office successfully campaigned on progressive education policies. One of his main policy platforms was to expand the New School movement to a province-wide policy and create student-centered Innovation Schools, which he delivered on during his tenure as one of his key contributions (Hong 2019). The policy was well received by citizens and this started a nationwide movement towards Innovation Schools, as education superintendents in other areas of the country also started to endorse more student-centered education (Yoo 2017).

During preliminary fieldwork in Korea in 2022, I interviewed local teachers to understand their experiences and roles in this shift to student-centered education. I also met with administrators at the Gyeonggi Provincial Education office to ask about the local Innovation School policy. What I heard

commonly from both teachers and education office administrators was that schools and teachers are the ones who have the final say in the extent of student-centered education that they practice, and that they vary in their willingness and capacity to implement more student-centered practices. While local governments have pushed towards more student-centered education and student-centered education is now practiced more on average, there is still a great degree of variation in education models regardless of whether a school is a designated 'Innovation school' or not.

The presence of both random school assignments and varying degrees of student-centered education implementation creates natural experiment settings in Korea. If a school district randomly assigns their students to schools and some schools are more student-centered than others, students are effectively being randomly assigned education models. In the next section, I explain how I identified such school districts.

Identifying the natural experiment setting

Identifying school districts that randomly assigns students to education models entailed several steps. I first used publicly available notices from the Gyeonggi Local Offices of Education to create a list of middle school districts that included only two schools and randomly assigns students to schools when there are excess applicants. Whether students were randomly assigned schools in a particular year is not public information, but the number of applicants and admits to a school in a given year is publicly available, on request, because education offices have this information and they are mandated by law to respond to citizen information requests.

I used this system to file information requests to education offices on the number of applicants and admits on each school-year included in my list. The information I received from these requests showed that most districts did not have overly popular schools, so students were in reality not often randomly assigned to schools. But there were several school districts that did. Table 1 shows the four districts with large schools that have the highest rate of random assignment. Each of the grouped rows

with two schools represent the middle school district, with the first middle school listed in each district being the popular school in that district. The first column shows how many people applied to each school when the applicants were finishing elementary school. The second column shows how many students were assigned to each school that year. The third and fourth columns show how many and what proportion of those assigned were randomly assigned the school they ended up attending. I show this information for both those who were in 8th grade and those who were in 9th grade (2nd and 3rd year in middle school, respectively) when I fielded my survey in the summer of 2023.

Table 8. Random assignment across districts

School	8th graders				9th graders			
	# applied	# assigned	# random	% random	# applied	# assigned	# random	% random
Yangil	328	231	231	100.0%	334	231	231	100.0%
Yangpyeong	125	222	97	43.7%	128	231	103	44.6%
Jangnae	324	230	230	100.0%	371	284	284	100.0%
Pyeongnae	134	228	94	41.2%	132	219	87	39.7%
Pangok	456	351	351	100.0%	452	326	326	100.0%
Hopyeong	189	294	105	35.7%	178	304	126	41.4%
Poongyang	388	330	330	100.0%	482	441	441	100.0%
Joogok	219	277	58	20.9%	199	240	41	17.1%

A potential issue in random assignment in such situations for many parts of the world is the availability of exiting to a private school of an individual's choice. In the Korean context, however, middle school (7th-9th grade) students do not typically have the option of going to a private school of their choice if they are not assigned a school of their preference. Regardless of the school's private or public status, the application period for middle schools is between October and early November, and the lottery results for schools in the public education system are notified in January so students can start their school year in March. Further, both public and private schools in the country are subject to local school assignment policies such as the lottery system (Kim et al. 2008). At the middle school level, opting out would entail going to a "Specialized Middle School," where admission rules are not dictated by the local education policy. Specialized Middle Schools – those specialized in an international

curriculum, an arts curriculum, a physical ed curriculum, or an alternative education curriculum make up 1.4% of 3,305 middle schools in the country as of 2022, so only a very small proportion South Korean students are not subject to the local education office's school admission rules (Korean Educational Statistics Service 2022; Korean Ministry of Education 2022). In effect, most students in Korea applying to middle school are subject to the local education office's school assignments even when the school is not their preference.

My target population is those who were randomly assigned their school, which ranges from 17% to 100% of each target school's students in the respective grade in Table 1. I could not target my recruitment to specifically this target population because I did not have information on whether someone applied to their school or not, so I targeted my recruitment to all students in each target school, and then filtered out those who were not randomly assigned their school through questions on my survey. I describe this process in the following section.

Recruitment

Recruitment was a crucial and labor-intensive step in my fieldwork. I worked with a team of research assistants to run recruitment stalls, post recruitment flyers, and hand out recruitment flyers in my target schools' neighborhoods, which are all common ways to advertise products and services in Korea. For the recruitment stalls, my research assistants and I took turns manning a canopied folding table, which we set up each day, on days the weather permitted (Figure 1). During my fieldwork, some individuals expressed concern that people would be hesitant to enter personal information and opinions in an online form by some online presence. So we used recruitment stalls to put a face to the research and create more interest and trust in the research.

We also posted recruitment flyers in large high-rise apartment complexes in the target school districts (Figure 2). As of 2022, three in four young Korean families live in high-rise apartments

(Ministry of Land, Infrastructure and Transport 2023[60]). Apartment complexes in Korea typically have notice boards near the main elevator, which displays both internal notices by the apartment management and also external advertisement flyers by individuals or companies that pay to display their advertisement for a pre-determined period. The purpose of posting recruitment flyers on these notice boards was to advertise the study to the parents of my participants.

While these recruitment methods likely helped expose my study to potential participants, the most effective recruitment method by far was handing out recruitment flyers outside school gates to students (Figure 3). We visited each target school either two or three times, depending on how effective the recruitment was. For most schools, I called or visited the target school prior to recruiting at the school gates and asked when students would be leaving school after classes so that we would start the recruitment at that time. We visited schools when students were leaving school after classes finished, because this is when students are more likely to accept flyers.

We handed out recruitment flyer "packages" during these school gate recruitments. Each flyer package included a Haribo (for the student) and a washcloth (for the parent) which my research assistants and I packaged in plastic wrappers so that they are easy to hand out, more weather-resistant, and less likely to be stripped of just the Haribo and trashed in the streets (Figure 4). In total, we handed out approximately 10,000 flyers. I note here that handing out flyers is a common method of advertising in Korea, and it is also common practice to attach a small gift on the flyers as it greatly helps the odds of people accepting the flyers.

[60] https://www.molit.go.kr/USR/NEWS/m_71/dtl.jsp?lcmspage=1&id=95089188

Figure 10. Recruitment using stalls

Figure 2. Recruitment using apartment complex notice boards

Figure 3. Recruitment at school gates

Figure 4. Recruitment flyer and packaging the flyers

I used the recruitment flyer in Appendix A for all recruitment methods. The title of the flyer read "School culture and citizenship survey" and the remaining text lists information about the research: research title, research purpose, who is eligible to participate, how to participate, and my contact information. Figure 5 shows the translation of the text. Under this text was a QR code that participants could scan with their mobile phones to access the study landing page, consent forms, and survey, which I discuss in more detail in the next section.

Figure 5. Translation of recruitment flyer text

School Culture and Citizenship Survey

We are recruiting middle school students and their parents to take part in an online survey. All eligible participants will receive a mobile gift certificate within 48 hours of submitting the survey.

Research title: Student-centered culture and citizenship
Research purpose: To assess the effect of student-centered education on citizenship
Who is eligible to participate: Pyeongnae, Jangnae, Hopyeong, Joogok, Poongyang, Keumleung, and Keumchon middle school students and their parents
Participation period: June 20th ~ August 31st 2023
How to participate: Scan the QR code below to submit an online survey (approximately 5-10 minutes)
Principal Investigator: Eui Young Noh (Vanderbilt University PhD

I provided compensation for participation in the form of virtual gift certificates, which I sent to the mobile phone number that participants provided for this purpose within 48 hours of survey completion. The gift certificates were worth approximately $3.7 and could be redeemed at locations such as a convenience store, a supermarket, or a café. Compensation was a crucial part of the recruitment process – during recruitment, students often asked whether they would really receive the gift certificate upon completing the survey and were excited to hear that they would.

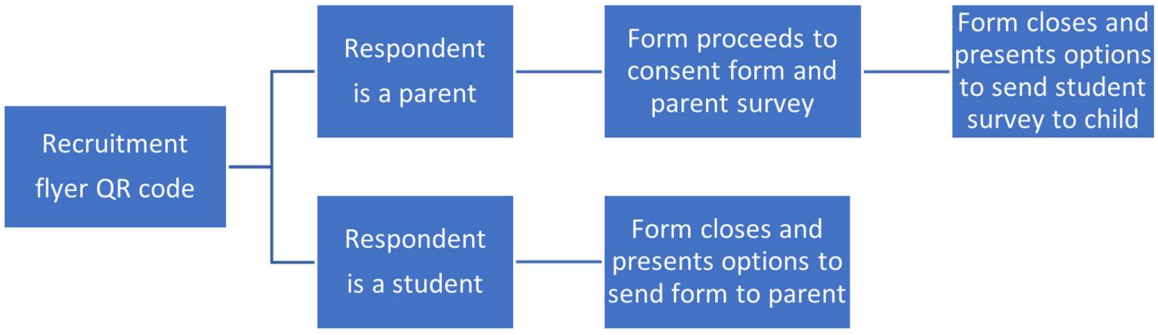
Consent and survey process

I recruited both middle school students and their parents to take part in the study. I programmed the online study information, consent, and survey forms so that student participants would not be able to access the consent and survey forms prior to submitting parental consent. That is, only those whose parents approved of their child's participation could access the student consent and survey

forms. This was programmed via Qualtrics' survey flow and survey end options. Appendix B shows the translation of the full student consent form, Appendix C shows the parent consent form, and Appendix D shows the student survey.

The recruitment flyer's QR code was linked to a landing page that introduced the study and listed the schools whose students (and parents) are eligible to participate. It then asked, "Are you a student or a parent?" For students, the page automatically closed and provided options to share the page with their parents so that parents could give consent for the child prior to the child's consent and participation. For parents, the survey proceeded to the parent consent and parent questionnaire items.[61] At the end of this survey, the parent could share the student consent and questionnaire with their child, either by putting in their child's phone number or by manually sharing a QR code displayed on this page. This was done via programming on my end using code that immediately sends a pre-written text to the phone number submitted in the form. The text included the link to the student consent and survey form. A little over two thirds of my respondents chose to share via text. Figure 6 illustrates the order of the consent and survey forms. Appendix B shows the consent form for student participants translated into English, and Appendix C shows the consent form for their parents or legal guardians.

Figure 6. Consent and survey process



[61] I collected parent surveys for 93 out of my 101 student respondents.

Random assignment of education models

165 students participated in the study. There were a number of participants attempting to re-take the survey, most likely to receive more gift cards. For these participants, I only retained the earliest submission in my data. There were also several instances where multiple submissions shared the same number at which to receive the gift card. I assume these to be re-takers as well and keep only their first submission in my data. I also exclude respondents who sped through the survey faster than they would be able to if they read the survey items.[62] This drops 13 respondents.

Among the remaining 152 respondents, 101 were randomly assigned their school (Table 2). These were individuals who applied for the popular school in their district when they applied for middle school six months to two and a half years prior to the survey date (depending on their current grade). To identify individuals who applied to popular schools, I included a question in my survey on whether the respondent had applied to their school. Since I know from my information requests which schools were the popular schools in each district, I am able to use responses to this question to identify those who were randomly assigned their school – students attending the popular school who answered that they had applied to their school and those attending the unpopular school who said that they had not applied to their school. I analyze these respondents only. Doing so allows me to compare those who were randomly assigned one type of education to those who were randomly

[62] I assume that middle school students on average read slower than adults. Given that the average silent reading rate for adults is 238 words per minute (Brysbaert 2019) and that my student survey questions included 382 words, I assume that respondents who took the student survey faster than 238/60 * 382 = 96.2 seconds did not read through the survey.

assigned another type, assuming that the popular schools and unpopular schools in my sample differ in their education model.

Table 2. Sample of study

	Attends popular school	Attends unpopular school	
Applied to popular school	70	31	→ **Sample**
Applied to unpopular school	0	51	

I find that this assumption holds. Table 3 shows estimates from two-tailed t-tests that compare the means of education model measures between popular and unpopular schools. Students attending the popular school in their district report a higher degree of sharing opinions in class with each other than those attending the unpopular school in their district. Popular schools are also significantly more likely to have ways for students to express their opinions to their school through means such as bulletin boards and 'suggestion boxes'. That is, popular schools in my sample are more student-centered in the aspect of giving students more voice both in and outside the classroom. Table 3 also shows the aspects in which schools do not significantly differ – I do not find any significant differences in means across schools in terms of opportunities for students to express their opinions in class, the degree of group work, nor student input when deciding on school rules.

I also do not find any statistically significant differences in attributes that might shape preferences for progressive education such as gender, income, or parental education. Parents' education level, household monthly income, and the proportion of girls are not statistically different between popular and unpopular schools at the 0.05 level (Table 4). That is, assignment of popular versus unpopular schools is balanced on these covariates, lending support to my assumption that school assignment was in fact random.

Table 3. Comparison of means in student-centered education model practices

	Mean of popular schools	Mean of unpopular schools	Difference	p-value
Students share opinions in class[63]	2.77	2.26	0.51	0.03
School has avenues for students to express opinions[64]	3.01	2.61	0.40	0.04
Students express opinions in class[65]	3.33	3.11	0.22	0.06
Students work together in groups in class[66]	2.60	2.65	0.05	0.80
School considers student opinions when making rules[67]	2.67	2.71	0.04	0.86

Table 4. Balance across household income, parental education, and gender

	Mean of popular schools	Mean of unpopular schools	Difference	p-value

[63] The question asks "How much do you agree or disagree about your reading class: Students share their opinions about class content with each other" and provides the response options strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. I code responses to range from 0 to 4.

[64] The question asks "How much do you agree or disagree: There are channels (suggestion boxes/boards, etc.) to gather students' opinions at our school" and provides the response options strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. I code these responses to range from 0 to 4.

[65] The question asks "How much do you agree or disagree: The teacher gives students the opportunity to express their opinions" and provides the response options strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. I code these responses to range from 0 to 4.

[66] The question asks "How much do you agree or disagree: Students form groups to work on assignments together during class" and provides the response options strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. I code these responses to range from 0 to 4.

[67] The question asks "How much do you agree or disagree: Our school reflects students' opinions when making or changing school rules" and provides the response options strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. I code these responses to range from 0 to 4.

Household monthly income[68]	3.63	3.96	-0.34	0.36
Parent's education level[69]	2.25	2.66	-0.41	0.06
Girls	0.59	0.59	0.01	0.96

Measuring civic engagement

I measure civic engagement with attention to news, signing petitions, and social media activity. I also included a 'school request' item as a behavioral measure for a civic activity. I asked about attention to news with how much the respondent agrees that they "pay attention to news on social issues." One in two individuals in my sample either agreed or strongly agreed to this statement (Figure 7). For petition participation, I asked if they have ever signed a petition. Signing petitions are a common form of civic activity in Korea, popularized by a national petition system run by the Blue House from 2017 to 2022. The Blue House petition system was widely used and known to the Korean public – over nine in ten citizens knew about Blue House petitions and over two in three had participated as of 2022 (Jung 2022). In my sample of middle school students, a little over four in five knew what petitions were and one in ten responded that they have signed a petition (Figure 8). This accounts for only ten individuals because of my small sample size, so for the analysis in the subsequent section, I combine categories to create an indicator for whether the respondent has either signed a petition before or is open to signing one in the future against the baseline of either not knowing what petitions are or not being open to signing petitions in the future.

[68] The question was included in the parent survey and asks "How much is your household income before taxes?" There were 7 response options to choose from, ranging from "less than 2 million KRW" to "more than 7 million KRW". I code these responses to range from 0 to 6.

[69] The question was included in the parent survey and asks "What is your highest level of education?" Response options were: middle school, high school, 2-year college, 4-year college, and graduate school. I code these responses to range from 0 to 4.

Figure 7. Distribution of agreement with the statement: I pay attention to news on social issues

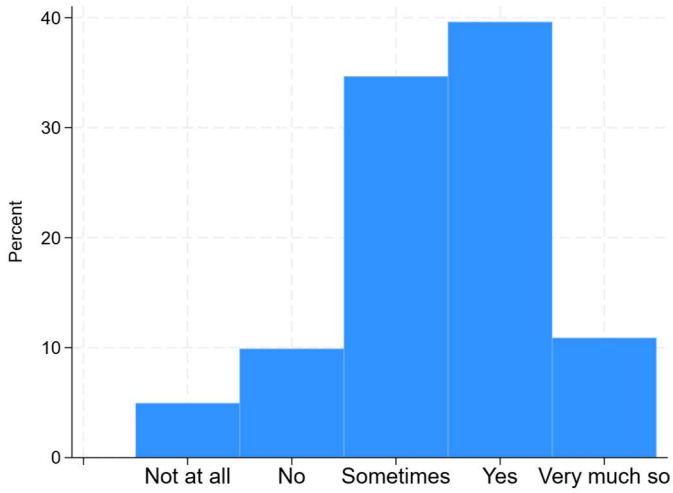
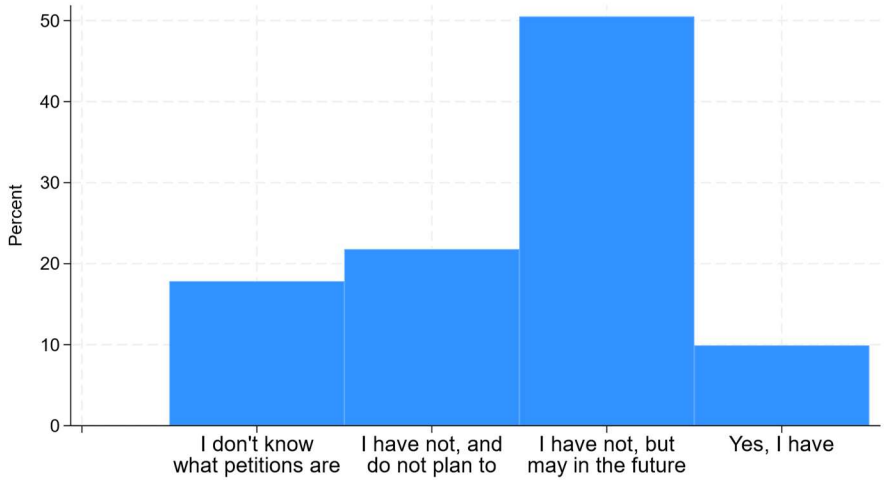


Figure 8. Distribution of responses to: Have you ever signed petitions?



My second measure of civic outcomes is engagement with social issues online and on social media. In one question, I asked respondents if they have uploaded a post, comment, photo, or video on the internet or on social media to express their opinions about a social issue. In a second question, I asked if they have supported a social cause by 'liking' or 'following' something online. A significant percentage of my respondents indicated that they have engaged with social issues online in these

ways at some point – one in five said they have uploaded posts or media to express their opinions on a social issue either in the past year or over a year ago, and two in five said they have used social media tools such as 'liking' or 'following' to express support for an issue (Figure 9 and Figure 10).

Lastly, my survey included a behavioral measure of civic activity. I asked respondents if they had anything to suggest or request to their school regarding issues such as school lunch, clothing regulations, facilities, and classes. Respondents could respond either yes or no to this question and for those who chose yes, the survey directed respondents to an open-ended question that asked them to briefly write their suggestions or requests. Respondents also read on this page that their suggestions or requests would be anonymized and delivered to their school. This aspect of the question was added so that the task would feel as an actual civic act would, with real world consequences and a real, relevant entity to which they would express their opinions to. A high percentage of respondents responded yes to this question – nearly one in three (29.7%) volunteered a suggestion or request to their school, most of which concerned issues related to better lunch options and regulations on dress.

Figure 9. Distribution of responses to: Have you ever uploaded a post online to express your opinion on a social issue?

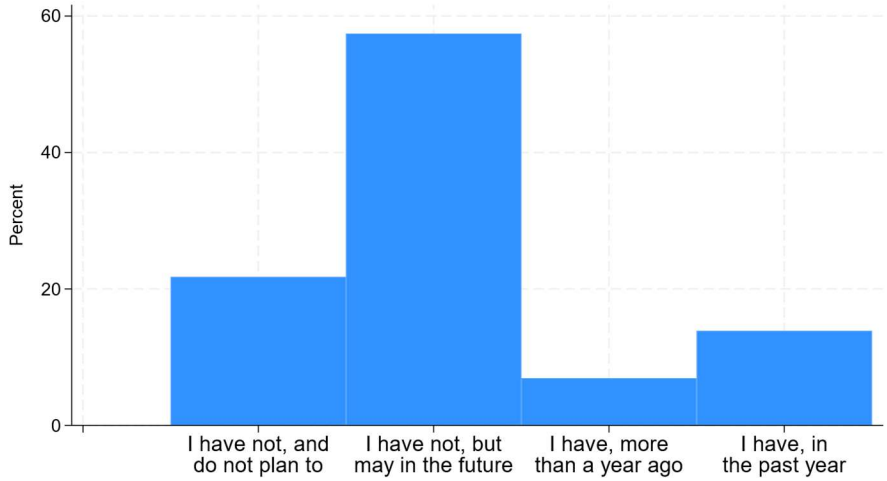
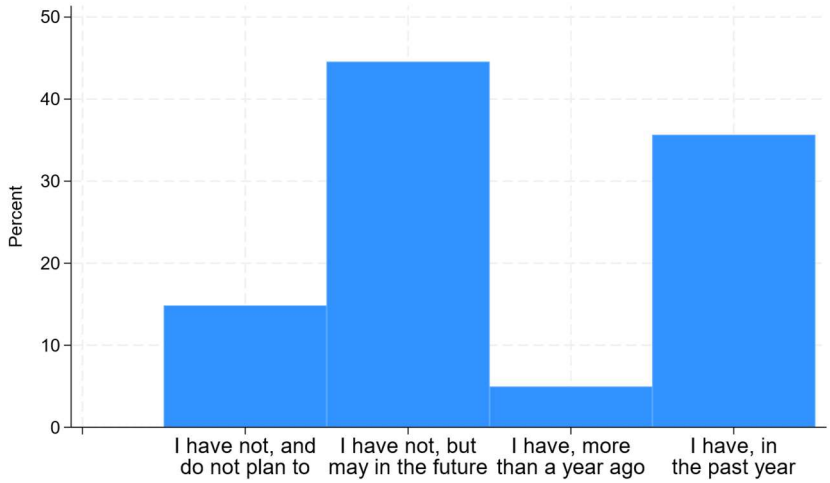


Figure 10. Distribution of responses to: Have you ever expressed your support for a social issue online by 'liking' or 'following'?



Analysis

Since popular schools are on more average more student-centered than unpopular schools, individuals in my sample who were randomly assigned to the popular school in their district were in effect assigned by chance to a more student-centered education model. I use this property of my sample to assess the civic effect of student-centered education, by comparing levels of civic engagement of those who were assigned the popular school in their district to the levels among those that were assigned the unpopular school in their district. I refer to the popular schools as student-centered and unpopular schools as teacher-centered below.

I use t-tests to compare means between these two groups. I find that student-centered education makes more active citizens – individuals who were by chance assigned a student-centered school are significantly more likely to sign petitions and use social media to weigh in on social issues (Table 5).[70] Those who are learning in student-centered models are, on average, slightly short of one-

[70] When I instead compare means for an indicator of whether the respondent supported a social issue online in the past year, the means are only significantly different in a one-tailed test ($p = 0.04$).

half of a standard deviation higher in their tendency to support social issues on social media platforms and either sign or be open to signing petitions. While I do not find that student-centered education makes individuals more likely to pay attention to the news or post about social issues on social media, the difference in means is in the expected direction. School requests are an exception. Individuals learning in more student-centered schools were less likely to express requests to their school compared to their peers in less student-centered schools, although the difference in means is again not statistically significant.

Table 5. Comparison of means in civic engagement

	Mean of student-centered schools	Mean of teacher-centered schools	Difference	p-value
Signs petitions[71]	0.67	0.45	0.22	0.04
Support social issue on social media[72]	0.49	0.23	0.26	0.01
Post about social issue on social media[73]	0.24	0.13	0.11	0.20
Attentive to news[74]	2.51	2.19	0.32	0.13
School request[75]	0.26	0.39	-0.13	0.19

[71] The question asks "Have you ever signed a petition?" Respondents could answer "yes," "no, but I may in the future," "no, and I don't think I will in the future," and "I don't know what petitions are." I recode responses to create an indicator of whether the respondent either chose "yes" or "no, but I may in the future" against the baseline of those who were closed to the possibility of signing petitions in the future and those who did not know what petitions are.

[72] The question asks "Have you ever expressed your support for a social issue by liking or following something on social media?" Respondents could answer "yes, in the past year," "yes, more than a year ago," "no, but I may in the future," and "no, and I don't think I will in the future." I recode responses to create an indicator for whether the respondent said that they have done so either in the past year or more than a year ago, against the baseline of choosing either of the two "no" options.

[73] The question asks "Have you ever posted or commented on social media to express your opinion on a social issue?" Respondents could answer "yes, in the past year," "yes, more than a year ago," "no, but I may in the future," and "no, and I don't think I will in the future." I recode responses to create an indicator for whether the respondent said that they have done so either in the past year or more than a year ago, against the baseline of choosing either of the two "no" options.

[74] The question asks respondents how much they agree with the statement that they pay attention to news on social issues. Respondents could answer strongly disagree, disagree, neither disagree nor agree, agree, and strongly agree. I code these responses to range from 0 to 4.

[75] This question asks, "Do you have any suggestions or requests to your school related to issues such as school lunch, clothing regulations, facilities, or classes?" Respondents could choose either yes or no.

I look at mechanisms next. In chapter 3, I found supportive evidence for my argument that political efficacy is one pathway through which student-centered education makes more active citizens. When analyzing data from my survey, however, I do not find any significant differences in means for political efficacy across schools (Table 6). My survey included the political efficacy question from KELS that I used in chapter 3 (To what extent do you agree that a good society can be made through citizen effort?), along with measures of internal and external efficacy using agreement with the statements: 'People like me have little influence on what the government does', 'The government doesn't care about the opinions of people like me,' and 'I know more about social issues in Korea than my friends'.[76] I find that for all political efficacy items, the means across schools are not significantly different from each other. The lack of significant differences in levels of political efficacy may be attributable to my small sample size, but I find that unlikely to be the case given that although the sample is small, the mean for student-centered schools is lower than teacher-centered schools.

Table 6. Comparison of means in political efficacy

	Mean of student-centered schools	Mean of teacher-centered schools	Difference	p-value
Good society through citizen effort	2.91	2.94	-0.02	0.93
People like me can't influence government	1.97	2.13	-0.16	0.50
Government doesn't care about the opinions of people like me	2.10	2.39	-0.29	0.21
Knowledgeable about important social issues	2.16	2.16	-0.00	0.99

[76] Respondents could answer strongly disagree, disagree, neither disagree nor agree, agree, or strongly agree. These responses were coded to range from 0 to 4.

Appendix A. Recruitment Flyer

학교문화와 시민성 설문조사

중학생 및 중학생 자녀를 둔 학부모님을 대상으로 온라인 설문 참여자를 모집합니다. 참여자 전원에게 48 시간 내로 모바일금액권이 지급됩니다.

연구제목: 학생중심문화 및 시민성 비교 연구
연구목적: 학생중심교육이 시민성에 미치는 영향을 평가할 수 있는 자료 수집
참여대상: 평내・장내・호평・ 판곡・주곡・풍양・금릉・금촌중학교 학생 및 학부모
참여기간: 2023 년 6 월 20 일 ~ 8 월 31 일
참여방법: 아래 QR 코드 스캔 후 설문(5-10 분 소요) 온라인 제출
연구책임자: 노의영 (밴더빌트대학교 박사학위 후보생: eui.young.noh@vanderbilt.edu)

응답해주신 내용은 국내외 교육정책 수립에 도움이 될 수 있습니다. 설문 중 언제든지 질문을 건너뛸 수 있습니다. 개인정보보호법에 따라 개인의 응답내용은 철저하게 비밀이 보장됩니다.

설문 접속 QR 코드

Appendix B. Consent form for student participants

Research Project Title: Comparative Study of Student-Centered Culture and Citizenship

This research focuses on the student-centered culture and citizenship in Korea. Before deciding to participate in this study, please carefully read the information and consent form. Participation in this study is voluntary and will only be conducted with those who express their willingness to participate. After reading the following information carefully, please indicate your intention to participate, and feel free to discuss it with your family or others if necessary. If you have any questions, please contact the principal investigator, Eui Young Noh, at 010-5171-0739. Your signature indicates that you understand the explanation of this study and that you wish to participate in it.

Background and Purpose of the Research

This research focuses on the student-centered culture and citizenship in Korea. The purpose of the study is to contribute to educational policies by understanding the student-centered culture and citizenship experienced by students in various environments, both domestically and internationally. This study examines the impact of student-centered education, as emphasized in the 7th National Curriculum, on domestic citizenship.

Research Participants

The participants of this study include 500 students and their guardians from the following schools: Hopyeong Middle School, Pangok Middle School, Jangnae Middle School, Pyeongnae Middle School, Pungyang Middle School, Jugok Middle School, Yangil Middle School, Yangpyeong Middle School, Geumneung Middle School, and Geumchon Middle School.

Research Participation Method

Participants will take part in an online survey that takes about 5-10 minutes to complete. The student survey page will be accessible upon submission of this consent form. Within 48 hours of completing the survey and submitting the consent form, the principal investigator will confirm the submission and send a 5,000 KRW mobile gift certificate to the provided contact information. The survey includes questions about class affiliation, school classes, school management, citizenship (qualities of a good citizen, political and social efficacy, social behavior, etc.), and relationships with parents.

Duration of Research Participation

Participants will complete an online survey taking about 5-10 minutes, conducted once between the research approval date and December 2023.

Benefits of Research Participation

Participants will help enhance understanding of public education and citizenship in Korea, contributing to educational policies based on this understanding. While compensation is provided, no direct benefits from participation in the research are guaranteed.

Side Effects or Risks of Research

There are no medications or other procedures applied for the purpose of this research. Although no adverse reactions are expected, any unexpected psychological discomfort or displeasure will be reported to the Institutional Review Board immediately. Participants showing adverse reactions will be excluded from the study. If any discomfort or displeasure arises during the survey, participants may leave the survey at any time.

Compensation or Costs for Research Participation

There are no costs for participating in this study. Participants will receive a 5,000 KRW mobile gift certificate within 48 hours of survey completion. Available certificates include GS25, CU, 7-Eleven, and KakaoPay.

Privacy and Confidentiality

The following personal information will be collected: name, school affiliation, gender, and contact information. This information is used for consent, participant identification, statistical analysis, and compensation, stored and used for three years for research purposes. Information is managed according to the Personal Information Protection Act and stored securely on the principal investigator's institution server, accessible only to the principal investigator. Responses will be anonymized by assigning unique numbers and discarding names immediately after collection. Data will be used for research purposes and published without revealing personal information. If legally required, personal information may be provided. Monitoring agents, inspectors, and the Institutional Review Board may access research-related materials to verify the reliability and procedures. Signing this consent form indicates acknowledgment and acceptance of these terms. Research-related materials will be kept for three years after the study ends, as required by the Bioethics and Safety Act, and then permanently deleted.

Voluntary Participation and Withdrawal

Participation in this study is voluntary, and non-participation will not result in any disadvantage. Participants may withdraw from the study at any time. Upon withdrawal, data will no longer be used and will be deleted. Contact the principal investigator, Eui Young Noh (010-5171-0739), to withdraw from the study.

For questions or issues during the survey, contact the principal investigator, Eui Young Noh:

Eui Young Noh (PhD Candidate, Vanderbilt University)

010-5171-0739

eui.young.noh@vanderbilt.edu

For questions about your rights as a research participant, contact the Ministry of Health and Welfare-designated Institutional Review Board at 02-737-8990.

Consent Form

Research Title: Comparative Study of Student-Centered Education and Citizenship in Korea

I have read the explanation of this study and have had my questions answered by the principal investigator.

I understand the risks and benefits and have received satisfactory answers to my questions.

I agree to participate in this study.

I consent to the collection and processing of my information as per current laws and Institutional Review Board regulations.

I agree that the principal investigator or their designee may access my personal information during the research process.

I understand that I can withdraw from the study at any time without any penalty.

I will keep a copy of this consent form until the end of the research.

Name: _____

Year of Birth:

School:

Signature:

Date: _____

Thank you for agreeing to participate in the survey. The survey takes appriximately 5-10 minutes, and a 5,000 KRW mobile gift certificate will be sent to your contact information within 48 hours after completion. Your responses will be anonymized and kept confidential. Please click the arrow to proceed with the survey.

Principal Investigator: Eui Young Noh (Vanderbilt University)

Contact Information: 010-5171-0739

Appendix C. Consent form for parents or guardians

Hello!

Welcome to the School Culture and Citizenship Survey.

Any students attending Hopyeong, Pangok, Pyeongnae, Jangnae, Jugok, Pungyang, Geumneung, and Geumchon Middle Schools and their parents are eligible to participate in the survey.

Parents can participate after submitting the consent form on the next page.

Students can participate after receiving parental consent.

Parents will take a 5-minute survey, and students will take a 5-10 minute survey. Both will receive a 5,000 KRW mobile gift card upon completion.

Both parents and students must participate in the survey to receive the gift cards.

Principal Investigator: Eui-Young Noh
(Vanderbilt University PhD Candidate)
eui.young.noh@vanderbilt.edu
010-5171-0739

Are you a student or a parent?

o Student
o Parent

[Proceed if parent, redirect to form for sharing link or QR code]

Research Project Title: Comparative Study on Student-Centered Culture and Citizenship

This study examines student-centered culture and citizenship in South Korea. Before agreeing to participate with your child, please carefully read the explanation and consent form. This study is conducted only for those who voluntarily agree to participate. Please read the following carefully and decide whether you and your child will participate. If necessary, discuss it with your family or others around you. If you have any questions, contact the research director, Eui-Young Noh, at 010-5171-0739. Your signature indicates that you have understood the explanation of this study and that you agree to participate with your child.

Background and Purpose of the Study

This study focuses on student-centered culture and citizenship in South Korea. By understanding the student-centered culture and citizenship experienced by students in public education, the study aims to contribute to educational policies in various environments both domestically and internationally. It investigates the impact of student-centered education on citizenship in the 7th national curriculum, which emphasizes student-centered education.

Participants

The study involves 500 students and their parents from Pungyang, Jugok, Hopyeong, Pangok, Yangil, Yangpyeong, Geumneung, Geumchon, Jangnae, and Pyeongnae Middle Schools.

Method of Participation

You and your child will participate in a one-time online survey that takes about 5-10 minutes each. You will first complete the parent's consent form, which will automatically open the parent's survey page. After completing the parent's survey, you will receive a QR code for your child to access their consent form and survey. After completing the survey, the research director will verify the submission within 48 hours, and both you and your child will receive a 5,000 KRW mobile gift card. The student survey includes questions on demographic information, student-centered culture at school, citizenship, relationships with parents, and household income. The parent's survey includes questions on demographic information, middle school choice, education level, household income, citizenship, and relationships with the child.

Duration of Participation

The online survey will take approximately 5-10 minutes, and will be conducted once from the research approval date to December 2023.

Benefits of Participation

Participants will contribute to the understanding of public education and citizenship in South Korea, aiding in the development of educational policies. While a reward is provided, direct benefits from participation are not guaranteed.

Potential Risks and Discomforts

No pharmaceuticals or procedures are applied for this study's purpose. Although no adverse reactions are expected, any unexpected psychological discomfort will be reported to the Institutional Review Board immediately, and the affected participants will be excluded from the study. If you or your child feel uncomfortable with any questions or information, you can exit the survey at any time.

Compensation

There are no costs associated with participation. Both you and your child will receive a 5,000 KRW mobile gift card upon completion of the survey, which will be confirmed and sent within 48 hours. Available gift card options include GS25, CU, 7-Eleven, and Kakao Pay.

Confidentiality and Data Protection

The personal information collected includes your name and contact information and your child's name, contact information, school affiliation, and gender. This data will be used for consent, participant assessment, statistical analysis, and reward distribution, stored for three years. The collected data will be managed according to the Personal Information Protection Act. Responses will be anonymized by assigning unique numbers to each participant, and names will be deleted immediately after assigning numbers. Research findings published in journals or conferences will not disclose personal information. Personal information may be provided if legally required. Monitors, inspectors, and the Institutional Review Board can access research-related materials to verify the study's reliability without violating confidentiality. Signed consent indicates understanding and agreement with these terms. Research-related documents will be stored for three years after the study concludes and then permanently deleted.

Voluntary Participation and Withdrawal

Participation is voluntary, and there will be no disadvantage for not participating. You can withdraw at any time without any penalty. Notify the principal investigator Eui-Young Noh (010-5171-0739) if you wish to withdraw. Upon withdrawal, your data will be deleted and not used in the study.

Inquiries

For questions or issues during the survey, contact the principal investigator:

Eui-Young Noh (Vanderbilt University PhD Candidate)

010-5171-0739

eui.young.noh@vanderbilt.edu

For questions about your rights as a research participant, contact the Ministry of Health and Welfare designated Institutional Review Board at 02-737-8990.

Consent Form:

Research Title: Comparative Study on Student-Centered Education and Citizenship in Korea

I have read the study explanation and received answers to my questions from the research director.

I understand the risks and benefits and am satisfied with the answers to my questions.

I voluntarily agree for myself and my child to participate in this study.

I consent to the collection and processing of my and my child's information according to current laws and Institutional Review Board regulations.

I consent to the research director or their delegate accessing my and my child's personal information directly when conducting or managing the study, and to research institutions, funding organizations, and the Ministry of Health and Welfare designated Institutional Review Board conducting investigations while maintaining confidentiality.

I understand I can withdraw from the study at any time without any penalty.

I will keep a copy of this consent form until the study ends.

Name: _____

Relationship with participant (Child)

o Mother

o Father

o Other: _____

Participant (Child) Name: _____

Participant (Child) Birth Year

o 2007

o 2008

o 2009

o 2010

o 2011

Participant (Child) School

o Hopyeong Middle School

o Pangok Middle School

o Jangnae Middle School

o Pyeongnae Middle School

o Jugok Middle School

o Pungyang Middle School

o Geumneung Middle School

o Geumchon Middle School

o Other

Signature: _____

Date: _____

Thank you for agreeing to participate in the survey.

The parent's survey takes about 5 minutes. After completion, follow the instructions to access the student survey. Upon confirming the submission of both surveys, a 5,000 KRW mobile gift card will be sent to each of you within 48 hours.

Your responses will be anonymized and kept confidential. Please proceed to the parent's survey by clicking the arrow below.

Principal investigator: Eui-Young Noh (Vanderbilt University PhD Candidate)

Mobile: 010-5171-0739

Appendix D. Student questionnaire

What grade are you in middle school?

- 1st year
- 2nd year
- 3rd year

Which class are you in?

- 1
- 2
- 3
- …
- 12

Gender

- Female
- Male

When applying to middle school, was ${e://Field/school} your first choice?

- Yes
- No
- I don't know

The following are situations that may occur during a class. Please answer while thinking your reading classes this semester.

The teacher's explanations and instructions take up most of the class time.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Classes revolve around the teacher and students asking and answering questions to each other.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

During class, the teacher helps students solve problems on their own.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

The teacher gives students the opportunity to express their opinions.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Continuing with this semester's reading classes:.

Students exchange their own opinions about the learning content.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Students form groups to work on assignments together during class.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Students collect and research materials on their own to work on assignments.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

I often ask questions during reading class.

- Strongly disagree
- Disagree

- Neither disagree nor agree
- Agree
- Strongly agree

I enjoy being called on and presenting during reading class.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

I actively participate in group assignments during reading class.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

I am keeping up well with reading classes.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

The following are questions about decision-making at school. How much do you agree with each statement?

Our school reflects students' opinions when making or changing school rules.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Our school plans events (field trips/festivals/sports days, etc.) based on students' opinions.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Students' opinions are well reflected in the management of the school cafeteria (menu, etc.).

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Students' opinions are well reflected in elective courses and after-school classes.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

There are channels (suggestion boxes/boards, etc.) to gather students' opinions at our school.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Student participation in school government makes the school better.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Do you have any suggestions or requests regarding school meals, attire, facilities, classes, etc.?

- Yes
- No

Please write down any suggestions or requests you have for the school. Your responses will be anonymized and compiled to be delivered to your teachers at ${e://Field/school}.

The following are questions about citizenship. How much do you agree or disagree with each statement?

A good society can be made by citizens’ efforts.

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree
- Strongly disagree

It is desirable for a leader to make all decisions if they are capable.

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree
- Strongly disagree

The most important policy decisions should be left to the people rather than politicians.

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree
- Strongly disagree

How much do you agree or disagree with the following statements?

People like me have little influence on what the government does.

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree
- Strongly disagree

The government is not interested what people like me think.

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree
- Strongly disagree

I know more about social issues in Korea than my friends.

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree

- Strongly disagree

The following questions are about the qualities of a good citizen. How important do you think each of the following is?

Always voting in elections

- Very important
- Important
- Neither important nor not important
- Not important
- Not important at all

Obeying laws and rules

- Very important
- Important
- Neither important nor not important
- Not important
- Not important at all

Actively participating in activities to solve local and social issues

- Very important
- Important
- Neither important nor not important
- Not important
- Not important at all

Helping those who are less well-off

- Very important
- Important
- Neither important nor not important
- Not important
- Not important at all

Sacrificing personal rights or freedoms for the public good (e.g., preventing the spread of COVID-19)

- Very important
- Important
- Neither important nor not important
- Not important
- Not important at all

People engage in various forms of social actions. Have you ever done the following?

Signed a petition

- I have done it
- I haven't done it, but might in the future
- I haven't done it and don't think I will
- I don't know what a petition is

Paying attention to news about social issues

- Strongly agree
- Agree
- Neither disagree nor agree
- Disagree
- Strongly disagree

Posting writings, comments, photos, or videos online or on social media to express opinions about social issues

- I have done it in the past year
- I have done it more than a year ago
- I haven't done it, but might in the future
- I haven't done it and don't think I will

Showing support for social issues online through likes, comments, follows, etc.

- I have done it in the past year
- I have done it more than a year ago
- I haven't done it, but might in the future
- I haven't done it and don't think I will

The following are questions about your family. To what extent do you agree or disagree?

My parents interfere even in small matters.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

My parents allow me to make my own choices.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

My parents make me follow their decisions unconditionally.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

My parents respect my opinions and allow me to express them freely.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

My family is well-off.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Lastly, the following are questions to confirm your eligibility in the study and send you your gift card. Please select the school information you provided earlier.

School

- Hopyeong Middle School
- Pangok Middle School
- Jangnae Middle School
- Pyeongnae Middle School
- Jugok Middle School
- Pungyang Middle School
- Geumneung Middle School
- Geumchon Middle School

Grade

- 1st year
- 2nd year
- 3rd year

Class

- 1
- 2
- 3
- …
- 12

As a token of our appreciation for participating in the survey, we would like to send you a 5,000 KRW mobile gift card.

Please enter a mobile number where you would like to receive the gift card and select your preferred type of gift card.

Contact Information for Receiving Voucher:

Gift card type: GS25 / CU / Seven Eleven / Kakaopay

Thank you for completing the survey.

Please double-check your contact information to ensure there are no delays in receiving your gift card. If there are any mistakes, please correct them in the input field below.

If you have any questions about participating in the research, please contact the principal investigator Noh Eui Young at 010-5171-0739.

Mobile phone number to receive the gift card: _____

Type of gift card: _____

Appendix E. Summary statistics

1) Student-centered education measures

Variable	Mean	Standard Deviation	Range	N
Share opinion in class	2.61	1.09	0–4	101
School has avenues for student voice	2.89	0.93	0–4	101
Express opinion in class	3.28	0.74	0–4	100
Group work in class	2.57	1.23	0–4	101
School considers student opinions when making rules	2.68	1.01	0–4	101

2) Civic measures

Variable	Mean	Standard Deviation	Range	N
Attention to news	2.42	0.98	0–4	101
Signs petitions	0.60	0.49	0/1	101
Supports social issues online	0.41	0.49	0/1	101
Posts about social issues online	0.21	0.41	0/1	101
School request	0.30	0.46	0/1	101

3) Political efficacy

Variable	Mean	Standard Deviation	Range	N
Good society made by citizen effort	2.92	1.07	0–4	101
People like me can't influence government	2.02	1.09	0–4	101
Government doesn't care about what people like me think	2.19	1.06	0–4	101
Knowledge of social issues	2.16	1.00	0–4	101

4) Other variables

Variable	Mean	Standard Deviation	Range	N
Girl	0.58	0.50	0/1	101
Household income	3.73	1.63	0–8	92
Parents' level of education	2.38	0.98	0–4	93

In Closing

In diverse populations around the world, those who are learning in student-centered models are more engaged citizens who are attentive to news and public discourse. Throughout the various data, years, and age groups that I look at across the chapters, I consistently find that student-centered education makes more active citizens. Individuals are more likely to be engaged in public discourse on social issues when they are exposed to student-centered education and those who learned in student-centered settings as adolescents grow up to be more active citizens, most robustly in terms of being active in discussions of social issues but also to varying degrees in voting, protesting, and signing petitions.

What I do not find as consistently is why student-centered education makes more engaged, active citizens. In chapter 3 using panel data on a nationally representative sample of a cohort in South Korea, I find that a significant part of the civic effects of student-centered education is mediated through political efficacy and perceptions that a community's interests are aligned with one's own interests. However, I do not find consistent results in chapter 4 using data from an original survey. I hesitate to conclude from my mixed results that we should discount these mechanisms given the small sample size of my original survey. Small sample sizes heighten chances of failing to detect differences between groups, implying that I may simply be underpowered to find differences in political efficacy that, in reality, exist between education models.

While the mechanisms are an area for future research, I find strong evidence that education models matter for civic engagement. Across countries, within schools, in the long-run, and among those who could not choose the education model they learn in, individuals learning in student-centered settings are more engaged citizens who are more likely to take part in public discourse on civic issues, vote, consume news, sign petitions, and protest. What is theoretically notable about the

persistent link between education models and civic engagement is that it operates independent of what is taught. Much prior work that investigates the civic effects of education duration or that of civics-related curricula assumes that schools make active, engage citizens because they teach them to be so. I find that schools shape citizens even when they are not teaching civics and civic skills. The social structure of teacher-student and peer relations in school, independent of what is communicated during these interactions, shapes civic engagement and activity. To this point, I test my theory throughout my dissertation with data on classes that do not focus on civics, such as reading, math, and science classes. The fact that more horizontal models of education in such classes shapes civic engagement and activity highlights the civic relevance of the nature of social interactions that we regularly experience and observe.

My findings have broader implications beyond theorizing about the relationship between education and civic engagement. I investigate the civic effects of a major shift in education policies around the world to student-centered models. Many areas around the world are shifting from conventional, teacher-centered education models to more student-centered models of schooling (Bell and Kozlowski 2008; Bremner 2019; Kim 2019; Schweisfurth 2013). In sub-Saharan Africa, student-centered education has been the "driving pedagogical ideal for contemporary curriculum reform" at the national level in recent years (Chisholm and Leyendecker 2009, 692; See also Lattimer 2015, Mtika and Gates 2010, and Vavrus et al. 2011). In the Middle Eastern and Arab-speaking world, pedagogical reforms have emphasized students' active roles and participation in class, as opposed to a pedagogy focused on repetition and memorization, where the students' role is more passive (Kim et al. 2019). The findings here imply that such global shifts may strengthen the role schools play in creating active citizens.

My findings also speak to the scope conditions of when and where student-centered education would be most effective in making active citizens. In most of the years that I detect a civic

effect of student-centered education on voting or signing petitions, student-centered education boosts civic activity only under conditions of child-centered parenting and less exposure to countervailing teacher-centered education in the form of after-school private tutoring. I do not find evidence of heterogeneous effects for protesting, implying that student-centered education increases protest participation regardless of family and education environments. This suggests that with the exception of protesting, those that grow up in child-centered parenting households and below-average levels of teacher-centered education outside of school tend to drive the civic boost that student-centered education brings to its learners. The resulting implication for the scope conditions under which education models can exert civic effects is that implementing more student-centered teaching practices in an education system will have limited civic effects if the individuals learning in these systems predominantly come from households that are more authoritarian, or if the individuals are otherwise exposed to authoritarian, hierarchical environments outside of school.

In addition, I analyze data on wealthier and less authoritarian countries in the world. While I use the most comprehensive global data available to empirically test my theory, most of Africa, the Middle East, and South Asia are not accounted for in my analysis because they are missing from the data. Countries that have weak political rights and civil liberties are concentrated in these regions. In such contexts, it may be more costly to be engaged citizens so that education models do not provide enough push to increase civic engagement. What is published as news and what is available as forms of civic engagement will also significantly differ in areas with weak civil liberties. So although I provide the most comprehensive test of the civic effect of education models to date, the civic role of education models in authoritarian countries is outside the scope of my study and should be an area for future research.

When researchers identify drivers of civic engagement or other socially desired outcome, it is not always feasible to implement changes towards that end. This is not the case for student-centered

education. I find that whether teachers adopt a student-centered model or not is driven by professional training they receive after starting their teaching career rather than fixed factors such as student characteristics, class structure, or the teacher's age and gender. This implies that the civic effect of education models can be realized by providing teachers with professional development workshops, seminars, and other training that equip them with the skills and motivation to adopt student-centered education models. Adopting more student-centered education models will simultaneously nurture more active citizens, and policymakers can do that through means such as enacting policies that strengthen teacher training.

What we currently know about education model effects is mostly restricted to academic performance. Consequently, debates on which education model to promote revolve around assessments of academic learning. While some show that those who learn in student-centered models outperform those who learn in teacher-centered models, others find that student-centered education either negatively impacts or does not matter for academic performance (Andersen and Andersen 2017; Belfi et al. 2015; Beom et al. 2018; Deslauriers et al. 2019; Granger et al. 2012; He et al. 2019; Lee and Boo 2022; Liebert et al. 2015; Olivian Blazquez et al. 2019; Rui et al. 2017). But if the way students learn also matter for long-term civic orientations, policy choices on education models as well as individual choices on which school to attend (or send their children to) should be based on assessments of both academic and civic merits. This dissertation contributes to making such considerations valid by theorizing and testing the civic effects of education models.

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