Climate change in the classroom*

Stefano Carattini[†‡§], Pamela Giustinelli[¶], and Marcella Veronesi[‖**]

October 31, 2024

Preliminary version

*First version: January 2024. This field experiment was registered on August 30, 2020, under the identifier AEARCTR-0006375. We thank seminar and conference attendees at ETH Zurich, Florida State University, Georgia Institute of Technology, Georgia State University, Heidelberg University, Johannes Kepler University Linz, University of Georgia, University of Missouri, and University of Tennessee as well as at the 2023 LEAP Bocconi-Fondazione Cariplo Conference, the 2023 CESifo Summer Institute on People's Understanding of and Support for Economic Policies, and the 2024 annual conferences of the European Association of Environmental and Resource Economists and the Italian Association of Environmental and Resource Economists. We also thank Benard Akalbeo, Sunyoung An, Edoardo Ardito, Getenet Atakilt, Valentina Bianciardi, Alessandro Cupolo, Alessio Corò, Vincent D'Anzi, Lorenzo Furlani, Guglielmo Imperiali d'Afflitto, Laura Lufray, Giacomo Manferdini, Martina Rovetto, Arash Sabzevari, Najwa Sadki, Ester Sartori, Rodrigo Sanchez Sienra, Benedetta Simonini, and Danilo Volpe for excellent research assistance. We also thank the University of Verona, Centro Interdipartimentale di Documentazione Economica (C.I.D.E), for their support in cleaning and organizing the data. Carattini acknowledges support from the Swiss National Science Foundation, grant number PZ00P1_180006/1. Giustinelli acknowledges support from Bocconi Junior Researchers' Grants (Year 2020) and from the European Union – *NextGenerationEU*, in the framework of the GRINS – *Growing Resilient, INclusive and Sustainable* project (GRINS PE00000018 – CUP B43C22000760006). The views and opinions expressed are solely those of the authors and do not necessarily reflect those of the European Union, nor can the European Union be held responsible for them. No funder had any involvement in the study design; the collection, analysis and interpretation of data; the writing of the report; or in the decision to submit the article for publication. Declarations of interest: none.

[†]Department of Economics, Andrew Young School of Policy Studies, Georgia State University, corresponding author: scarattini@gsu.edu

[‡]CEPR

[§]CESifo

[¶]Department of Economics, IGIER, LEAP, and COVID Crisis Lab, Bocconi University

[‖]Department of Technology, Management and Economics, Technical University of Denmark

[**]Department of Economics, University of Verona

Abstract

Knowledge gaps and biased beliefs concerning both climate change and climate policy represent a major obstacle to the decarbonization process. Climate education may represent a scalable solution to address such biased beliefs. In the context of a nationwide reform of the secondary school curriculum in Italy, we built a course on climate change and climate policy and implemented a field experiment training thousands of teachers on climate change and policy in a staggered fashion. At baseline and endline we collected survey data on teachers, students, and parents to examine starting knowledge, attitudes, behaviors, perceptions, and preferences and how such outcomes vary following exposure to climate education. Our study highlights important initial knowledge gaps and provides evidence on the ability of climate education to address biased beliefs at scale.

Keywords Climate education; field experiment; biased beliefs; public support; school teachers

JEL codes C93; D72; D83; Q54

1 Introduction

Climate change is one of the most pressing issues of the current century. Yet, knowledge about climate change – the problem – and climate policy – the solution – is not especially widespread among the general public, with biased beliefs still playing an important role in present day policymaking (Millner and Ollivier 2016; Egan and Mullin 2017; Carattini et al. 2018).

A growing literature uses survey experiments to address knowledge gaps and biased beliefs with scholars providing information directly to a sample of citizens, usually online (see Haaland et al. 2023 for a review of some of the literature). However, the challenge for policymakers and civil society consists in addressing knowledge gaps and biased beliefs among the entire population – or at least key cohorts – in a real-world setting where information is provided by many sources, potentially with conflicting interests (see Oreskes and Conway 2011; Supran and Oreskes 2017; Brulle 2021; Farrell et al. 2019; Wetts 2020; Supran et al. 2023 on climate change).

In the case of climate change, climate education in schools is the natural candidate policy to provide information at scale to the youngest generations – and voters and leaders of tomorrow – as well as potentially to older adults too, in their roles of teachers and parents. While topics related to climate change are gradually expanding across school curricula, generally at the discretion of teachers and school principals, there is still very limited understanding of broader interventions bringing climate change into the classroom in a systematic fashion.

In this paper, we randomly provide training on climate change and climate policy at scale, to thousands of Italian secondary school teachers in about 2,800 schools. We implement our large-scale field experiment against the backdrop of a recent nationwide

curricular reform of civic education, introducing teaching of climate change in all school grades and so making Italy the first country to teach climate change systematically in its school curriculum.

To this end, we developed a proprietary course on climate change and climate policy, whose structure mirrors closely the organization of the Intergovernmental Panel on Climate Change's working groups. The first module focuses on the hard science of climate change, including origins and causes, measurement, and evolution. The second module focuses on the impacts of climate change and potential margins of adaptation. The third module focuses on mitigation, covering systemic approaches through climate policies and behavioral change at the individual level. The course was delivered online through video lectures, complemented by interactive cards and quizzes. The course material was made available to all teachers participating in the course and was ready for use with secondary school students. We therefore focus on secondary school teachers and students, as use of the material with younger students would most likely require substantial re-calibration to the primary education curriculum. Secondary school teachers who participated in our intervention were let free to customize the material to their teaching needs.

Before and after our intervention, inviting teachers assigned to the treated group to take the first edition of our course, we administered surveys to thousands of teachers, students, and parents, to measure their knowledge, attitudes, beliefs, preferences, and behaviors. Administrative data from various sources, as well as paradata from the online platform used to deliver the course, complement our baseline and endline surveys.

With our field experiment, we address the following two questions. First, suppose you want to teach climate change systematically in secondary schools: where do you start? Second, can formal education of climate change and climate policy address

knowledge gaps, and if so, do we observe also changes in attitudes, beliefs, preferences, and behaviors? We address the first question descriptively, leveraging the baseline survey. We address the second question causally, leveraging random variation in exposure to our course on climate change and climate policy.

Many important insights follow from this field experiment. In the current version of the paper, we focus on teachers. Concerning our first research question, we document the limited knowledge teachers (know to) have of the subject at baseline, which is even more pronounced when it comes to economic policies for climate mitigation. Teachers covered climate change in a limited fashion prior to our course, if anything focusing mostly on the hard science and most well-known features, such as the greenhouse gas effect and sea level rise. Teachers, however, are generally well aware of their limited preparedness and eager to learn more. Teachers largely representing the underlying society, we also identify a non-negligible fraction of climate skeptics among them.

Concerning our second research question, we find that our course substantially improves knowledge among teachers, in some cases also addressing some dimensions of climate skepticism, compared to the control group. As a result, perceived preparedness improves on both climate change and climate policy. Relatedly, teachers' assessment of and preferences for economic instruments to tackle climate change, in particular carbon pricing, is affected by the treatment. Further, teachers also reconsider their plans concerning own future behavior, following belief revision about the harmfulness of climate-unfriendly behaviors such as flying.

This paper contributes to multiple strand of literature. First, a growing literature in economics examining people's understanding of economic problems and of, and support for, their solutions. In this stream of work, information provision is often done at random, but mostly using survey experiments, and assessing treatment effects on impact

(e.g., Stantcheva 2021; Alesina et al. 2023; Haaland and Roth 2023). In the context of environmental policy, evidence on biased beliefs has also come from the lab, including on belief revision following experience with new policies (e.g., Cherry et al. 2014; Dal Bó et al. 2018), a pattern that has been observed causally also in the field (Carattini et al. 2018). Hence, information provision has been used as an imperfect substitute for experience (e.g., Carattini et al. 2017, 2019; Dal Bó et al. 2018 for previous studies and e.g. Dechezleprêtre et al. 2022; Douenne and Fabre 2022 for concurrent studies). However, no study has so far implemented an intervention akin to ours, providing direct policy implications by testing the type of intervention that governments could implement as well, at the same scale.

Second, and related to the previous point, our paper speaks to an established literature in political economy and political science about the ideal of an informed citizenry and the role of misinformation in politics (e.g., Bartels 1996; Kull et al. 2003; Healy et al. 2010; see also DellaVigna and Gentzkow 2010; Allcott and Gentzkow 2017 for reviews). It shows the potential of nationwide reforms of school curricula to, everything else equal, move closer to such ideal.

Third, our paper connects to a recent literature highlighting the importance of implementing interventions at scale to maximize policy relevance (e.g., Deaton 2010; Al-Ubaydli et al. 2017, 2021; List 2022, 2024), by accounting for "option-C thinking" (List 2024) and using the same scale as for governmental interventions.

Fourth, our paper belongs to a literature measuring subjective expectations and beliefs and linking them to behavior (e.g., Dominitz and Manski 1996; Delavande 2008; Van Der Klaauw 2012; Wiswall and Zafar 2015; Giustinelli 2016; Andre et al. 2022; Giustinelli and Shapiro 2024; see also the reviews by Manski 2004; Bachmann et al. 2022). We apply these techniques to the context of climate change, measuring causally

the impact of climate education with a field experiment.

Fifth, it relates to a literature examining, largely qualitatively, climate education in other contexts or, in this case quantitatively, the relationship between education and climate-relevant outcomes (e.g., Bozdoğan et al. 2011; Leal Filho and Hemstock 2019; Monroe et al. 2019; Worth 2021; Angrist et al. 2024). We complement this literature by providing quantitative evidence from a large-scale field experiment.

Sixth, we contribute to an experimental strand of literature in the economics of education, implementing randomized interventions in and around the classroom (e.g. Avvisati et al. 2014; Alan et al. 2019; Papay et al. 2020; Alan et al. 2021; Dhar et al. 2022), as well as studies looking at education and beliefs, including on climate change, from a number of different perspectives (e.g. Cantoni et al. 2017; Monroe et al. 2019; Cordero et al. 2020; Worth 2021; Angrist et al. 2023). Our intervention is unique in tackling knowledge gaps about climate change and policy at scale.

The remainder of this paper is organized as follows. Section 2 describes the institutional context of our intervention. Section 3 introduces our experimental design. Section 4 presents our data. Section 5 details our empirical approach. Section 6 provides our empirical results. Section 7 concludes.

2 Background

Our project leverages the unique context of Italy, the first country in the world to formally introduce by law the systematic teaching of climate change in the curriculum of all grades of primary and secondary education starting in the school year 2020-2021.[1]

[1]The Italian reform received international media coverage in 2019, with headlines such as "Italy to become first country to make learning about climate change compulsory for school students" on *CNN*, "Italy's students will get a lesson in climate change" in *The New York Times*, or "Italy to put

Within this context, we implement a large-scale nationwide field experiment to evaluate the impact on teachers, students, and parents of training secondary school teachers about climate change and climate policy.

From the school year 2020-2021, Italian students in every grade of primary and secondary education may study climate related topics as part of the new cross-disciplinary civics ("educazione civica trasversale"), introduced by Law 92/2019 and put into effect by ministerial Guidelines 35/2020.[2]

Law 92/2019 was passed on August 20, 2019. The reform was subsequently implemented by Ministerial Decree 35/2020 on June 22, 2020. The reform targeted civic education. Civic education was first introduced in Italian schools by decree 585/1958 as part of the history curriculum and was limited to secondary education, including both middle and high schools. Specifically, the decree required that the history curriculum included the teaching of the national constitution, the rights and duties of citizens, and the institutional organization of the country. In the following decades, civic education was gradually eliminated from the curriculum, first by limiting its teaching to one hour a week in middle schools starting in 1979, and then by eliminating its teaching altogether in 1990. An attempt to reintroduce the teaching of civics was made in 2008 via a pilot whose implementation was left to schools' autonomy. The recent reform has put civics to the center, by identifying its teaching as strategic in shaping future citizens, by widening its scope beyond the legal and institutional domain (constitution, rights and duties of citizens, institutional organization of the country, etc.), and by explicitly recognizing its multi- and inter-disciplinary nature which, according to the law, should be reflected in its teaching.

sustainability and climate at heart of learning in schools" in *The Guardian*.

[2]https://www.miur.gov.it/documents/20182/0/ALL.Linee_guida_educazione_civica_dopoCSPI.pdf (last accessed, October 24, 2023).

Indeed, the law prescribes that the new civics be taught across multiple school subjects, rather than as a standalone subject, possibly by multiple teachers, under the supervision of a teacher acting as a "civics coordinator." It also prescribes a floor of 33 hours of teaching of civics per year across the involved subjects/teachers in all school grades (1 to 13).

The new civic education is organized around three main domains or thematic pillars. The first pillar includes topics such as constitution, law (national and international), legality, and solidarity. Thus, the first pillar covers aspects that were already part of civic education in the past.

The second pillar deals with topics such as sustainable development, environmental education, knowledge and protection of heritage and territory. Both Law 92/2019 and, in greater detail, decree 35/2020 identify as one of the main references the 2030 Sustainable Development Agenda of the United Nations. Specifically, decree 35/2020 requires that the skill profiles students need to acquire by the end of primary and secondary schooling be updated to include knowledge and skills needed to achieve the United Nations 2030 Sustainable Development Goals, with a strong focus on protection of the environment and natural resources (goals 6-7 and 14-15) and addressing climate change (goal 13).

The third topic is digital citizenship. The rationale is to prepare students to a world where online interactions are ubiquitous and provide many opportunities, yet also risks that the youth need to understand and manage.

Despite the change in government in Italy following the snap elections of September 2022, with a right-wing government in power since October 2022, the reform has not been further amended and no amendments are currently under consideration, to the best of our knowledge. While Italy in 2023 lost 15 positions in the ranking by Germanwatch,

it did so because of changes in long-run goals, not rollback of existing policies.

Realizing that actual implementation of the new curriculum inside the classrooms would require concrete aiding measures to schools and teachers, in July 2020 the Italian government issued a plan for the training of teachers.[3] Specifically, the plan required civic coordinators to acquire formal training through training modules of at least 10 hours, to be completed and certified by June 30, 2021. Civic coordinators would then provide 30 hours of tutoring to other teachers, following a model of "cascade training."

Italian teachers are regularly expected to receive additional training to maintain their knowledge up to date and no financial incentives are provided to teachers for continued education. Courses recognized by the government as valid for continued education are regularly listed on a governmental platform known as S.O.F.I.A..[4] Training of civics coordinators for implementation of the new civics was no exception to these rules.

3 Experimental design

The reform and its underlying institutional setting created a unique opportunity, but also some challenges, for evaluation. First, introduction of cross-disciplinary civics was implemented nationally, that is, simultaneously in all schools located on the Italian territory. Second, because of the autonomy granted to schools by the Italian law (the so-called "autonomia scolastica") with respect to important implementation aspects of the new cross-disciplinary civics, the actual exposure of students to climate science and

[3]https://www.istruzione.it/educazione_civica/allegati/piano%20formazione.pdf (last accessed, December 1, 2023).

[4]S.O.F.I.A. is an Italian acronym which stands for "Sistema Operativo per la Formazione e le Iniziative di Aggiornamento del personale della scuola," that is, a system for the training and continued education of school personnel.

climate policy topics might vary greatly across Italian regions, schools, and even classes. Clearly, such variation should not be viewed as random.

To address these issues, we decided to introduce a source of exogenous variation by creating and randomly assigning a free online course on climate change and climate policy, targeting secondary school teachers, and to evaluate the effect of our course. Crucially, the course was ready in July 2020 when the Italian government mandated training of teachers. In the late summer of 2020, shortly before the start of the school year 2020/2021, we recruited secondary school teachers and assigned them to the treatment, represented by the course, in a randomized fashion, as described in what follows. We now proceed by describing our experimental design and then how we recruited teachers.

Our experimental design combines clustering, encouragement, and staggered components. The clustering component follows from the fact that we randomized the course at the province level to minimize the extent of potential spillovers between treatment and control teachers, while still capturing potential remaining spillovers as part of our data collection. A province in Italy is in many ways similar to a county in the United States. Lower levels of randomization would have been the teacher, class, or school. We opted for randomization at the province level recognizing that spillovers are not only likely to occur across teachers within the same school, but are also possible across schools, for example, because teachers teaching in different schools within the same province are friends or know each others. Appendix Section A describes in detail the randomization process and provides balance of covariate tables based on administrative data. Appendix Section B provides power calculations.

The encouragement component follows from the fact that we offered the course to the teachers assigned to the treatment group, but ultimately the teachers decide whether

to take the course or not. This implies that there may be some non-compliance in our setting, whose implications for our empirical approach are discussed in detail in Section 5. In fact, there are two potential forms of non-compliance. First, teachers may decide not to take our course during the time frame of our study, even when encouraged to do so. That is, some teachers assigned to treatment might have not been treated, either because of lack of interest or time when the treatment occurred or because the information about the course did not reach them. Second, teachers may decide to get trained even when not encouraged to do so. That is, some teachers assigned to the no-treatment condition, might have been treated nevertheless. While the latter would not be able to access our course at the same time of the treated teachers, for the reasons that we describe in what follows, they might have accessed a different course, with a different content. Our data collection accounts for this possibility, as detailed in Section 4.

The staggered component implies that eventually the control group was treated as well, but at a later time compared to the treatment group, and actually beyond what we consider the time frame of our study, at least for causal purposes.

We now recount the exact implementation of our intervention.

Recall that, in July 2020, teachers, in particular civics coordinators, were mandated to receive training to prepare for the implementation of the nationwide reform of civic education. In August 2020, we started recruiting teachers in the treated provinces and in September in the control provinces. All teachers were given access to the online platform where the course was delivered and asked to fill a very short survey about themselves as course participant. This short survey also allowed us to verify the school province where the teacher was teaching and double check treatment assignment. Teachers were also asked to fill a longer survey, designed for teachers, and have their students respond

to a survey designed for students and their parents respond to a survey designed for parents. More details about these surveys are provided in Section 4.

We recruited eligible secondary school teachers by contacting all public and public-equivalent private junior high schools (grades 6-8) and high schools (grades 8-13) nationwide, with the help of the provincial school boards as well as directly with the help of the teacher training office of the University of Verona. Provincial superintendents and school principals were informed about the course's general content and online format, as well as the fact that the course was entirely free of charge. Provincial superintendents and school principals were also asked to circulate links to surveys with their teachers, students, and parents.

Depending on their province, teachers in the treated group were assigned to a first edition of the course, which became available in September 2020, and teachers in the control group to a second, identical edition, whose modules were going to be delivered online at the end of the school year 2020-2021. This way, teachers in the control group could also use our course to meet the training requirements within the deadline of June 30, 2021, and may be less prone to look for alternative courses. At the same time, by registering for the course and starting to access the online platform at the same time as the teachers assigned to the treatment group, we could encourage all teachers, their students, and the students' parents to participate in the baseline survey.

All outcomes were measured before the second edition of the course started, i.e, before the control group received the treatment.

Overall, we recruited 9,363 secondary school teachers from about 2,800 schools, who signed up for our course. For the causal analysis, however, we are interested in the 3,337 secondary school teachers from treatment provinces who were assigned to the first edition of the course. Recall that teachers in control provinces were assigned to

the second edition of the course, which was the same as the first edition and open also to teachers from treatment provinces who had missed the first edition. As a result, the second edition of the course had an enrollment of 6,026. Sections 4 and 5 discuss potential selection issues and how we address them.

The course is organized in three modules along the lines of the working groups of the Intergovernmental Panel on Climate Change, that is, the body within the United Nations tasked with condensing the scientific consensus about climate change.[5] The three working groups cover a wide variety of disciplines and so did the content provided in our course. The first module covered the "hard" science of climate change, its origins, measurement, evolution, and causes. The second module focused on impacts of climate change and margins of adaptation. The third module addressed the question of how to mitigate climate change, as a society through economic instruments for climate policy and as an individual by learning about the implications of various behaviors. Appendix Section C describes the content of the course in detail. At the end of the course, teachers could download a certificate of participation from the course website but also claim a certificate of participation provided by the Italian governmental platform for teacher training (S.O.F.I.A). Teachers were also asked to fill a questionnaire evaluating the course, which also provides us with information about their preferences over the different modules as well as perceived difficulty.

[5]Recall that both Law 92/2019 and decree 35/2020 identify as one of the main references the 2030 Sustainable Development Agenda of the United Nations, with a focus – for pillar two – on protection of the environment and natural resources (goals 6-7 and 14-15) and addressing climate change (goal 13).

4 Data

In this section we describe our data. We start by covering the data used in the randomization process, with more details following in Appendix Section A. We then describe the baseline survey for teachers. Next, we describe three sources of data linked with the course: an introductory survey for teachers taking the course, the evaluation questionnaire, and the meta-data that the course platform, Moodle, provides. Then, we describe the endline (or follow-up) survey for teachers, which is largely similar to the baseline survey in structure and content. The following step details the baseline and endline (follow-up) surveys for students and parents. Finally, we also provide details about additional administrative data, which we use to study selection as well as to measure outcomes outside of the context of the surveys.

Administrative data for randomization The randomization process relied on administrative data at the province level. We used a total of 35 variables, divided into four categories. First, we considered the geographical location of the province within Italy, considering three macro-regions: North, Center, and South. Second, we considered socioeconomic characteristics such as total population, population density, unemployment rate, and income per capita. Third, we considered school characteristics, such as the total number of schools, total enrollment, and number of schools and enrollment by grade. Fourth, we considered data providing information on the penetration of green technologies and green behaviors, as potential proxies of green preferences as well as of the potential impact of ambitious climate policy. Here we consider variables such as adoption of solar photovoltaics (PV), use of public transport, and density of cars, among others. The source for all these data is the Italian Institute of Statistics (ISTAT).

Baseline survey for teachers The baseline survey is organized in modules. Here we describe the content of each module.

The baseline survey can also be used to assess balancedness between the control and treatment groups at the individual level. Tables D.4 and D.3 in Appendix Section D.1 do so, for the entire sample of baseline respondents and for the panel of teachers, i.e. for those teachers who are also observed in the endline survey, respectively.

The survey opens with a brief introduction about the study. It then goes on to assess the respondent's eligibility and type (teacher, student, parent, other) and to route the respondent to the relevant version of the survey (non-eligible respondents were routed out of the survey). Next, it elicits the respondent's consent.[6] After the eligibility and consent steps are cleared, the actual survey begins.

The first module asks questions about the respondent, in particular in her role as teacher. The respondent is asked to report on the main characteristics and location (zip code and province) of the school(s) where they work; their experience and contract (e.g., temporary versus permanent, part time versus full time); the classes and subjects they teach; whether they are the civic coordinator – or is anyway part of the group of teachers responsible for the teaching of civics – for any of their classes. If a teacher teaches in multiple schools, all questions are repeated for each school. The relevant descriptive statistics are shown in Table D.1.

The second module focuses on the teaching of civics, including past engagement (in the school year 2019-2020) with topics of one or more pillars, and plans for the remainder

[6]Teachers, students, and parents were asked their consent to take, respectively, the teacher, student, and parent survey. Additionally, parents – including teachers who were parents of eligible students – were asked a separate consent for each of their eligible children to take the student survey. Before starting the survey, students were also asked to verify that their parents had given their consent to the student's participation. They were also given a link which their parents could use to provide their consent, if they had not already done so.

of the ongoing school year (school year 2020-2021). The module then zeroes in on the sustainability pillar (the second), and asks detailed questions about past, present, and future coverage of climate change, including class hours and specific topics covered. Concerning the latter, the survey lists 30 topics in a relatively detailed way (e.g., carbon cycle, carbon footprint, carbon taxes), based on the structure of our course. In this part, the respondent is additionally asked whether they have ever received training in the domains corresponding to each of the three pillars of civics, and – with regards to the second pillar – specifically on climate change, and whether they are interested in receiving training. If a teacher teaches in multiple schools, all questions are repeated for each school.

The third module concerns individual behaviors (or behaviors at the household level) that are relevant for climate change mitigation, such as kilometers driven each year, commuting habits, continental and intercontinental flying, and meat consumption, among others. The survey asks retrospectively for 2019 as well as about plans for 2021. The survey also includes a battery of questions assessing teachers' intention to reciprocate hypothetical climate-friendly efforts, of different degrees, that may be realized by fellow Italian citizens. Here, we are interested in the extent to which local social norms may drive cooperation also in global social dilemmas such as climate change mitigation, as posited in Carattini et al. (2019).

The fourth module measures beliefs about climate change and climate policy. It starts with a battery of questions about climate change's existence and anthropogenic origin. It also measures second-order beliefs of respondents about the beliefs of climate scientists and the rest of the Italian population. The module additionally measures teachers' perceived preparedness about climate change and then tests their knowledge with a battery of climate literacy questions. Subsequently, the survey elicits respon-

dents' perceived preparedness on economic policy (borrowing from Stantcheva 2021), respondents' preferences over various climate policy instruments, respondents' beliefs about the policies' effectiveness in reducing greenhouse gas emissions or local air pollution, and respondents' beliefs about the policies' distributional effects. Then, public support for a global carbon tax, in terms of tax rate and use of revenues, is assessed (borrowing from Carattini et al. 2019). The module ends by measuring emotions related with climate change, including climate concern.

The survey's fifth and last module includes questions capturing standard socioeconomic characteristics; risk, time, and social preferences (borrowing from Falk et al. 2018); and detailed information about teachers' educational background.

The baseline survey was administered on August 31, 2020. We invited teachers to fill the survey through school principals, school superintendents and our course platform. Our final sample includes 7,992 secondary school teachers from 2,848 schools.

Table D.2 compares our sample with the underlying population of Italian teachers based on statistics from OECD and the Italian National Institute of Statistics (ISTAT).

The descriptive evidence provided in Section 6.1 is based upon the panel sample of respondents that answered both the baseline survey and the follow-up survey.

Course introduction survey When teachers registered for the course on Moodle, the platform used to deliver our teaching materials, they were initially asked to fill an introductory survey. The survey included three questions and was designed to take one minute at the maximum. Teachers were asked to specify the school type, noting that the course was intended for secondary school teachers, and the province. Teachers were also asked to share how they had become aware of the course.

Course evaluation survey Following the completion of the course, teachers were asked to evaluate it in another short survey, which started with a short battery of questions eliciting personal information such as date of birth and province of birth. Then teachers were asked to share their overall satisfaction with the course as well as with each module. Teachers were also asked to assess how difficult each module is, for them as well as for their students. Further, teachers were asked to share their plans to use the material with their students and if they had already used it, then starting from which date. These questions were also asked by module and topic as well as content type (e.g. slides, quizzes). This short survey ended with an open-ended question allowing teachers to share freely their thoughts about the course.

Meta-data from Moodle The online course platform (Moodle) allowed us to collect the following information about the course participants: (i) name, last name, and email address; (ii) whether and when the participant viewed each activity of the course (e.g., announcements, slides, videos, end-of-module quizzes, course introduction and course surveys); (iii) whether and when the participant completed the course and each activity of the course; (iv) how many times and when the participant accessed the course and which activity of the course; (v) the quiz grade and how many times the participant attempted it; and (vi) whether and when the participant downloaded the course certificate.

Follow-up survey for teachers and panel All teachers who responded, even when partially, to the baseline survey and shared their e-mail addresses were invited to fill a follow-up survey, after the course was provided to the treatment group.

The follow-up survey corresponds to the baseline survey except for the following deviations. First, the follow-up survey does not include questions related to respondents'

characteristics that are unlikely to change over such a short period of time and so can be derived from the baseline survey, such as the respondent's educational background, country of birth, job institution and location, the classes and subjects taught, and the type of work contract. Second, we changed the reference period of the questions on civic education in the second block to school years 2020-2021 (backward looking) and 2021-2022 (forward looking) and the questions on respondents' self-reported behavior in the third module to years 2021 and 2022. Third, we added a set of new questions in the follow-up survey. In particular, we asked whether the respondent attended our course, whether the respondent received our teaching material from colleagues or whether the respondent shared our teaching material with colleagues. Given the context of our intervention, we also asked teachers to report on the fraction of classes taught in person and online and the fraction of working hours in person and online. In addition, the follow-up survey includes a new block of questions on the current and planned use of our teaching material. The questions are specific to each module of our course and distinguish between the type of support (e.g., slides, videos, quizzes, and iteractive cards). The follow-up survey also asks respondents to indicate whether they used the teaching material that we provided as part of the course as is or adapted it to their students.

We additionally re-administered the baseline survey, again recruiting teachers through school principals and school superintendents, with the aim of potentially capturing responses from teachers who had taken the baseline survey without sharing their e-mail addresses as well as from new teachers who had not taken the baseline and whose characteristics could be compared to the respondents to the baseline survey.

Follow-up and new baseline surveys were administered in April 2021.

Our causal analysis in Section 6.2 relies on our final panel dataset of about 4,000 teachers.

5 Empirical approach

In what follows we describe the empirical approach of our study. Recall that our field experiment combines staggered implementation, clustering design, and encouragement design. Teachers are assigned at random depending on their province to treatment, which consists in having access to our course on climate change in its first edition. Assignment at the province level is done to minimize the extent of potential contamination (clustering design), given that teachers may teach in more than one school, making treatment assignment at the school level (and even more so at the class level) prone to contamination. According to our baseline survey, about 7% of teachers teach in more than one school. Only 0.14% teach in more than one province and only one teacher teaches in both a control and treatment provinces. We remove this teacher from the analysis. In addition, as mentioned, we do capture in our follow-up survey potential sharing of course materials.

Given the Italian government's requirement for teachers to train by the summer of 2021, we opted for a staggered implementation, whereby the course, in a second edition, also became available to teachers in the control group. However, our main interest here is on the impact of the first edition of the course on the teachers assigned to treatment compared to the counterfactual. We also have an encouragement component, since we can only invite teachers assigned to treatment to take our course but cannot force them to do so, so that compliance is imperfect.

Given the encouragement design and with it exogenous treatment assignment and endogenous compliance, we can consider the following approaches. First, we can use ordinary least squares, focusing on treatment received. While informative in comparison with other specifications, these estimates would be biased by selection. Second, we can focus on treatment assignment and provide intent-to-treat estimates, which would

however be diluted (biased downward) because of imperfect compliance. Third, we can measure local average treatment effects, instrumenting endogenous compliance with exogenous uptake. We follow the latter approach to provide our main results.

Hence, our main specification is as follows:

$$Y_{i,t} = \alpha_i + \beta * \hat{T_{i,t}} + X_{i,t} + \epsilon_{i,t}$$

where $Y_{i,t}$ is any outcome of interest measured for teacher i at time t (baseline or endline), $alpha_i$ is a teacher-specific fixed effect, $\hat{T_{i,t}}$ is a variable, instrumented via treatment assignment at the province level, which takes value 0 for any group in the pre-period and takes value 1 for the teachers in the treatment group in the post-period if they were exposed to the treatment, $X_{i,t}$ is a matrix of covariates (although we also present estimates without covariates), and $\epsilon_{i,t}$ is the error term, clustered at the province level.

6 Empirical results

In this section we describe two sets of findings. The first set of findings is descriptive in nature and responds to the following research question: suppose you want to teach climate change systematically in secondary schools: where do you start?

The second set of findings is causal and responds to the following research question: can formal education of climate change and policy address knowledge gaps, and if so, does it also shape attitudes, beliefs, preferences, and behaviors?

6.1 Descriptive evidence

In this section, we focus on teachers included in the panel dataset. We analyze teacher's baseline knowledge of climate change and climate policy, preferences and beliefs over the latter, beliefs about climate change, individual behaviors, and teaching habits related to climate change and climate policy as well as the other two pillars that were part of the reform of civic education.

One block of the survey asks a set of questions concerning the school year 2019-2020, i.e., the year prior to our intervention. Teachers are asked to report the number of hours that they devoted to topics within each of the three pillars as well as specifically on issues related to sustainable development and, within the latter, to climate change. For all these items, we also asked respondents about their plans for the school year 2020-2021.

In the school year 2019-2020, more than half of the teachers did not devote any time to the teaching of topics of the law pillar and the digital citizenship pillar (51% and 52%, respectively), and 21% did not devote any time to the teaching of topics of the sustainability pillar. In that year, the average number of hours devoted to topics of each of the three pillars was, respectively, 4, 7, and 3, with significantly more hours planned for 2020-2021 across the three pillars.

We also asked teachers whether they received training on the content of each of the pillar. Most teachers did not. About 46% of the teachers did not take any courses related to the pillars; 81%, 59%, and 72% did not take any course related to pillars 1, 2, and 3, respectively. Teachers were also asked whether they were planning to receive training on the pillars in the future, including a probabilistic measure of their likelihood to take a related course in the near future. Interest in receiving training

was especially high for the two pillars for which it is plausible that teachers would especially need to update their knowledge, sustainability (78%) and digital citizenship (50%). The probabilities of attending courses related to these pillars are also high: 57% for digital citizenship and 81% for sustainability. We also measured past experience on climate change courses and teachers' interest in a free course on climate change in the future, such as the one we were offering. The average probability of taking the climate change course is about 81%. Note that when teachers reported having received training on climate change in the past, which about 15% of them did, 66% of this subsample reported its details in an open field. While we do not analyze this information in detail, we take teachers' diligence in reporting as an indicator of the good quality of our survey data.

We then analyze teachers' baseline coverage of climate change in the classroom. In the school year 2019-2020, about 32% of teachers allocated zero hours to climate change topics in their courses. Teachers that taught climate change in the past allocated on average about 7 hours per year. Table 1 summarizes the choice of topics of the teachers that taught climate change based on our course content, as described in Appendix Section C. While some of the most well-known aspects of climate change are among the most covered by teachers, including the greenhouse effect and the impacts of climate change, others are rarely part of the curriculum, including climate adaptation measures at the individual and societal levels, and economic instruments such as carbon taxes and environmental subsidies. When asked about their future plans, about 89% of the teachers declared to plan to allocate some hours to climate change in their courses, with an average of 8 hours per year.

Consistently with their teaching choices, teachers generally declare to be "little" (36%) or "quite informed" (59%) about climate change and only rarely "very informed"

(5%), as summarized in Table 2. This table also shows that When it comes to economic policy topics, an important majority declares to be "little informed" (69%), despite finding that it is "quite important" or "very important" (49% and 50%, respectively) to be informed on economic policies. The discrepancy between perceived preparedness and interest may point to barriers to access knowledge about economic policies, which our intervention aims to overcome, as examined in Section 6.2.

The limited preparedness that teachers in our sample perceive is also consistent with an objective measure of knowledge that we collected through a battery of climate literacy questions. The battery includes six questions on global warming and its drivers, greenhouse gas emissions, average per capita emissions in Italy, and impact of climate change on developing economies. Only 6% of teachers answered correctly to all six questions as reported in Table 3 based on an index that aggregates correct responses over the total number of questions. On average teachers answered correctly 67% of responses. However, 69% replied "I do not know" to at least one question, an important element in itself, as shown in Figure 1.

Responses on perceived preparedness are consistent on average with a very high level of interest in taking a course on climate change as expressed by the teachers (mean subjective probability is 82%; standard deviation is 20), where the question that we asked, "Imagine that in the future you are offered a 10-hour online course, certified and free of charge, on teaching of climate change, covering the topics discussed above. On a scale between 0 and 100, what is the percent chance that you will take the course?," mirrors our offering.

The limited knowledge that teachers have does not seem to be driven by climate skepticism. Teachers largely express high levels of confidence about the existence of climate change (mean subjective probability is 92%), and to a large extent also about

its anthropogenic nature (mean subjective probability is 87%), as shown in Table 4.

Teachers, however, expect less consensus among scientists, in particular concerning the existence of climate change, and, even to a stronger degree, citizens, as shown in Table 4. Hence, when comparing their responses with other surveys of the Italian population, we tend to note some false consensus, as for instance already observed in a concurrent study by Geiger and Swim (2016); Sparkman et al. (2022).

Teachers also expect climate change to generally have negative impacts on humanity, as shown in Table 5. They are asked about their level of concern regarding the impact of climate change on a various group of potential victims, including human beings, plants, animals, children, future generations, and themselves (in terms of health and lifestyle). The highest concern is for the future of the Planet (58%), followed by the future generations (52%) and children (47%), while there is low concern for the impact of climate change on own lifestyle (31%).

Another block measures teachers' habits and behaviors. Tables 6, 7, and 8 summarize eating and purchasing habits, commuting habits, car usage, continental and intercontinental flights, and dietary preferences. Past behavior is measured for 2019, future plans for 2021. Teachers seem to reflect the underlying society pretty closely, as shown by the comparison with other surveys or national statistics for Italy. That is, teachers in our sample do not seem especially green on a range of dimensions. For instance, only 1.5% of them report to be strictly vegetarian, based on 2019 meat consumption. This variation across survey items also provides a useful sanity check, ensuring that teachers were paying attention to our questions throughout the survey instrument.

The survey also includes a series of measures of "activism," to be understood in a very generic fashion. In general we observe that many respondents declare to be trying to make their consumption behavior more climate-friendly, even when in levels it may

still not look like such. Donations to and volunteering for environmental causes are limited, though, suggesting indeed that the teachers in our sample do not seem to have particularly strong green preferences while still generally caring for the environment. Most teachers are also committed to keep doing more over time, although again less so when it comes to donating or volunteering, as well as demonstrating.

Purchasing behavior concerning solar panels, renewable energy tariffs, and electric or hybrid vehicles seem also generally consistent with the rest of the Italian population. Once more, teachers are committed to do more in the future, at least where they can. The intention of purchasing solar panels is relatively high among homeowners but very low among renters, which makes sense.

We then tested teachers' perceptions about the environmental harmfulness of various actions, with the corresponding estimates reported in Table 9. Teachers tend to consider abstaining from meat consumption helpful, even when they do not. They also consider buying environmentally-friendly products (including green electricity and cars) useful, much more so than donating to or volunteering for environmental organizations. We also observe quite some heterogeneity regarding the potential of signing petitions, possibly reflecting some disillusion with this type of policy process. The same applies to participating in demonstrations. Interestingly, we also observe some heterogeneity related to the harmfulness of driving or flying less.

One aspect in which we are interested concerning these behaviors is their drivers, in particular the role of local social norms. Carattini et al. (2019) make the case that despite the global properties of climate change mitigation, people's behavior tends to follow local social norms, including descriptive norms about other people's behavior. Hence, we asked teachers whether they would be more or less likely to adopt a given behavior if most (80%) of their fellow Italian residents were adopting it (versus only

20%) and if most (80%) of the global population was (versus only 20%). The distribution of responses across items seems to be partly dependent on who else undertakes the behavior, but we also note a consistent group of teachers who seem to be intrinsically motivated or Kantian cooperators à la Roemer (2010).

Following a block of questions about individual behaviors, the survey moved to economic policies. We already reported above that when we asked teachers general questions about economic policies, based on Stantcheva (2021), teachers tend to consider it important to be informed about economic policies, yet acknowledge that they may not be.

We then zoom in on climate policies, first by measuring public support for a series of instruments, in Table 10. In line with the existing literature (see Carattini et al. 2018 for a review), absent particular informational treatments, people, including the teachers in our sample, tend to prefer as climate policy instruments green spending, subsidies and tax credits for innovation and the adoption of existing technologies, and regulations than more cost-effective approaches such as carbon pricing. We measured support for carbon pricing in terms of carbon taxes (with revenues redistributed per capita as carbon dividends) and in terms of a global cap-and-trade system. That is, similarly to studies of the general population, the teachers in our sample show strong support for climate action, as also demonstrated by high support for a very ambitious new climate treaty, but when it comes to actual policies, such support tends to be lower for carbon pricing, although majority support is still present.

Consistently, as reported in Table 11, teachers find regulations and subsidies more effective than carbon taxes, for both local and global pollution, in line with the literature. Teachers in our sample do recognize, though, that regulations can have important regressive effects. However, again in line with the literature, they do not recognize that

a carbon tax and dividend tends to be progressive.

We then move to global carbon pricing. Here, we are first interested in knowing where teachers would set the price, for 2030. One of the main reference for estimates for the social cost of carbon has it now around \$185 per ton of CO_2 (Rennert et al. 2022), although at the time of the survey figures in the \$40 to \$100 per ton of CO_2 would have also been very plausible. Cost-effectiveness studies indicate ranges around \$60 to \$100 per ton of CO_2 (Stiglitz et al. 2017; IMF 2019; Parry et al. 2021). Teachers were asked to respond via an open field. Hence, we have four types of answers: dollars per ton of CO_2, which is the unit of measurement that economists would use; relative increases with respect to current prices; and qualitative answers, such as "high;" a small minority of protest answers, challenging the idea of a global architecture around a carbon price as hypothesized in the question. Overall, the main takeaways are two. First, most teachers in our sample do not have a sense of the relevant orders of magnitude in terms of dollars per ton of CO_2. Second, for those who may do, there is substantial heterogeneity, as depicted in Figure 2, with the average at \$117.[7]

Borrowing from Carattini et al. (2019), we then ask about how revenues from the global taxation of carbon emissions should be used. Note that a global carbon price could be obtained either via a global carbon tax, implying centralization of revenues, or harmonized carbon taxes, for instance as advocated by the International Monetary Fund (Parry et al. 2021) in the context of a minimum global carbon price (which in their case would however not be uniform, in the spirit of Bataille et al. 2018). In the former case, countries would need to agree on the use of revenues. In the latter case, each country would maintain sovereignty over the use of revenues and would only need to agree on the level of pricing. Hence, teachers were exposed to three types of revenue

[7]We calculate the average after removing nine outliers above \$11,000, of which three above one million. We consider them protest answers as defined in the stated preference literature.

use that imply sovereignty (reducing labor taxes in Italy, a national climate fund in Italy, and domestic carbon dividends) and three types of revenue use that imply global pooling (a global climate fund for all countries, a global climate fund for developing economies, international carbon dividends).

Again very much in line with the literature, most support goes to the domestic and international climate funds, i.e., environmental earmarking, as shown in Table 12. As the literature shows, absent specific information provision people tend to underestimate the effectiveness of carbon pricing and ask for revenues to be earmarked for environmental purposes, which they see as the main way for carbon pricing to reduce emissions, rather than through the direct effect on relative prices (see again Carattini et al. 2018 for a review of the literature). Among climate funds, the international climate funds that targets all countries is the most popular, compared to the domestic one, or the international funds for developing economies only. This pattern is largely consistent with Carattini et al. (2019). Domestic and international carbon dividends receive very limited support, despite their progressive properties. Domestic carbon dividends tend to be progressive. International carbon dividends as introduced in Carattini et al. (2019) can reduce within- and between-country inequalities as well as poverty, as also shown by Budolfson et al. (2021). However, as mentioned, people, likely including the teachers in our sample, are generally unaware of these properties.

6.2 Causal evidence

In this section, we analyze the impact of our intervention on a number of outcomes. We follow the structure of our survey, as also done in Section 6.1. Consistently with Section 5, we focus mostly on estimates from the instrumental variable approach, but also produce intent to treat estimates, which are consistent with the estimates from the

instrumental variable approach. We describe our findings mostly using the following instrumented variable for treatment received: whether eligible teachers completed the course and received the course certificate. 56% of eligible teachers in our survey, i.e. teachers in treated provinces, completed the course. Estimates are very similar based on whether teachers signed up for the course and joined the Moodle platform. 62% of eligible teachers in our survey joined the Moodle platform.

We start by considering teaching plans, where we compare teaching plans for the 2020-2021 school year as reported in the baseline survey, and as discussed in Section 6.1, and teaching plans for the 2021-2022 school year, as reported in the follow-up survey.

We then move to knowledge of climate change, including perceived. Actual knowledge, as measured by our battery of climate literacy questions, increases by about 5%. More strikingly, there is a 30% reduction in the fraction of teachers declining to answer ("do not know" answers).

Our course also reduces climate skepticism, but only on the anthropogenic sources of climate change, not its existence. Recall that baseline values were 91.8 for the latter, 87.5 for the former. For the anthropogenic sources of climate change, we observe a 2.5% decrease in climate skepticism.

We now turn to habits and behaviors. The corresponding estimates are provided in Table 14. We start by considering intentions to drive for 2022, where our course leads to a 4% reduction in expected kilometers driven. We observe similar plans to reduce domestic flights within the European Union (compared to the counterfactual, as teachers plan to fly more in 2022 compared with 2020), in the order of about 30%, pointing to flying as a behavior with more margin for short-term adjustments than driving. A similar pattern is observed for flights across the continent, in the order of about 60%. In contrast, we observe a decline in the intention to purchase locally

sourced or organic products. Albeit small, and much smaller than the effects observed for flights, these effects seem to point to a reallocation of climate-friendly efforts towards more harmful behaviors, which are more important to curtail. Recall that one activity in our course exposed teachers to their own carbon footprint. No planned behavioral change is observed for meat consumption, suggesting that flying is the margin of choice for behavioral change for many teachers in our sample. Note that teachers do revise their beliefs about the usefulness of reducing meat consumption. However, unlike for flying or driving, belief revision does not lead to a change in intentions.

We also find limited impacts on behaviors more related to activism, including willingness to support companies with climate goals, sign climate-related petitions, demonstrate in climate protests, purchase green electricity, solar panels, and electric vehicles. Note that the course did not significantly affect teachers' beliefs about the usefulness of engaging in such behaviors.

We now move to policy outcomes. Consistent with Section D, we first discuss how teachers' approach economic policies in general, then look at public support and perceived effectiveness for a range of climate policies, and conclude with global architectures. The course did not change teachers' inclination to be informed on economic issues, which was already fairly high. Teachers do feel, however, somewhat more informed about economic issues after being exposed to the course.

In terms of policy preferences, support for various policies went up in the treatment group. The largest improvement was for cap and trade, with public support improving by around 10% on average on a scale from 0 to 100. Recall that cap and trade was also the focus of one of the interactive cards. The treatment effect on public support exceeds 5% for a tax and dividend approach, but the coefficient is not significant. Support also increases for an international treaty imposing to Italy a 90% reduction

in greenhouse gas emissions (4.4%), subsidies for energy efficiency in buildings (3.3%), regulations on greenhouse gas emissions (2.7%), subsidies for cleaner vehicles (2.5%), bans on internal combustion engine vehicles (about 2%), research funds on renewables (less than 2%, statistically non significant), and fuel efficiency standards (about 1%, statistically non significant). That is, while the course increases support for climate policy in general, where the effect is most striking is for those policies, in particular market-based instruments such as cap and trade, which were relatively less popular at baseline. Consistently, here is where we observe substantial belief revision in terms of policy effectiveness, in the case of carbon taxes in the order of about 7% on a scale from 1 to 3 (low to high). There seems also to be an improvement in the order of about 5% in how teachers perceive carbon taxes in terms of potential progressivity, although the corresponding coefficient is not statistically significant.

7 Conclusions

Biased beliefs concerning both climate change and climate policy can be an obstacle to the implementation of the policies and behavioral changes needed to tackle greenhouse gas emissions. In this paper, we document such biased beliefs and show that climate education can contribute to address them at scale.

In particular, we leverage a nationwide reform of civics education in Italy and associated requirement for teachers to receive new training and implement a field experiment training thousands of teachers on climate change and climate policy in a staggered fashion, using a proprietary course that was recognized by the Italian government towards the abovementioned requirement.

At baseline and endline we collected survey data on teachers, students, and parents

to examine starting knowledge, attitudes, behaviors, perceptions, and preferences and how such outcomes vary following exposure to climate education. Our study highlights important initial knowledge gaps among teachers, students, and parents, but also provides evidence on the ability of climate education to address biased beliefs at scale.

Our intervention takes the same form and scale than a government's effort to train teachers on climate change and climate policy, of which our intervention was actually part, informing policymakers directly about the potential of climate education. Our baseline evidence also confirms the need for climate education in secondary schools to be accompanied by training of teachers, who otherwise tend to have very limited knowledge on the topic, in particular concerning the economics of climate change and climate policy, despite meaningful interest.

References

Al-Ubaydli, O., M. S. Lee, J. A. List, C. L. Mackevicius, and D. Suskind (2021). How can experiments play a greater role in public policy? Twelve proposals from an economic model of scaling. *Behavioural Public Policy 5*(1), 2–49.

Al-Ubaydli, O., J. A. List, and D. L. Suskind (2017). What can we learn from experiments? Understanding the threats to the scalability of experimental results. *American Economic Review 107*(5), 282–286.

Alan, S., C. Baysan, M. Gumren, and E. Kubilay (2021). Building social cohesion in ethnically mixed schools: An intervention on perspective taking. *The Quarterly Journal of Economics 136*(4), 2147–2194.

Alan, S., T. Boneva, and S. Ertac (2019). Ever failed, try again, succeed better: Results from a randomized educational intervention on grit. *The Quarterly Journal of Economics 134*(3), 1121–1162.

Alesina, A., A. Miano, and S. Stantcheva (2023). Immigration and redistribution. *The Review of Economic Studies 90*(1), 1–39.

Allcott, H. and M. Gentzkow (2017). Social media and fake news in the 2016 election. *Journal of Economic Perspectives 31*(2), 211–36.

Andre, P., C. Pizzinelli, C. Roth, and J. Wohlfart (2022). Subjective models of the macroeconomy: Evidence from experts and representative samples. *The Review of Economic Studies 89*(6), 2958–2991.

Angrist, N., K. Winseck, H. A. Patrinos, and J. S. Graff Zivin (2023). Human capital and climate change. Working Paper 31000, National Bureau of Economic Research.

Angrist, N., K. Winseck, H. A. Patrinos, and J. S. Graff Zivin (2024). Human capital and climate change. *The Review of Economics and Statistics Forthcoming*.

Avvisati, F., M. Gurgand, N. Guyon, and E. Maurin (2014). Getting parents involved: A field experiment in deprived schools. *The Review of Economic Studies 81*(1), 57–83.

Bachmann, R., G. Topa, and W. v. d. Klaauw (2022). *Handbook of Economic Expectations*. Elsevier.

Bartels, L. M. (1996). Uninformed votes: Information effects in Presidential elections. *American Journal of Political Science 40*(1), 194–230.

Bataille, C., C. Guivarch, S. Hallegatte, J. Rogelj, and H. Waisman (2018). Carbon prices across countries. *Nature Climate Change 8*(8), 648.

Bozdoğan, A. E., F. Karslı, and c. Şahin Çakır (2011). A study on the prospective teachers' knowledge, teaching methods and attitudes towards global warming with respect to different variables. *Energy Education Science and Technology Part B: Social and Educational Studies 3*, 315–330.

Brulle, R. J. (2021). Networks of opposition: A structural analysis of U.S. climate change countermovement coalitions 1989-2015. *Sociological Inquiry 91*(3), 603–624.

Budolfson, M., F. Dennig, F. Errickson, S. Feindt, M. Ferranna, M. Fleurbaey, D. Klenert, U. Kornek, K. Kuruc, A. MÃ©jean, W. Peng, N. Scovronick, D. Spears, F. Wagner, and S. Zuber (2021). Climate action with revenue recycling has benefits for poverty, inequality and well-being. *Nature Climate Change*.

Cantoni, D., Y. Chen, D. Y. Yang, N. Yuchtman, and Y. J. Zhang (2017). Curriculum and ideology. *Journal of Political Economy 125*(2), 338–392.

Carattini, S., A. Baranzini, and R. Lalive (2018, June). Is taxing waste a waste of time? Evidence from a Supreme Court decision. *Ecological Economics 148*, 131–151.

Carattini, S., A. Baranzini, P. Thalmann, F. Varone, and F. Vöhringer (2017). Green taxes in a post-Paris world: Are millions of nays inevitable? *Environmental and Resource Economics 68*, 97–128.

Carattini, S., M. Carvalho, and S. Fankhauser (2018). Overcoming public resistance to carbon taxes. *Wiley Interdisciplinary Reviews: Climate Change 9*(5), e531.

Carattini, S., E. P. Fenichel, A. Gordan, and P. Gourley (2019). For want of a chair: Teaching price formation using a cap and trade game. *The Journal of Economic Education*.

Carattini, S., S. Kallbekken, and A. Orlov (2019). How to win public support for a global carbon tax. *Nature 565*.

Carattini, S., S. Levin, and A. Tavoni (2019). Cooperation in the climate commons. *Review of Environmental Economics and Policy 13*(2), 227–247.

Cherry, T. L., S. Kallbekken, and S. Kroll (2014). The impact of trial runs on the acceptability of environmental taxes: Experimental evidence. *Resource and Energy Economics 38*(C), 84–95.

Cordero, E. C., D. Centeno, and A. M. Todd (2020). The role of climate change education on individual lifetime carbon emissions. *PLOS ONE 15*(2), e0206266.

Dal Bó, E., P. Dal Bó, and E. Eyster (2018). The demand for bad policy when voters underappreciate equilibrium effects. *Review of Economic Studies 85*(2), 964–998.

Deaton, A. (2010). Instruments, randomization, and learning about development. *Journal of Economic Literature 48*(2), 424–455.

Dechezleprêtre, A., A. Fabre, T. Kruse, B. Planterose, A. Sanchez Chico, and S. Stantcheva (2022). Fighting climate change: International attitudes toward climate policies. Working Paper 30265, National Bureau of Economic Research.

Delavande, A. (2008). Pill, patch, or shot? Subjective expectations and birth control choice. *International Economic Review 49*(3).

DellaVigna, S. and M. Gentzkow (2010). Persuasion: Empirical evidence. *Annual Review of Economics 2*(1), 643–669.

Dhar, D., T. Jain, and S. Jayachandran (2022). Reshaping adolescents' gender attitudes: Evidence from a school-based experiment in india. *American Economic Review 112*(3), 899–927.

Dominitz, J. and C. F. Manski (1996). Eliciting student expectations of the returns to schooling. *The Journal of Human Resources 31*(1), 1–26.

Douenne, T. and A. Fabre (2022). Yellow vests, pessimistic beliefs, and carbon tax aversion. *American Economic Journal: Economic Policy 14*(1).

Egan, P. J. and M. Mullin (2017). Climate change: US public opinion. *Annual Review of Political Science 20*(1), 209–227.

Falk, A., A. Becker, T. Dohmen, B. Enke, D. Huffman, and U. Sunde (2018). Global evidence on economic preferences. *Quarterly Journal of Economics 133*(4), 1645–1692.

Farrell, J., K. McConnell, and R. Brulle (2019). Evidence-based strategies to combat scientific misinformation. *Nature Climate Change 9*(3), 191–195.

Geiger, N. and J. K. Swim (2016). Climate of silence: Pluralistic ignorance as a barrier to climate change discussion. *Journal of Environmental Psychology 47*, 79–90.

Giustinelli, P. (2016). Group decision making with uncertain outcomes: Unpacking child-parent choice of the high school track. *International Economic Review 57*(2), 573–602.

Giustinelli, P. and M. D. Shapiro (2024). SeaTE: Subjective ex ante Treatment Effect of health on retirement. *American Economic Journal: Applied Economics 16*(2), 278–317.

Haaland, I. and C. Roth (2023). Beliefs about racial discrimination and support for pro-Black policies. *The Review of Economics and Statistics 105*(1), 40–53.

Haaland, I., C. Roth, and J. Wohlfart (2023). Designing information provision experiments. *Journal of Economic Literature 61*(1), 3–40.

Healy, A. J., N. Malhotra, and C. H. Mo (2010). Irrelevant events affect voters' evaluations of government performance. *Proceedings of the National Academy of Sciences 107*(29), 12804–12809.

IMF (2019). Fiscal monitor: How to mitigate climate change. Technical report, IMF, Washington, DC.

Kull, S., C. Ramsay, and E. Lewis (2003). Misperceptions, the media, and the Iraq War. *Political Science Quarterly 118*(4), 569–598.

Leal Filho, W. and S. L. Hemstock (2019). Climate Change Education: An Overview of International Trends and the Need for Action. In W. Leal Filho and S. L. Hemstock (Eds.), *Climate Change and the Role of Education*, Climate Change Management, pp. 1.17. Cham: Springer International Publishing.

List, J. A. (2022). *The Voltage Effect: How to Make Good Ideas Great and Great Ideas Scale*. New York: Currency.

List, J. A. (2024). Optimally generate policy-based evidence before scaling. *Nature 626*(7999), 491–499.

Manski, C. F. (2004). Measuring expectations. *Econometrica 72*(5), 1329–1376.

Millner, A. and H. Ollivier (2016). Beliefs, politics, and environmental policy. *Review of Environmental Economics and Policy 10*(2), 226–244.

Monroe, M. C., R. R. Plate, A. Oxarart, A. Bowers, and W. A. Chaves (2019). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research 25*, 791–812.

Oreskes, N. and E. M. Conway (2011). *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. Bloomsbury Publishing USA.

Papay, J. P., E. S. Taylor, J. H. Tyler, and M. E. Laski (2020). Learning job skills from colleagues at work: Evidence from a field experiment using teacher performance data. *American Economic Journal: Economic Policy 12*(1), 359–388.

Parry, I., S. Black, and J. Roaf (2021). Proposal for an international carbon price floor among large emitters. Technical Report 2021/001, International Monetary Fund.

Rennert, K., F. Errickson, B. C. Prest, L. Rennels, R. G. Newell, W. Pizer, C. Kingdon, J. Wingenroth, R. Cooke, B. Parthum, D. Smith, K. Cromar, D. Diaz, F. C. Moore, U. K. MÃŒller, R. J. Plevin, A. E. Raftery, H. Å evÄÃkovÃ¡, H. Sheets, J. H. Stock, T. Tan, M. Watson, T. E. Wong, and D. Anthoff (2022). Comprehensive evidence implies a higher social cost of CO2. *Nature 610*(7933), 687–692.

Roemer, J. E. (2010). Kantian equilibrium. *Scandinavian Journal of Economics 112*(1), 1–24.

Sparkman, G., N. Geiger, and E. U. Weber (2022). Americans experience a false social reality by underestimating popular climate policy support by nearly half. *Nature Communications 13*(1), 4779.

Stantcheva, S. (2021). Understanding tax policy: How do people reason? *The Quarterly Journal of Economics 136*(4), 2309–2369.

Stiglitz, J. E., N. Stern, M. Duan, O. Edenhofer, G. Giraud, G. Heal, E. L. la Rovere, A. Morris, E. Moyer, M. Pangestu, Y. Sokona, P. R. Shukla, and Winkler (2017). Report of the High-Level Commission on Carbon Prices. Technical report, Carbon Pricing Leadership Coalition.

Supran, G. and N. Oreskes (2017). Assessing ExxonMobil's' climate change communications (1977-2014). *Environmental Research Letters 12*(8), 084019.

Supran, G., S. Rahmstorf, and N. Oreskes (2023). Assessing ExxonMobil's global warming projections. *Science 379*(6628).

Van Der Klaauw, W. (2012). On the use of expectations data in estimating structural dynamic choice models. *Journal of Labor Economics 30*(3), 521–554.

Wetts, R. (2020). In climate news, statements from large businesses and opponents of climate action receive heightened visibility. *Proceedings of the National Academy of Sciences 117*(32), 19054–19060.

Wiswall, M. and B. Zafar (2015). Determinants of College Major Choice: Identification Using an Information Experiment. *Review of Economic Studies 82*(2), 791–824.

Worth, K. (2021). *Miseducation: How Climate Change Is Taught in America*. New York, NY: Columbia Global Reports.

Tables and Figures

Table 1: Teaching climate change in the school year 2019-2020 (panel sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Total		Science		Humanities		Foreign languages		Social sciences		Art		Other disciplines	
Topic	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Panel A: The science of climate change														
Measurement of land and ocean temperatures	0.101	0.301	0.109	0.312	0.097	0.312	0.092	0.290	0.029	0.169	0.048	0.216	0.110	0.313
Climate models	0.056	0.230	0.049	0.217	0.076	0.217	0.064	0.246	0.058	0.235	0.024	0.154	0.041	0.199
The difference between climate and weather	0.128	0.334	0.129	0.335	0.172	0.335	0.079	0.271	0.049	0.216	0.091	0.291	0.099	0.299
The carbon cycle	0.073	0.261	0.122	0.328	0.018	0.328	0.029	0.168	0.010	0.099	0.023	0.152	0.061	0.240
Climate changes in human history	0.112	0.315	0.088	0.284	0.147	0.284	0.114	0.319	0.154	0.363	0.143	0.354	0.104	0.306
The greenhouse effect	0.175	0.380	0.159	0.366	0.173	0.366	0.275	0.448	0.154	0.363	0.190	0.397	0.192	0.394
Greenhouse gases	0.139	0.346	0.140	0.347	0.150	0.347	0.147	0.355	0.068	0.253	0.048	0.216	0.141	0.349
The Keeling curve	0.010	0.100	0.014	0.117	0.008	0.117	0.000	0.000	0.010	0.099	0.000	0.000	0.008	0.088
Increase in temperatures	0.157	0.364	0.146	0.353	0.161	0.353	0.144	0.352	0.126	0.334	0.140	0.351	0.195	0.397
Panel B: The impacts of climate change														
Ocean warming	0.147	0.354	0.137	0.344	0.173	0.344	0.121	0.327	0.096	0.296	0.095	0.297	0.165	0.372
Changes in rainfall and snowfall	0.111	0.314	0.115	0.319	0.099	0.319	0.086	0.281	0.107	0.310	0.116	0.324	0.130	0.337
Droughts	0.108	0.310	0.102	0.303	0.111	0.303	0.107	0.310	0.125	0.332	0.095	0.297	0.116	0.320
Floods and landslides	0.123	0.329	0.123	0.329	0.131	0.329	0.080	0.272	0.086	0.281	0.143	0.354	0.133	0.340
Extreme weather events	0.096	0.295	0.090	0.286	0.102	0.286	0.108	0.311	0.087	0.283	0.071	0.261	0.107	0.309
Reduction in snow cover	0.060	0.237	0.079	0.270	0.050	0.270	0.022	0.146	0.019	0.139	0.024	0.154	0.046	0.211
Melting of glaciers	0.164	0.370	0.154	0.361	0.187	0.361	0.142	0.350	0.175	0.382	0.140	0.351	0.165	0.371
Reduction of sea ice	0.055	0.229	0.059	0.236	0.058	0.236	0.044	0.205	0.049	0.216	0.024	0.154	0.049	0.215
Thawing of permafrost	0.076	0.265	0.076	0.264	0.096	0.264	0.051	0.220	0.039	0.194	0.068	0.255	0.064	0.246
Sea level rise	0.135	0.341	0.134	0.341	0.140	0.341	0.085	0.280	0.107	0.310	0.167	0.377	0.149	0.357
Ocean acidification	0.050	0.219	0.070	0.255	0.029	0.255	0.007	0.085	0.039	0.194	0.024	0.154	0.048	0.215
Human migrations	0.098	0.298	0.074	0.262	0.145	0.262	0.084	0.278	0.114	0.320	0.095	0.297	0.093	0.291
Panel C: Solutions to climate change														
How to calculate your carbon emissions	0.041	0.199	0.046	0.209	0.034	0.209	0.079	0.270	0.019	0.139	0.000	0.000	0.036	0.187
Reducing your environmental impact	0.151	0.358	0.141	0.348	0.154	0.348	0.158	0.366	0.097	0.298	0.167	0.377	0.186	0.390
Climate adaptation at the individual level	0.057	0.232	0.053	0.224	0.055	0.224	0.051	0.220	0.078	0.269	0.000	0.000	0.074	0.262
Climate adaptation measures at society level	0.059	0.235	0.049	0.217	0.066	0.217	0.036	0.188	0.087	0.284	0.071	0.261	0.072	0.259
Contact of humans with animal diseases	0.044	0.204	0.053	0.224	0.042	0.224	0.007	0.085	0.068	0.253	0.000	0.000	0.031	0.173
Panel D: Economic measures to mitigate climate change														
Command and control	0.040	0.197	0.031	0.174	0.054	0.174	0.043	0.204	0.057	0.233	0.048	0.216	0.038	0.192
Environmental subsidies	0.019	0.136	0.017	0.127	0.016	0.127	0.022	0.147	0.039	0.194	0.000	0.000	0.026	0.159
Carbon taxes	0.017	0.129	0.017	0.131	0.011	0.131	0.007	0.085	0.038	0.193	0.000	0.000	0.023	0.151
International climate negotiations	0.083	0.275	0.076	0.265	0.099	0.265	0.093	0.291	0.058	0.235	0.024	0.154	0.085	0.279
Other topic	0.046	0.210	0.049	0.216	0.045	0.216	0.029	0.168	0.048	0.215	0.071	0.261	0.041	0.199
No topic	0.072	0.259	0.066	0.248	0.067	0.248	0.053	0.225	0.139	0.348	0.048	0.216	0.079	0.271

Table 2: Perceived preparedness (panel sample)

	(1)	(2)	(3)	(4)	(5)	(6)
	Little		Quite		Very	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Informed on climate change	0.361	0.480	0.590	0.492	0.050	0.217
Informed on economic policy topics	0.688	0.464	0.282	0.450	0.031	0.172
Importance of being informed on economic policies	0.014	0.117	0.489	0.500	0.497	0.500

Notes: The variable "Informed on climate change" refers to the question "There are problems or issues about which we feel we have all the information we need (...), and others about which we wish we had more information than we currently have. In this regard, how do you feel about the issue of climate change?"; the variable "Informed on economic policy issues" refers to the question "how informed do you consider yourself to be on issues of economic policy?"; and the variable "Importance to be informed on economic policy issues" refers to the question: "how important do you think it is to keep informed on issues of economic policy?"

Table 3: Climate literacy (panel sample)

	(1) Correct response (%)	(2) Do not know response (%)
Mean	67.26	16.51
Std. Dev.	18.90	15.86
None	0.39	27.2
1 / 6	1.91	41.35
2 / 6	5.98	12.14
3 / 6	15.06	3.81
4 / 6	31.4	1.17
5 / 6	25.95	0.57
All	5.72	0.16
No answer	13.6	13.6

Notes: The variable "correct response" is the percentage of correct responses given by the teacher, that is total number of correct responses divided by six questions. The variable "Do not know response" is the percentage of "I do not know" responses, that is total number of "I do not know" divided by six questions.

Table 4: Climate change beliefs (panel sample)

	(1) Mean	(2) Std. Dev.
Panel A: Climate change exists		
Teachers' own beliefs	91.791	13.956
Beliefs about scientists (min %)	55.863	31.299
Beliefs about scientists (max %)	84.817	20.032
Beliefs about Italian citizens (min %)	49.080	26.134
Beliefs about Italians citizens (max %)	77.300	19.691
Panel B: Climate change is anthropogenic		
Teachers' own beliefs	87.514	14.516
Beliefs about scientists (min %)	61.938	27.893
Beliefs about scientists (max %)	85.594	17.434
Beliefs about Italian citizens (min %)	52.698	25.415
Beliefs about Italians citizens (max %)	78.558	18.852

Table 5: Concerns on climate change impacts (panel sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Very low		Low		Medium		High		Very high	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Plants	0.010	0.100	0.069	0.253	0.319	0.466	0.415	0.493	0.186	0.390
Animals	0.003	0.057	0.028	0.165	0.275	0.446	0.437	0.496	0.257	0.437
Human beings	0.005	0.074	0.025	0.155	0.225	0.417	0.433	0.496	0.312	0.463
Children	0.003	0.051	0.016	0.126	0.147	0.355	0.369	0.483	0.465	0.499
Own children	0.010	0.101	0.022	0.147	0.163	0.370	0.356	0.479	0.448	0.497
Italians	0.012	0.111	0.059	0.235	0.360	0.480	0.398	0.489	0.171	0.377
Own self	0.021	0.145	0.129	0.335	0.397	0.489	0.307	0.461	0.146	0.353
Own health	0.015	0.120	0.113	0.316	0.361	0.480	0.314	0.464	0.197	0.398
Own lifestyle	0.056	0.230	0.311	0.463	0.376	0.485	0.188	0.391	0.069	0.254
Own future	0.017	0.131	0.158	0.365	0.414	0.493	0.272	0.445	0.139	0.346
Future generations	0.002	0.048	0.012	0.109	0.120	0.325	0.344	0.475	0.522	0.500
The future of the Planet	0.016	0.127	0.030	0.171	0.113	0.317	0.264	0.441	0.577	0.494

Table 6: Eating habits

	Panel A		Panel B		Panel C	
	Eating local products		Eating organic food		Eating meat	
	2019	2021	2019	2021	2019	2021
Multiple times per week	44.02	55.15	32.08	40.09	42.52	31.62
Once per week	32.22	26.54	28.84	26.43	40.30	46.54
Every two weeks	7.34	7.43	10.19	11.11	7.84	10.28
Once per month	10.67	7.30	16.56	13.56	4.14	5.57
Once per year	3.12	1.81	4.29	2.85	0.65	0.92
Never	2.62	1.78	8.04	5.97	4.55	5.07

Table 7: Climate-unfriendly behaviors (panel sample)

	Panel A: Past behavior		Panel B: Future behavior	
	Mean	Std. Dev.	Mean	Std. Dev.
Km driven	3.967	1.471	3.900	1.427
Continental flights	1.202	2.034	0.906	1.628
Intercontinental flights	0.167	0.645	0.176	0.589

Table 8: Climate-friendly behaviors (panel sample)

	Panel A: Past behavior (yes/no)		Panel B: Future behavior	
	Mean	Std. Dev.	Mean	Std. Dev.
Avoiding eating meat for environmental reasons	0.475	0.499	58.813	28.210
Buying goods/services from companies fighting climate change	0.684	0.465	71.592	23.434
Paying attention to the environmental impact of goods/services	0.880	0.325	80.093	19.623
Supporting environmental organizations	0.328	0.469	49.034	30.246
Signing climate change petitions	0.525	0.499	69.427	28.538
Participating in climate demonstrations	0.361	0.480	55.573	31.668
Buying renewable energy	0.320	0.467	64.460	28.896
Buying solar panels	0.185	0.388	46.502	34.671
Buying electric vehicles	0.135	0.342	54.479	33.075

Table 9: Behaviors' effectiveness in fighting climate change (0-10)

Behavior	Mean	Std. Dev.
Avoiding eating meat for environmental reasons	6.984	2.555
Buying goods/services from companies fighting climate change	7.859	2.086
Paying attention to the environmental impact of goods/services	8.397	1.756
Supporting environmental organizations	5.996	2.756
Signing climate change petitions	6.007	2.877
Participating in climate demonstrations	5.616	2.887
Buying renewable energy	7.973	2.208
Buying solar panels	7.599	2.607
Buying electric vehicles	7.478	2.593
Eating local products	8.720	1.703
Eating organic food	7.429	2.475
Avoiding car use	8.012	2.197
Avoiding flying	7.567	2.637

Table 10: Public support (0-100) (panel sample)

Policy	Mean	Std. Dev.
Subsidy energy efficiency in building	80.796	19.430
Regulate CO_2	83.267	18.822
International treaty	81.373	21.003
Cap and trade	61.596	31.040
Subsidy green veichles	83.054	20.081
Bans on internal combustion engine vehicle	79.574	23.952
Build nuclear power plant	30.743	31.037
Fund research on renewables	88.118	16.866
Subsidy for high efficient vehicle	87.546	17.006
Tax and dividend approach	61.677	29.384

Table 11: Policies' effectiveness and distributional effects (1-3) (panel sample)

Policy effects	Mean	Std. Dev.
Ban on internal combustion engine		
Reduces emissions	2.513	0.635
Reduces local pollution	2.737	0.516
Reduces regressive effects	1.790	0.735
Subsidies to renewables		
Reduce emissions	2.576	0.567
Reduce local pollution	2.534	0.595
Reduce regressive effects	2.151	0.719
Carbon tax		
Reduces emissions	2.182	0.738
Reduces local pollution	2.131	0.744
Reduces regressive effects	1.734	0.744

Table 12: Use of revenues from global taxation of carbon emissions (panel sample)

Use	Frequency
Reduce income taxes in Italy	8.414
National climate fund in Italy	25.032
Domestic carbon dividends	3.828
Global climate fund for developing economies	10.391
Global climate fund for all countries	49.937
International carbon dividends	2.398

Table 13: Intervention: Knowledge

	LATE	Mean (ex ante)	N
Climate literacy complete	4.599***	68.739	5292
	(1.351)	(0.349)	
Don't know	-6.246***	16.437	5796
	(0.886)	(0.292)	
Climate litaracy	4.286**	67.633	5796
	(1.376)	(0.347)	

Notes: Standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 14: Intervention: Habits and behaviors

	LATE	Mean (ex ante)	N
Meat consumption	-0.003	2.119	4510
	(0.063)	(0.026)	
Purchase of goods/services from companies fighting climate change	1.439	71.633	5922
	(1.335)	(0.428)	
Attention to the environmental impact of goods/services	0.958	79.859	5920
	(1.274)	(0.361)	
Support to environmental organizations	1.062	48.981	5692
	(2.264)	(0.562)	
Signing climate change petitions	0.615	69.635	5766
	(1.900)	(0.526)	
Participation in climate demonstrations	-0.020	55.749	5650
	(1.769)	(0.591)	
Purchase of renewable energy	-0.483	64.331	5718
	(1.887)	(0.539)	
Purchase of solar panels	1.477	46.600	5480
	(2.034)	(0.659)	
Purchase of electric vehicles	2.670	54.496	5556
	(2.037)	(0.628)	
Eating local products	0.026	1.801	4532
	(0.086)	(0.024)	
Eating organic food	-0.138*	2.316	4456
	(0.078)	(0.031)	
Km driven	-0.173**	3.912	5928
	(0.076)	(0.026)	
Intra-EU flights	-0.338**	0.906	6114
	(0.117)	(0.029)	
Extra-EU flights	-0.126**	0.180	6082
	(0.052)	(0.011)	

Notes: Standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 15: Intervention: Behaviors' efficacy

	LATE	Mean (ex ante)	N
Avoiding eating meat for environmental reasons	0.362**	7.002	5776
	(0.159)	(0.047)	
Buying goods/services from companies fighting climate change	0.407**	7.885	5788
	(0.149)	(0.038)	
Paying attention to the environmental impact of goods/services	0.105	8.405	5770
	(0.107)	(0.032)	
Supporting environmental organizations	0.286	6.032	5600
	(0.183)	(0.052)	
Signing climate change petitions	0.363**	6.039	5630
	(0.162)	(0.054)	
Participating in climate demonstrations	0.119	5.661	5568
	(0.193)	(0.054)	
Buying renewable energy	0.184	7.975	5706
	(0.160)	(0.041)	
Buying solar panels	0.080	7.617	5602
	(0.186)	(0.049)	
Buying electric vehicles	0.065	7.508	5670
	(0.182)	(0.048)	
Eating local products	0.100	8.729	5810
	(0.115)	(0.031)	
Eating organic food	0.306**	7.420	5732
	(0.149)	(0.046)	
Avoiding car use	0.144	8.033	5752
	(0.125)	(0.041)	
Avoiding flying	0.503**	7.573	5686
	(0.160)	(0.049)	

Notes: Standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 16: Intervention: Being informed of economic policies

	LATE	Mean (ex ante)	N
Informed on economic policies	0.126**	2.265	5620
	(0.046)	(0.012)	
Importance of being informed	0.022	3.486	5626
	(0.028)	(0.010)	

Notes: Standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 17: Intervention: Public support

	LATE	Mean (ex ante)	N
Subsidy energy in building	2.954**	80.969	5282
	(1.479)	(0.374)	
Regulate CO2	2.298*	83.540	5260
	(1.204)	(0.358)	
International treaty	3.744**	81.566	5224
	(1.241)	(0.405)	
Cap and trade	5.070**	61.711	4892
	(2.406)	(0.624)	
Subsidy green veichles	1.318	83.154	5202
	(1.747)	(0.391)	
Bans on vehicle	1.859	79.670	5144
	(1.728)	(0.469)	
Build nuclear power plant	-3.420*	30.960	4842
	(1.952)	(0.629)	
Fund research on renewables	1.607	88.354	5196
	(0.990)	(0.322)	
Subsidy for efficient vehicle	1.942	87.682	5194
	(1.232)	(0.327)	
Tax and dividend approach	3.165	61.848	4974
	(2.007)	(0.587)	

Notes: Standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 18: Intervention: Policy effectiveness and distributional effects

	LATE	Mean (ex ante)	N
Ban on internal combustion engine			
Reduce emission	-0.033	2.516	4528
	(0.050)	(0.013)	
Reduce local pollution	0.041	2.741	4516
	(0.039)	(0.011)	
Minimize regressive consequences	0.109	1.788	2362
	(0.073)	(0.021)	
Subsidies to renewables			
Reduce emission	0.036	2.576	4466
	(0.044)	(0.012)	
Reduce local pollution	-0.045	2.537	4384
	(0.047)	(0.013)	
Minimize regressive consequences	-0.061	2.158	2774
	(0.079)	(0.020)	
Carbon tax			
Reduce emission	0.145**	2.184	3624
	(0.058)	(0.017)	
Reduce local pollution	0.046	2.138	3556
	(0.065)	(0.018)	
Minimize regressive consequences	0.097	1.745	2070
	(0.081)	(0.023)	

Notes: Standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 19: Intervention: Usage of revenues from global taxation of carbon emissions

	Non treated		Treated	
	1st wave	2nd wave	1st wave	2nd wave
Reduce income taxes in Italy	8.317	7.578	8.621	7.393
National climate fund in Italy	24.312	27.008	26.478	26.190
Domestic carbon dividends	3.647	4.469	4.187	5.013
Global climate fund for developing economies	10.877	12.630	9.360	10.025
Global climate fund for all countries	50.096	46.438	49.754	48.747
International carbon dividends	2.751	1.878	1.601	2.632

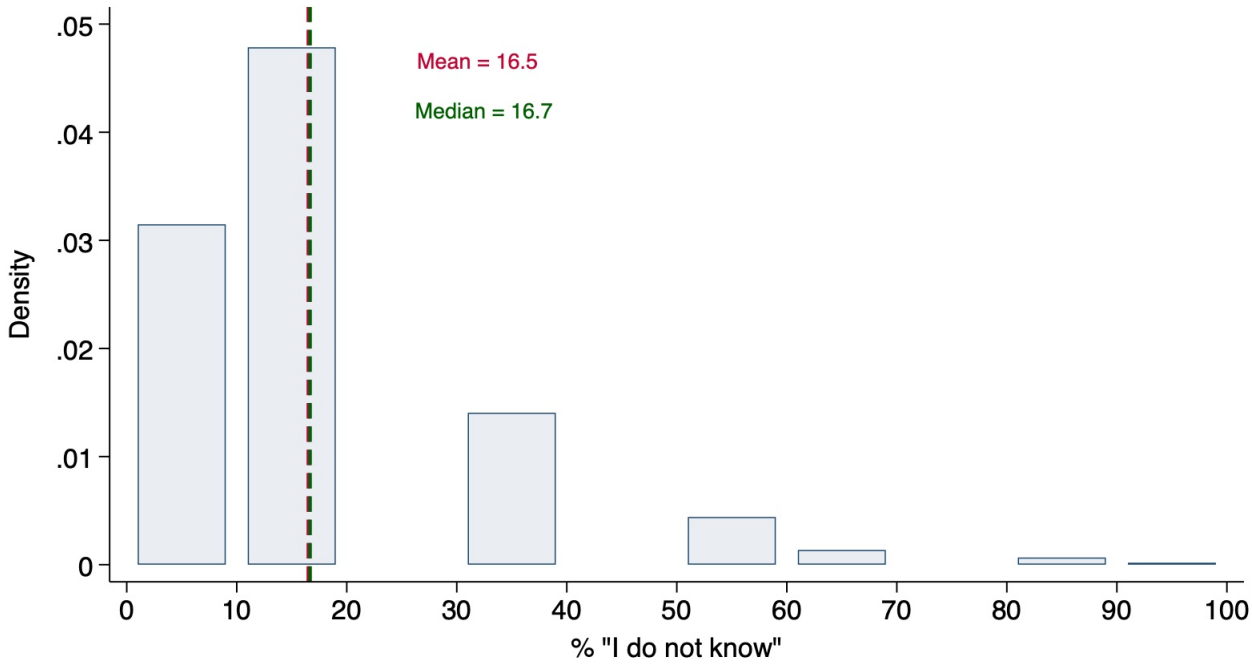

Figure 1: Climate literacy - "I do not know"

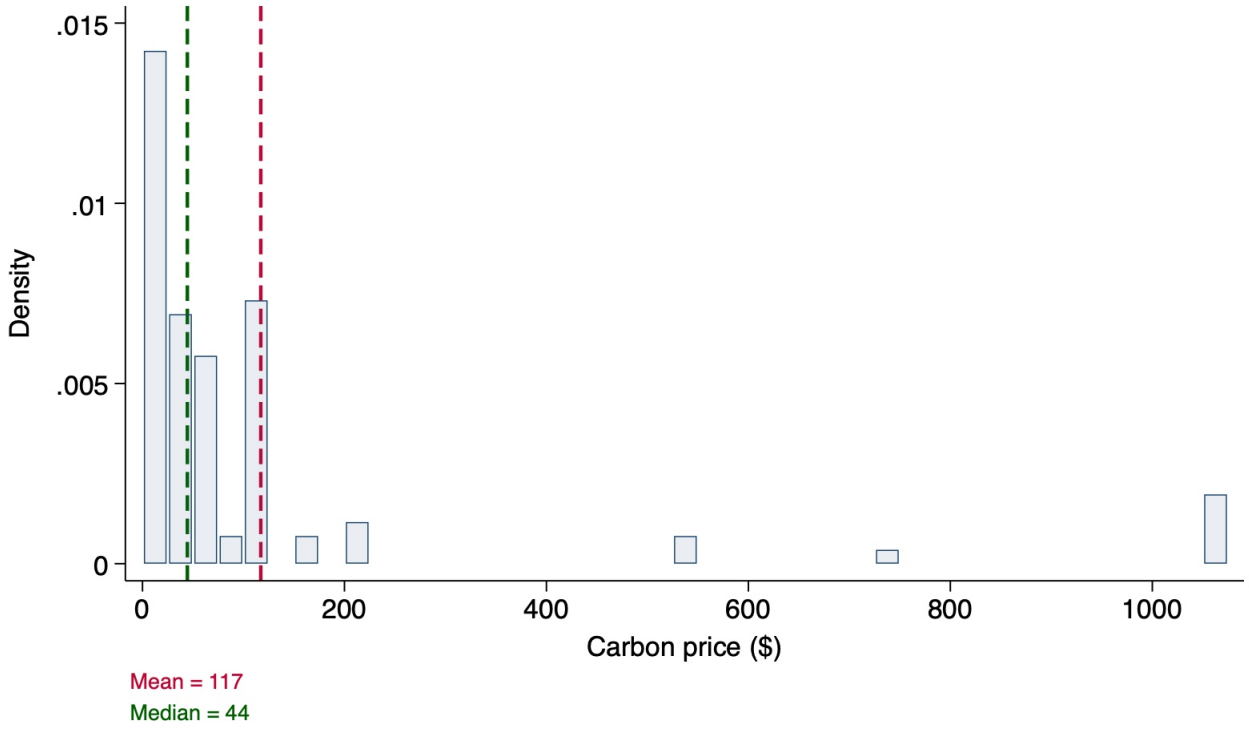

Figure 2: Carbon price (tCO_2)

Appendix

A Randomization

In Italy, there are 107 school districts, one for each Italian province. We randomize 86 superintendents of the school districts, given that 16 of them are responsible for 2 or 3 school districts, in order to avoid contamination. This approach led to 43 superintendents being assigned to the control group and 43 superintendents being assigned to the treatment group. Table A.1 provides the distribution of provinces to the treatment and control groups.

Then, we test for potential differences between treatment and control groups. Table A.2 shows that there are not significant differences between treatment and control groups in terms of geographic location, socio-economic characteristics, school types and environmental characteristics.

Table A.1: Treatment and control provinces

Treatment group	Control group
Ancona	Agrigento
Aosta	Alessandria
Arezzo	Ascoli Piceno
Bologna	Asti
Caltanissetta	Avellino
Campobasso	Bari
Chieti	Barletta-Andria-Trani
Cremona	Belluno
Enna	Benevento
Ferrara	Bergamo
Firenze	Biella
Foggia	Bolzano
Frosinone	Brescia
Genova	Brindisi
Grosseto	Cagliari
Imperia	Caserta
Isernia	Catania
L'Aquila	Catanzaro
Latina	Como
Lecce	Cosenza
Lecco	Crotone
Lodi	Cuneo
Messina	Fermo
Milano	Forlì-Cesena
Napoli	Gorizia
Nuoro	La Spezia
Oristano	Livorno
Padova	Lucca
Pavia	Macerata
Perugia	Mantova
Pescara	Massa-Carrara
Pistoia	Matera
Pordenone	Modena
Prato	Monza Brianza
Ragusa	Novara
Ravenna	Palermo
Reggio Emilia	Parma
Rovigo	Pesaro Urbino
Siena	Piacenza
Siracusa	Pisa
Sondrio	Potenza
Taranto	Reggio Calabria
Teramo	Rieti
Terni	Rimini
Torino	Roma
Trapani	Salerno
Trento	Sassari
Udine	Savona
Varese	Sud Sardegna
Verbano-Cusio-Ossola	Treviso
Verona	Trieste
Vicenza	Venezia
	Vercelli
	Vibo Valentia
	Viterbo

Table A.2: Balance table at the superintendent level

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group		Treatment group			
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Difference	p-value
Panel A: Geographic location						
North	0.442	0.502	0.488	0.506	0.047	0.670
Center	0.163	0.374	0.186	0.394	0.023	0.779
South	0.256	0.441	0.186	0.394	-0.070	0.441
Panel B: Socio-economic characteristics						
Total population	589,159.000	657,932.312	619,829.562	673,149.625	30,670.531	0.831
Female population	302,046.125	341,893.344	318,417.344	347,051.562	16,371.221	0.826
Male population	287,112.875	316,081.281	301,412.188	326,117.781	14,299.311	0.837
Total foreign population	49,491.316	83,948.81	55,764.945	76,671.770	6,273.628	0.718
Female foreign population	25,555.016	44,182.170	28,829.861	39,373.450	3,274.845	0.718
Male foreign population	23,936.303	39,781.070	26,935.086	37,348.760	2,998.783	0.719
Unemployment rate	10.705	6.018	10.284	5.624	-0.421	0.738
Gross Domestic Product (per capita)	26,113.178	7,671.360	27,432.945	8,007.408	1,319.767	0.437
Population density	280.217	350.729	310.860	485.423	30.643	0.738
Panel C: School characteristics						
Total number of schools	560.713	482.034	539.039	490.368	-21.674	0.837
Kindergartens	233.512	200.775	226.992	206.015	-6.519	0.882
Primary schools	173.128	143.902	165.965	147.901	-7.163	0.820
Grade 1 schools	83.019	68.195	78.054	65.601	-4.965	0.732
Grade 2 schools	71.054	74.675	68.027	75.743	-3.027	0.852
Total enrollment	84,873.648	94,222.640	89,131.930	103,370.453	4,258.279	0.842
Kindergarten enrollment	14,500.104	15,625.470	15,443.569	17,804.880	943.465	0.795
Primary school enrollment	27,019.357	31,166.920	28,370.178	33,172.830	1,350.822	0.846
Grade 1 school enrollment	16,992.500	19,056.720	17,829.094	21,139.020	836.593	0.848
Grade 2 school enrollment	26,361.686	28,541.810	27,489.086	31,459.880	1,127.399	0.862

Table A.3: Balance table (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group		Treatment group			
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Difference	p-value
Panel D: Environmental characteristics						
Water use	213.036	38.968	214.601	45.364	1.565	0.864
Electricity use	2,740.956	2,648.08	3,216.373	3,117.770	475.417	0.448
Number of PV installations	7,885.229	6,192.28	8,269.651	5,574.040	384.422	0.763
Total PV capacity	175,101.609	107,561.836	205,626.016	137,872.125	30,524.410	0.256
Waste collected	476.807	88.335	493.940	84.163	17.132	0.360
Public transport	89.785	135.214	81.311	96.962	-8.474	0.739
Bus availability	69.427	33.215	65.724	30.292	-3.703	0.591
Kilometers by bus	2,159.996	1,196.43	2,067.519	1,158.140	-92.477	0.717
Bike route density	33.813	38.852	37.053	40.431	3.240	0.706
Pedestrian zones	40.780	76.316	34.424	36.863	-6.356	0.624
Car density	2,630.674	748.045	2,594.019	800.333	-36.655	0.827
Employees in cooperatives	4.323	1.699	4.434	1.833	0.111	0.771
Ultra-wideband subscriptions	13.721	3.560	14.192	3.948	0.471	0.563
Observations	43		43			

Notes: The sample includes 107 Italian provinces and 86 school district superintendents since 16 superintendents are responsible for 2 or 3 provinces (43 in the control group and 43 in the treated group). Columns (1)-(4) and (2) present the mean and the standard deviation of each variable for the control and the treatment groups. Column (5) presents the difference in the mean of each variable. Column (6) presents the p-value of tests of difference in means between treatment and control groups. Panel A shows the differences between treated and control groups in the geographic location of each province and panel B in the socio-economic characteristics in 2018. Panel C presents the differences between treatment and control groups in each province's school characteristics in 2018 where kindergardens, grade 1 and grade 2 schools refer to the number of schools, and enrollment refers to the number of students enrolled. Panel D presents the differences between treatment and control groups in environmental characteristics where water use refers to total liters of water per inhabitant per day in 2018, electricity use to the total electricity consumption requested from distribution networks in 2018 (GWh), number of PV installations is the number of photovoltaic panels installed in 2018, total PV capacity is the photovoltaic power (kW) in 2018, waste collected is the total waste collected per inhabitant (kg) in 2017, public transport is the number of annual passengers in public transport per inhabitant in 2017, bus availability is the number of buses per 100,000 inhabitants in 2017, kilometers by bus are the number of kilometers travelled by bus per inhabitant in 2017, bike route density is the number of kilometers per 100 km^2 of bike routes in 2017; pedestrian zones is the number of square meters area as pedestrian zone in 2017, car density is the number of vehicles circulating per km^2 of urbanized area in 2017, employees in cooperatives is the percentage of cooperative company employees out of total employees, and ultra-wideband subscriptions is the number of ultra-wideband subscriptions as a percentage of the resident population. Source: Italian Institute of Statistics ISTAT (http://dati.istat.it/, last accessed, June 27, 2024).

B Power calculations

In this appendix section we present the power calculations related to the results presented in the paper, with the aim of describing as precisely as possible the statistical power of our setting. In the following, we present the minimum detectable effect (MDE) for any of the outcomes presented in Tables 13 to 18. Throughout, we always consider one-sided tests with a significance level of 5% and a power of 80%.

Table B.1: MDE: Knowledge

	MDE	Mean (ex ante)	N
Climate literacy complete	1.504	68.739	5292
Don't know	1.145	16.437	5796
Climate litaracy	1.589	67.633	5796

Table B.2: MDE: Habits and behaviors

	MDE	Mean (ex ante)	N
Meat consumption	0.070	2.119	4510
Purchase of goods/services from companies fighting climate change	1.679	71.633	5922
Attention to the environmental impact of goods/services	1.379	79.859	5920
Support to environmental organizations	2.037	48.981	5692
Signing climate change petitions	1.863	69.635	5766
Participation in climate demonstrations	2.238	55.749	5650
Purchase of renewable energy	2.174	64.331	5718
Purchase of solar panels	2.917	46.600	5480
Purchase of electric vehicles	2.473	54.496	5556
Eating local products	0.116	1.801	4532
Eating organic food	0.101	2.316	4456
Km driven	0.096	3.912	5928
Intra-EU flights	0.121	0.906	6114
Extra-EU flights	0.045	0.180	6082

Table B.3: MDE: Behaviors' efficacy

	MDE	Mean (ex ante)	N
Avoiding eating meat for environmental reasons	0.170	7.002	5776
Buying goods/services from companies fighting climate change	0.154	7.885	5788
Paying attention to the environmental impact of goods/services	0.131	8.405	5770
Supporting environmental organizations	0.178	6.032	5600
Signing climate change petitions	0.214	6.039	5630
Participating in climate demonstrations	0.218	5.661	5568
Buying renewable energy	0.164	7.975	5706
Buying solar panels	0.201	7.617	5602
Buying electric vehicles	0.187	7.508	5670
Eating local products	0.121	8.729	5810
Eating organic food	0.166	7.420	5732
Avoiding car use	0.168	8.033	5752
Avoiding flying	0.206	7.573	5686

Table B.4: MDE: Being informed of economic policies

	MDE	Mean (ex ante)	N
Informed on economic policies	0.048	2.265	5620
Importance of being informed	0.044	3.486	5626

Table B.5: MDE: Public support

	MDE	Mean (ex ante)	N
Subsidy energy in building	1.529	80.969	5282
Regulate CO2	1.546	83.540	5260
International treaty	1.725	81.566	5224
Cap and trade	2.565	61.711	4892
Subsidy green veichles	1.602	83.154	5202
Bans on vehicle	1.724	79.670	5144
Build nuclear power plant	2.655	30.960	4842
Fund research on renewables	1.368	88.354	5196
Subsidy for efficient vehicle	1.322	87.682	5194
Tax and dividend approach	2.249	61.848	4974

Table B.6: MDE: Policy effectiveness and distributional effects

	MDE	Mean (ex ante)	N
Ban on internal combustion engine			
Reduce emission	0.054	2.516	4528
Reduce local pollution	0.051	2.741	4516
Minimize regressive consequences	0.099	1.788	2362
Subsidies to renewables			
Reduce emission	0.067	2.576	4466
Reduce local pollution	0.062	2.537	4384
Minimize regressive consequences	0.091	2.158	2774
Carbon tax			
Reduce emission	0.083	2.184	3624
Reduce local pollution	0.080	2.138	3556
Minimize regressive consequences	0.110	1.745	2070

C Course

As mentioned in the main body of paper, the structure of our proprietary course on climate change and climate policy mirrors closely the organization of the Intergovernmental Panel on Climate Change's working groups. The first module focuses on the hard science of climate change, including origins and causes, measurement, and evolution. The second module focuses on the impacts of climate change and potential margins of adaptation. The third module focuses on mitigation, covering systemic approaches through climate policies and behavioral change at the individual level. The course was delivered online through video lectures, complemented by interactive cards and quizzes. The course material was made available to all teachers participating in the course and was ready for use with students. In what follows we describe in detail the organization of the course.

An introductory module, to which we refer as module zero, described the outline of the course, the requirements to receive a certificate, and how the instructors were going to communicate with the class.

The first module covered the following topics on the science of climate change, divided into four parts for the video lectures:
- the difference between climate and weather;
- whether the Earth is currently warming;
- how we know that the Earth is currently warming;
- what is a climate model;
- what are the causes of global warming;

- CO_2, carbon cycle, and climate change;
- climate change throughout history;

- how to know that CO_2 levels have been increasing;
- the Keeling curve;
- CO_2 in the atmosphere over the last 800,000 years;

- how can CO_2 emissions affect global temperatures;
- the greenhouse gas effect;
- greenhouse gases and climate change;
- which sectors contribute to greenhouse gases and thus climate change.

The first module also included, besides the video lectures, a final quiz and the following interactive cards:
- reading a heat map;
- plotting temperature increases from raw data;

The second module covered the following topics on the impacts of climate change, divided into three parts for the video lectures:
- sea level rise;
- ocean warming;
- droughts;
- floods and landslides;
- extreme weather events;
- snow melting;
- glacier retreat;
- sea ice melting;
- permafrost thawing;

- sea level rise;
- ocean acidification;

- climate change impacts on agriculture;
- climate change impacts on water supply;
- climate change impacts on energy demand and supply;
- climate change impacts on human health;

- climate change impacts on flora, fauna, and ecosystems;
- climate change impacts on coastal areas;
- climate change impacts on recreational activities;
- climate change impacts on migration;

The second module also included, besides the video lectures, a final quiz and the following interactive cards:
- thermal expansion model (hands-on activity with plastic bottles and straws);
- modeling the Earth system;
- landslide risk using landslide hazard maps for Italy;
- flood risk using flood maps for Italy;
- land versus sea or how melting land ice affects sea level rise differently from melting sea ice (hands-on activity with plastic containers and actual ice);
- Netflix documentary "Our planet" and guided class discussion;
- online "climate change expedition" examining climate change impacts around the world via the U.S. Environmental Protection Agency's website;
- tracking wildfires with satellite data.

The third module covered the following topics on potential solutions to climate change, divided into four parts for the video lectures:

- own individual behavior and carbon footprints;
- every effort counts;
- what can be done to reduce the carbon footprint;

- own individual behavior and adaptation to climate change;

- economic policies for climate change mitigation: command and control;
- economic policies for climate change mitigation: market-based instruments (overview);
- economic policies for climate change mitigation: other policy instruments;

- more in-depth analysis of carbon taxation;
- the social cost of carbon;
- how to calculate climate damages;
- how to use revenues from carbon taxation;
- more in-depth analysis of cap and trade;
- the European Union Emissions Trading System;
- international climate negotiations;

- the European Union's strategy for climate adaptation;
- climate adaptation in Italy;
- the Declaration on climate adaptation for the Green Cities;
- examples of adaptation measures from around the world.

The third module also included, besides the video lectures, a final quiz and the following interactive cards:

- grocery shopping's carbon footprint;

- documentary "Make the world Greta again" and guided class discussion;

- Participating in a citizen science project;

- Using satellites to examine the potential for solar energy;

- Pedagogical game on cap and trade (with random allocation of allowances, or chairs, through a game of musical chairs), from Carattini et al. (2019).

D Descriptive statistics

D.1 Descriptive statistics of teachers

In this section, we describe our sample of teachers, in terms of both their socioeconomic characteristics, keeping in mind that they all share the same job, as well as in terms of their role in the schools where they teach. We provide these statistics based on the panel sample of teachers, that is teachers that answered both the baseline survey and the follow-up survey. The next section compares this sample with the baseline sample. Our panel sample covers schools across 106 provinces, over a total of about 15,000 Italian middle and high schools in 107 provinces.

We start with the socioeconomic characteristics of our sample of teachers. We have information about their gender, age, educational background, origin (most teachers teach in their province of origin), self-reported intention to be a teacher since the completion of their studies, generalized trust, altruism, and risk and time preferences. As Table D.1 shows, 78% are female, the average age is 52, 69% have a bachelor degree, 32% a master's degree, and about 10% a PhD degree. 73% are married and 98% are born in Italy. 55% are from the Northern Italy, 14% from the center and 30% from the Southern Italy.

The survey was designed to target teachers in both junior high schools and high schools. Table D.1 shows that 43% of the teachers in our panel sample are in middle schools, 57% in high schools, and rarely they teach in both middle and high school. About 98% teach in a public school. Around 7% teach in more than one school, although teachers in public schools rarely teach also in private schools and vice versa. 78% of the teachers have a permanent contract and 85% work full time. The average number of years of teaching is 17. Figure D.1 provides the distribution of years of experience.

We also know in what grade teachers were teaching during the baseline school year, i.e. 2020-2021, including the number of hours taught. The distribution of teaching hours is provided in Figure D.2. Importantly for our context, we also know the subject that each teacher teaches. We further know whether teachers in our sample are engaged in teaching, along with other colleagues, or have the responsibility to coordinate civics education within their school. 51% have the role of coordinator. 80% of the teachers in our sample taught civics education, 45% science, 22% humanities, 6% foreign languages, 5% social sciences, 2% art, and 22% other disciplines.

We also have information about some socioeconomic characteristics for the population of Italian teachers. Hence, we compare the teachers in our sample with the underlying population in Table D.2. Overall, the age and gender distributions of our sample are similar to the ones of the Italian population. The sub-sample of high school teachers is older than the one of middle school teachers, and has a higher proportion of male teachers. Northern Italy has a higher proportion of both middle and high school teachers than the rest of Italy.

We conclude this section by analyzing in Tables D.4 and D.3 balancedness between treatment and control group at the individual level in the panel sample and in the baseline sample. The control group has a somewhat higher proportion of teachers with a bachelor degree (70% vs 67.2%) and working full time (90% vs 81%), that are coordinators of civics education (50% vs 40%), and teach civics education (80% vs 70%).

Table D.1: Descriptive statistics - Panel sample

Variable	Mean	Std. Dev.
Female	0.776	(0.417)
Age	52.200	(9.502)
Bachelor degree	0.686	(0.464)
Master's degree	0.324	(0.468)
PhD degree	0.094	(0.292)
Married	0.728	(0.445)
Born in Italy	0.975	(0.155)
Northern Italy	0.555	(0.497)
Central Italy	0.142	(0.349)
Southern Italy	0.303	(0.460)
Teaching goal	0.387	(0.487)
Generalized trust	5.820	(2.178)
Altruism	6.720	(2.233)
Risk preferences	5.227	(2.414)
Time preferences	7.225	(1.792)
Middle school	0.425	(0.494)
High school	0.567	(0.496)
Middle and high school	0.008	(0.087)
Public school	0.976	(0.153)
Private school	0.022	(0.146)
Public and private school	0.002	(0.049)
Permanent contract	0.777	(0.416)
Temporary contract	0.219	(0.414)
Permanent and temporary contract	0.003	(0.059)
Full time	0.852	(0.355)
Part time	0.136	(0.343)
Full time and part time	0.011	(0.106)
Teaching in multiple schools	0.068	(0.252)
Teaching years	17.202	(10.637)
Teaching hours	15.344	(7.549)
Civics education coordinator	0.452	(0.498)
Teaching civics	0.740	(0.439)
Teaching science	0.453	(0.498)
Teaching humanities	0.223	(0.416)
Teaching foreign languages	0.062	(0.241)
Teaching social sciences	0.048	(0.214)
Teaching art	0.024	(0.154)
Teaching other disciplines	0.220	(0.414)
Observations	3,831	

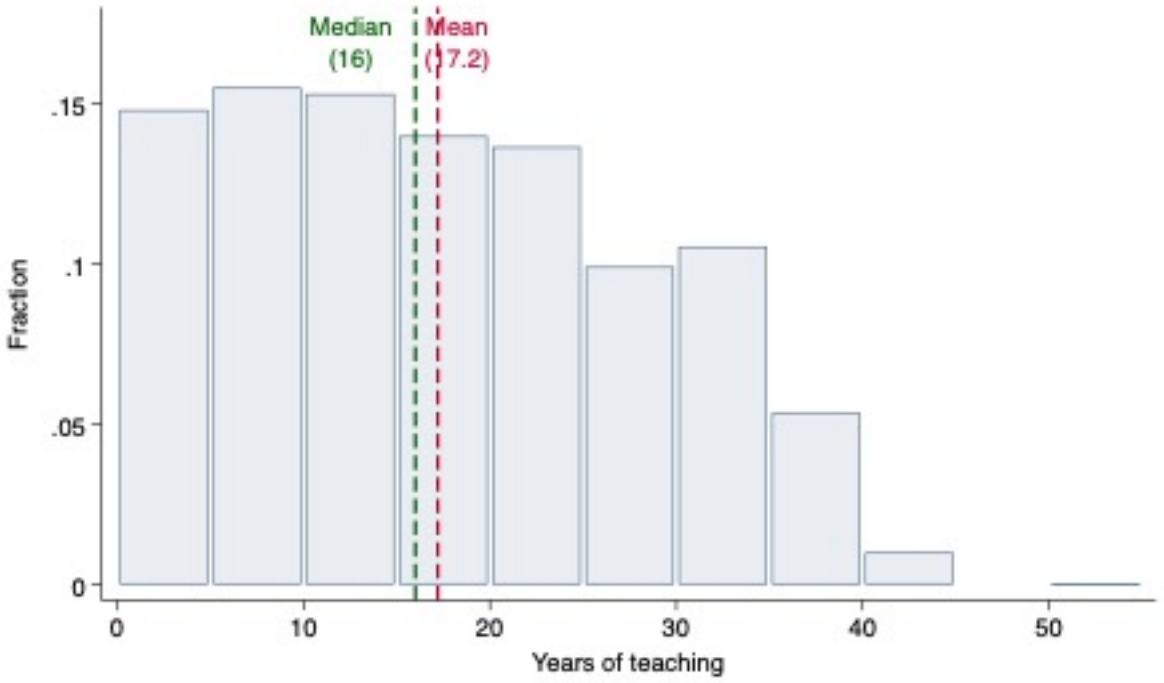

Figure D.1: Experience in teaching

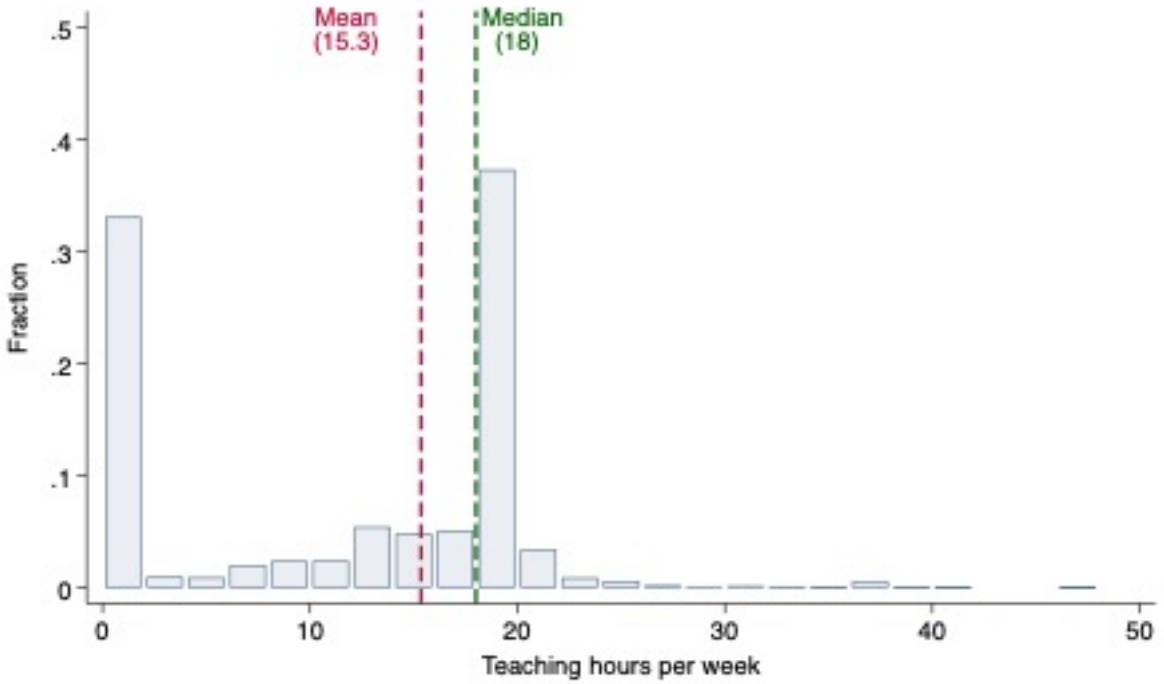

Figure D.2: Teaching hours per week

Table D.2: Panel sample vs Italian population of teachers

	Panel sample			Italian population			
	Middle school teachers	High school teachers	Middle and high school teachers	Middle school teachers	High school teachers	Middle and high school teachers	Italian population (working age 25 - 65)
Age (s.d.)	50.7 (9.4)	53.5 (9.3)	52.2 (9.5)	49	53	50	45.2
Age <30 (%)	0.9	1	1	2	2	2	9.88
Age 30-39 (%)	12.4	8.4	10.2	14	11	12	21.93
Age 40-49 (%)	28	19.8	23.3	30	24	26	28.68
Age ≥50 (%)	58.7	70.8	65.5	54	63	60	39.52
Female (%)	84.2	72.6	77.6	77	63.6	68.6	50.44
Male (%)	15.8	27.4	22.4	23	36.4	31.4	49.56
Northern Italy (%)	59.7	52.8	55.5	41	39	40	45.87
Central Italy (%)	10.9	16.4	14.2	27	27	20.2	19.92
Southern Italy (%)	29.4	30.8	30.3	32	33	39.8	34.22

Notes: This table compares our panel sample with the Italian population of middle and high school teachers and with the working age Italian population. Sources: Istat 2018 (http://dati.istat.it/Index.aspx?QueryId=37105; http://dati-censimentipermanenti.istat.it/, last accessed, June 27, 2024); MIUR (https://dati.istruzione.it/espscu/index.html?area=anagScu, last accessed, June 27, 2024); OECD "Education at a Glance," 2019 (https://www.oecd.org/italy/TALIS-Country-profile-Italy.pdf; https://gpseducation.oecd.org/CountryProfile?plotter=h5primaryCountry=ITAtreshold=5topic=TA, , last accessed, June 27, 2024).

Table D.3: Balance table - Panel sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group		Treatment group			
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Difference	p-value
Female	0.780	(0.415)	0.773	(0.419)	-0.007	(0.659)
Age	51.780	(9.683)	52.555	(9.345)	0.775	(0.116)
Bachelor degree	0.703	(0.457)	0.672	(0.470)	-0.031	(0.034)**
Master's degree	0.339	(0.474)	0.311	(0.463)	-0.028	(0.074)*
PhD degree	0.090	(0.286)	0.098	(0.297)	0.008	(0.507)
Married	0.727	(0.446)	0.729	(0.444)	0.003	(0.882)
Born in Italy	0.974	(0.158)	0.976	(0.153)	0.002	(0.734)
Northern Italy	0.497	(0.500)	0.603	(0.489)	0.106	(0.423)
Central Italy	0.165	(0.372)	0.122	(0.328)	-0.043	(0.666)
Southern Italy	0.338	(0.473)	0.275	(0.446)	-0.063	(0.602)
Teaching goal	0.393	(0.489)	0.382	(0.486)	-0.012	(0.614)
Generalized trust	5.865	(2.156)	5.780	(2.197)	-0.084	(0.271)
Altruism	6.807	(2.176)	6.653	(2.277)	-0.154	(0.056)*
Risk preferences	5.305	(2.414)	5.165	(2.412)	-0.140	(0.103)
Time preferences	7.255	(1.742)	7.202	(1.833)	-0.053	(0.407)
Middle school	0.438	(0.496)	0.414	(0.493)	-0.024	(0.492)
High school	0.561	(0.496)	0.572	(0.495)	0.011	(0.743)
Middle and high school	0.001	(0.024)	0.014	(0.116)	0.013	(0.000)***
Public school	0.982	(0.134)	0.971	(0.168)	-0.011	(0.092)*
Private school	0.018	(0.131)	0.025	(0.156)	0.008	(0.235)
Public and private school	0.001	(0.024)	0.004	(0.062)	0.003	(0.058)*
Permanent contract	0.769	(0.422)	0.784	(0.411)	0.016	(0.585)
Temporary contract	0.230	(0.421)	0.210	(0.408)	-0.020	(0.488)
Permanent and temporary contract	0.001	(0.034)	0.005	(0.073)	0.004	(0.020)**
Full time	0.899	(0.301)	0.813	(0.390)	-0.086	(0.000)***
Part time	0.098	(0.297)	0.168	(0.374)	0.071	(0.000)***
Full time and part time	0.003	(0.054)	0.018	(0.135)	0.016	(0.001)***
Teaching in multiple schools	0.013	(0.115)	0.112	(0.315)	0.098	(0.000)***
Teaching years	17.037	(10.566)	17.348	(10.699)	0.311	(0.556)
Teaching hours	15.593	(8.553)	15.247	(6.510)	-0.346	(0.216)
Civics education coordinator	0.505	(0.500)	0.405	(0.491)	-0.100	(0.000)***
Teaching civics	0.796	(0.403)	0.692	(0.462)	-0.104	(0.000)***
Teaching science	0.467	(0.499)	0.445	(0.497)	-0.022	(0.260)
Teaching humanities	0.233	(0.423)	0.216	(0.412)	-0.017	(0.253)
Teaching foreign languages	0.056	(0.230)	0.067	(0.250)	0.011	(0.219)
Teaching social sciences	0.049	(0.215)	0.048	(0.214)	-0.000	(0.955)
Teaching art	0.021	(0.145)	0.027	(0.161)	0.005	(0.257)
Teaching other disciplines	0.209	(0.407)	0.224	(0.417)	0.015	(0.275)
Observations	1,724		2,091			

Notes: See Table D.1.

Table D.4: Balance table - Baseline sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group		Treatment group			
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Difference	p-value
Female	0.777	(0.416)	0.765	(0.424)	-0.012	(0.391)
Age	51.147	(9.977)	51.419	(9.617)	0.272	(0.597)
Bachelor degree	0.705	(0.456)	0.678	(0.467)	-0.026	(0.027)**
Master's degree	0.354	(0.478)	0.341	(0.474)	-0.013	(0.441)
PhD degree	0.094	(0.292)	0.096	(0.294)	0.001	(0.906)
Married	0.704	(0.456)	0.721	(0.448)	0.017	(0.244)
Born in Italy	0.978	(0.146)	0.977	(0.150)	-0.001	(0.761)
Northern Italy	0.489	(0.500)	0.590	(0.492)	0.101	(0.445)
Central Italy	0.159	(0.366)	0.130	(0.337)	-0.029	(0.759)
Southern Italy	0.351	(0.477)	0.280	(0.449)	-0.071	(0.562)
Teaching goal	0.399	(0.490)	0.389	(0.488)	-0.010	(0.624)
Generalized trust	5.821	(2.171)	5.790	(2.158)	-0.032	(0.652)
Altruism	6.753	(2.214)	6.655	(2.251)	-0.098	(0.154)
Risk preferences	5.272	(2.430)	5.201	(2.413)	-0.071	(0.347)
Time preferences	7.223	(1.802)	7.190	(1.806)	-0.033	(0.544)
Middle school	0.443	(0.497)	0.445	(0.497)	0.002	(0.940)
High school	0.557	(0.497)	0.541	(0.498)	-0.016	(0.611)
Middle and high school	0.001	(0.026)	0.015	(0.120)	0.014	(0.000)***
Public school	0.976	(0.153)	0.970	(0.172)	-0.006	(0.362)
Private school	0.023	(0.151)	0.025	(0.156)	0.002	(0.820)
Public and private school	0.001	(0.026)	0.005	(0.074)	0.005	(0.004)***
Permanent contract	0.739	(0.439)	0.759	(0.428)	0.020	(0.514)
Temporary contract	0.261	(0.439)	0.236	(0.425)	-0.025	(0.417)
Permanent and temporary contract	0.001	(0.026)	0.005	(0.071)	0.004	(0.001)***
Full time	0.888	(0.315)	0.808	(0.394)	-0.080	(0.000)***
Part time	0.110	(0.313)	0.174	(0.379)	0.064	(0.001)**
Full time and part time	0.002	(0.042)	0.018	(0.133)	0.016	(0.000)***
Teaching in multiple schools	0.008	(0.091)	0.123	(0.328)	0.115	(0.000)***
Teaching years	16.236	(10.800)	16.265	(10.657)	0.028	(0.958)
Teaching hours	15.077	(8.049)	14.626	(6.742)	-0.451	(0.041)**
Civics education coordinator	0.495	(0.500)	0.413	(0.493)	-0.082	(0.000)***
Teaching civics	0.792	(0.406)	0.683	(0.466)	-0.110	(0.000)***
Teaching science	0.440	(0.496)	0.417	(0.493)	-0.024	(0.181)
Teaching humanities	0.233	(0.423)	0.215	(0.411)	-0.018	(0.197)
Teaching foreign languages	0.057	(0.232)	0.067	(0.250)	0.010	(0.173)
Teaching social sciences	0.046	(0.210)	0.050	(0.218)	0.004	(0.507)
Teaching art	0.024	(0.154)	0.032	(0.176)	0.008	(0.053)*
Teaching other disciplines	0.232	(0.422)	0.250	(0.433)	0.018	(0.141)
Observations	2,885		4,398			

Notes: See Table D.1.