Fostering Civic Engagement through Project-Based Learning

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Project-based learning (PBL) is an instructional approach that provides civics, social studies, and American government students with the opportunity to actively and cooperatively engage with real-world issues and situations. In a prominent scenario, students identify a problem in their community or school, research the problem and policy-based solutions, consult with stakeholders, and develop an action plan. PBL has been lauded as a mechanism for imparting civic knowledge, dispositions, and skills. It can be a gateway to life-long civic engagement as it provides students with an invitation to take part in the life of their community. It conveys knowledge of how the system works, instills an authentic desire to work for the good of society, and imparts the proficiencies necessary for participation. Students can develop civic-related social and emotion learning (SEL) competencies, such as critical thinking and collaborative skills, as well as facility with using science, technology, engineering, and mathematics (STEM) skills to address public policy concerns. At the same time, PBL is not without its critics who challenge its efficacy as a genuinely student-driven approach and argue that PBL requires substantial resources and can be difficult to implement in the classroom.

This paper addresses the basic question: Is project-based learning for secondary school students an effective mechanism for developing civic knowledge, skills, and dispositions? The study will focus on Project Citizen (PC), a widely used curricular program of the Center for Civic Education. The Civic Education Research Lab (CERL) at Georgetown University conducted a three-year study of PC from 2020-2023. The project employed a randomized control trial (RCT) that compared students of teachers who took part in PC professional development (PD) and implemented the curriculum in their classrooms to students enrolled in traditional civics and social studies classes. Survey data collected on middle and high school students was used to test hypotheses about the effectiveness of PC in conveying civic orientations.

PBL: The Project Citizen Model

Project-based learning is a student-centered, active learning pedagogical approach used in civics classes take up real-world issues and propose solutions. The Buck Institute for Education defines PBL as follows:

> Project Based Learning is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge (What is Project Based Learning? | PBLWorks).

PBL allows students to move from the theoretical or hypothetical to the practical. Material covered in lectures and textbooks can be translated into real world experiences. PBL is highly adaptable and can be designed to address state and common core standards (Halvorsen and Duke, 2017). Learning-by-doing has been shown to increase knowledge retention and enhance the development of dispositions and skills across a range of disciplines (Larmer, 2018). Students generally have positive views of classes that integrate PBL. They exhibit greater motivation to learn as they develop a stronger connection to the course content. PBL can initiate lifelong learning, as students acquire soft skills, such as networking and teamwork, analytical skills, and technical skills, including data analysis (Albert, 2019). The affirming impact of PBL on learning outcomes extends to high-need students, including students of color and students from lower income households (Vontz, Metcalf, and Patrick, 2000; Halvorsen and Duke, 2017).

PBL can improve student outcomes in civics, social studies, and related fields. Evidence suggests that students in project-based classes have greater gains in civic knowledge than those in traditional lecture-style classes (Kingston, 2018). Students whose classes employ PBL significantly outperform their peers who take traditional civics classes on content knowledge tests. A higher percentage of AP students who are taught using PBL achieve passing scores on the AP U.S. Government and Politics test than their peers. AP students also demonstrate a deeper understanding of the content and develop more sophisticated problem-solving skills (Parker, et al., 2013). PBL's emphasis on authentic, active, and collaborative learning contributes to its ability to increase students' civic orientations, SEL competencies, and reading and writing comprehension. (Amulla, 2020). Students' STEM proficiencies can be increased through PBL, especially when they are used to research and find evidence to support a policy position (Hanif, Wijaya, and Winaro, 2019).

Critics express concerns that PBL promotes activities at the cost of covering core content knowledge. At a time when standardized tests and learning objectives have become the norm, students in classes using PBL may not have the depth of knowledge to perform well on these required assessments. A recurrent theme is that PBL is difficult to do well, especially given constraints on teachers' time and resources. PBL poses challenges to classroom management, as students are expected to be drivers of the project while teachers act as facilitators and monitor progress. It can be difficult to keep students focused on the project. Identifying a problem that is relevant, doable, and aligned with real-world circumstances can be difficult. Teachers may not be able to connect with cooperative community partners to facilitate the project. Typical issues associated with group work, such as division of labor and disagreements among participants, may be exacerbated, especially when a project is difficult to manage or controversial (Evenddy, Gailea, and Syafrizal, 2023). Students who lack skills, such as the ability to work collaboratively or to communicate effectively, will be disadvantaged even if they have a superior grasp of the subject matter (Aldabbus, 2018). Assessment of projects can be difficult, as teachers must provide students with continuous feedback while simultaneously motivating them to do independent work. The criteria for evaluating PBL outcomes is more complex, time-consuming, and open to subjective judgement than standardized testing, although the potential to find common ground exists (Miller, 2012).

Project Citizen Research Program

Project Citizen was launched by the Center for Civic Education in California in 1992 and was disseminated nationally in 1995. To date, the program has been used in 75 countries (http://civiced.org/programs/project-citizen). PC's objective is "to motivate and empower students to use the rights and responsibilities of democratic citizenship by intensively examining a policy issue in their schools or communities" (Ozturk, 2022). Students work as a class to identify a problem, research alternative policy-based solutions, develop a policy proposal to address the problem, and design a political action plan to convince public officials to adopt and implement the policy. Students present their action plans and portfolios to leaders in their schools and communities. PC is designed to support students' development of SEL and STEM skills.

Project Citizen encompasses best practices for PBL (see Larmer, 2018). It is inquiry-based, as students guided by teachers identify an issue or problem that is societally relevant or personally meaningful, such as a challenging situation within their school. They devise a question that will frame their project. The PC curriculum is designed to be implemented over a period of weeks as a form of sustained inquiry. Students have opportunities for input into how the project will proceed and are encouraged to express their ideas. They conduct research, propose alternate solutions to the problem they identified, and work collaboratively and cooperatively to arrive at a consensus about the proposal they will recommend. Students receive feedback as they present portfolios of their research and their proposal to community leaders and answer questions. They are encouraged to consider suggestions that have been offered by their teacher, peers, and stakeholders. The class reflects on their work and the process, which can help teachers to adapt the curriculum going forward.

Studies conducted in the U.S. and in other countries have found support for PC's ability to convey civic orientations. An early assessment employed case studies in the U.S. that documented PC students' "success stories." Students carried out projects that helped homeless teens, got a traffic light installed at a dangerous intersection, and developed a method for conducting research on the World Wide Web that was widely adopted (Tolo, 1998). The curriculum was lauded as a "springboard" that provided American students with an entrée to community service opportunities by providing them with the requisite dispositions and skills for engagement (Atherton, 2000). Using a mixed method approach, a study of a middle school PC class in California found that the program improved students' civic literacy, increased their sense of political efficacy, and helped to develop collaborative skills (Morgan, 2016). Research fielded in Idaho indicated that high school students who participated in PC had higher levels of political efficacy and a stronger sense of civic responsibility than college students who had not taken part in the program (Fry and Bentahar, 2013). A large-scale program evaluation found that middle and high school students who participated in PC made greater improvements in civic development, including civic knowledge, civic discourse skills, and public policy problem-solving skills than students in a control group. Teachers who had more experience teaching the curriculum had better student outcomes than those new to the program. The study found that PC had similar outcomes regardless of students' gender, native language, and level of participation in extra-curricular activities. Non-White students made greater gains in persuasive writing ability, but racial/ethnic differences on other indictors were negligible (Root and Northup, 2007). Preliminary research on the PCRP has found that PC students made statistically significant gains in civic knowledge, dispositions, skills, and SEL competencies as well as acquiring civics-relevant STEM skills (Owen and Irion-Groth, 2020; Owen, 2023).

Evaluators have noted that the PC intervention can be adapted to a wide range of classroom contexts which explains its widespread international use (Atherton, 2000). A comparative study of the effectiveness of PC in Indiana (U.S.), Latvia, and Lithuania found that the curriculum had positive, statistically significant impacts on civic knowledge, dispositions, and skills in all three countries. Students in Lithuania gained the most civic knowledge. Students in Lithuania and Latvia showed more interest in politics than their counterparts in Indiana. PC students in Indiana exhibited the greatest improvement in civic skills (Vontz, Metcalf, and Patrick, 2000). A study conducted in Taiwan employed a quasi-experimental design where twelve teachers each instructed one class using PC and another using traditional, discipline-based

civics instruction. The findings demonstrated that PC students significantly outperformed students in the traditional civics class in terms of their level of political interest, commitment to the rights and responsibility of citizenship, and development of core civic skills (Liou, 2004). Research in Indonesia employed a quasi-experimental design to test whether PC could be used to promote values-based education mandated by the country's National Education System. The study found that PC was an effective model for developing democratic character traits, including critical thinking, positive interaction, discussion, and collaboration skills, and promoting decision-making that is in the public interest. The character orientations developed in the context of citizenship education carried over to the students' daily lives (Kabatia, Irwan, and Firman, 2021).

Teacher Professional Development

Effectively employing PBL in the classroom requires that teachers have the requisite active learning pedagogical skills. The need for quality PD for teachers implementing PC in their classrooms has been documented in the U.S. and abroad (Owen and Irion-Groth, 2020; Owen, 2023; Ozturk, 2022; Ozturk, Rapoport, and Ozturk, 2021; Root and Northup, 2007). Teachers' grasp of relevant content may exceed what is required for a traditional lecture and textbook heavy approach given the student-driven aspect of PBL. To deal with teacher shortages in recent years, state policymakers have been relaxing certification requirements (Will, 2022), which notably impacts civics and social studies education. Increasingly, instructors reach the classroom without sufficient coursework in the field (Hamilton, et al., 2020). In addition to more standard knowledge of American government and institutions, PC teachers must be familiar with how the public policy process, interest groups, and non-governmental organizations work. They should be able to teach students core research skills, such as working with primary source documents, and related STEM techniques, like survey research and basic data analysis.

The PCRP evaluated the effectiveness of the Center's PC PD program and curriculum intervention. The PD program was designed to enhance teachers' content knowledge of the U.S. Constitution, government institutions, and the public policy process. It also aimed to have teachers develop effective PBL pedagogies for instructing PC and improve their capacity to engage young people in the PC curriculum. Teachers took part in four- or five-day summer institutes at sites across the country organized by the Center's staff and their network of state coordinators. Educators attended shorter follow-up PD sessions over the course of the academic year and participated in a professional learning community consisting of PCRP participants, Center staff, state coordinators, and mentor teachers. They implemented the PC curriculum intervention in their classes during the academic year.

Research on the first two cohorts of PC demonstrated that teachers made statistically significant gains in relevant content knowledge. Their civic knowledge was notably higher than that of control group teachers who did not receive the PCRP PD. They became more committed to imparting civic dispositions and skills to students as opposed to primarily focusing on rote learning of civic content. PC teachers used active learning instructional techniques in their classrooms substantially more often after the PC program, especially activities that were designed to directly engage students in their school and wider community. They also were more committed to instruction that would promote students' development of SEL competencies, especially cooperation, collaboration, civil discussion, expression, and public speaking.

Teachers' self-efficacy improved because of their participation in PCRP as they felt more capable of handling challenging situations in their classrooms (Owen, 2023).

Hypotheses

Given the findings of prior research on PBL in general and PC specifically, the following hypotheses were tested in this study using data from all three cohorts of the PCRP:

H_1: Students who participate in Project Citizen will gain more civic knowledge than students who take a traditional civics class.

H_2: The perceived civic competence of students who participate in Project Citizen will increase more than that of students who take a traditional civics class.

H_3: The civic skills of students who participate in Project Citizen will improve more than those of students who take a traditional civics class.

H_4: The civic dispositions of students who participate in Project Citizen will improve more than those of students who take a traditional civics class.

Study Timing: The Impact of the COVID-19 Pandemic

Three cohorts of teachers and students were enrolled in the PCRP study. The research coincided with the timing of the PD program and classroom implementation of the PC curriculum intervention. The PD program began with a summer institute and the curriculum was taught during the following academic year during which teachers attended follow-up PD sessions. The cohort 1 study was conducted in 2020-21, cohort 2 in 2021-22, and cohort 3 in 2022-23.

The PCRP was undertaken during the COVID-19 pandemic. The study offered a unique opportunity to track the implementation, outcomes, and possibilities of a civics program that relies heavily on active learning during periods of societal upheaval and shifting conditions in the educational environment. The unique circumstances of implementing PC during the pandemic presented challenges. Teachers and students had to adapt to virtual and hybrid instruction. Disruptions to program implementation occurred due to COVID-related absences of teachers and students. Some teachers left the profession midcourse, requiring classes to be combined or substitutes to be brought in for the remainder of the school year. Even as teachers and students returned to the classroom, shifting modes of delivering the curriculum coupled with the lingering deleterious effects of the pandemic on student learning (Kuhfeld, et al., 2022; Kwakye and Kibort-Crocker, 2021), engagement (Hutchinson and Moore, 2021), and behavior (Lambert, 2022, Shen-Berro, 2023) posed novel challenges to implementing the PC curriculum.

The pandemic seriously disrupted the normal course of secondary school instruction during the first study cohort (2020-21), as most schools rapidly transitioned to virtual learning. Despite the challenges, the Center proceeded with the first year of the PCRP. The teacher PD program was held entirely online during the summer of 2020. The majority of teachers (69%)

implemented the PC curriculum intervention with their students virtually. Twenty-eight percent of teachers met with their students partially online and partially in-person or in a hybrid learning environment. Only 2% of teachers implemented the PC curriculum entirely in-person. Students presented their project portfolios—the culminating PC activity—primarily online to panels of community and government leaders. Teachers continued to deal with the impact of the COVID-19 pandemic during cohort 2 (2021-22) The instructional environment was characterized by a constant state of uncertainty, as teachers were still adapting to the conditions of the pandemic. Almost all (97%) of the teachers participating in the PCRP had taught their classes virtually for at least part of the previous academic year. While most schools started the new academic year with the intention of holding classes in-person, only 36% of PCRP teachers taught their classes in-person for the duration. Sixty-four percent of teachers held classes virtually for at least part of the time. By cohort 3 (2022-23), all of the educators in the study were teaching in person, although some experienced short periods of virtual instructional continuity during heavy outbreaks of the virus.

Study Design

The quantitative impact evaluation of the PCRP employed a randomized control trial (RCT) design examining teacher and student outcomes that were planned to meet the U.S. Department of Education's What Works Clearinghouse (WWC) evidence standards without reservations. The RCT design provided for randomized assignment of teachers and their students to PC intervention and control groups at the middle school (grades 6-8) and high school (grades 9-12) levels. Teachers were recruited for each cohort through the Center's network of state coordinator and mentor teachers via personal outreach to their extensive contacts, advertising in education-related publications, and posting on social media. Qualified applicants were accredited public or private middle and high school teachers of civics, social studies, American government, and American history courses in which the PC program could be incorporated in the ensuing academic year. Schools nationwide were recruited for participation in the PCRP. All teachers within a school who qualified were invited to take part in the study. In many cases, a school had only one qualified instructor. Applications were submitted to the Center where they were reviewed to determine if they met the program and study criteria. Schools/teachers were then randomly assigned to the PC intervention and control groups. While there was no explicit intention to target teachers from schools serving high-need and economically disadvantaged students to the program, and this was not a prerequisite for participation, a majority of the participating teachers served these students.

While data were collected on teachers, this study focuses on student outcomes. All students of teachers in the PC intervention and control groups were enrolled in the study. A hierarchical design was employed where schools (clusters) were randomly assigned to PC treatment and control groups. The sample consisted of students in intact classrooms. All students enrolled in the classes in the study were eligible to take part in the research. Eighty schools (40 intervention and 40 control group) were recruited for inclusion in the study during each program year. Data for stayers, students who remained in the study and participated in the pre- and post-program testing, were analyzed. The stayers consisted of a total of 1,754 students in cohort 1, 1,718 in cohort 2, and 1,941 in cohort 3. (See Table 1 for a detailed breakdown.) The COVID-19 pandemic impacted student attrition rates, which were higher in cohorts 1 and 2.

Table 1
Student Samples by Cohort, Condition, and Grade Level

	Cohort 1		Cohort 2		Cohort 3	
	Middle School	**High School**	**Middle School**	**High School**	**Middle School**	**High School**
Project Citizen	382	650	375	483	558	568
Intervention	390	332	480	379	443	372
Total	1,754		1,718		1,941	

Methodology

Quantitative data on students were collected through pretest and posttest surveys. Pretests were administered prior to the start of students' PC instruction (intervention group) or another civics, social studies, American government, or American history class (control group). Posttests were given to students at the conclusion of these classes. The surveys were administered online during class periods and were proctored by teachers. The Georgetown University Institutional Review Board (IRB) reviewed the student protocol (STUDY00002826) and granted an exemption to the submission.

Statistical analyses were conducted on the pretest/posttest student data to assess changes in civic outcomes due to the PC intervention and to compare the outcomes of the PC and control groups. Separate analyses were run for middle and high school students. Paired sample t-tests were performed to estimate pretest/posttest mean differences and significance tests for PC and control group students. Hierarchical linear models were estimated using analysis of covariance (ANCOVA) to determine if there were statistically significant differences in the adjusted mean posttest scores of students in the PC intervention and control groups. ANCOVA was an appropriate model for this analysis as it adjusts for nonequivalence in intervention and control group scores at baseline (on the pretest). The dependent variable in the ANCOVA models was posttest score on the outcome measure. Intervention/control group was treated as a fixed factor. The pretest score on the outcome measure and a code identifying the school attended by the student were entered as covariates.

Effect sizes for the difference of means were measured by Hedges' g. For the ANCOVA models, the adjusted means and unadjusted standard deviations were used in computing the effect sizes.[1] A coefficient of .20 to .50 was interpreted as a small effect, .51 to .80 a medium effect, and greater than .80 a large effect. WWC's improvement index was computed which represents the average expected change in the percentile rank if an average comparison group member receives the intervention. In other words, it is the difference in percentile ranks for an average intervention group versus an average comparison group member. The improvement index ranges from 0 to plus or minus 50.

[1] What Works Clearinghouse, Procedures and Standards Handbook, version 5, pp. 135-36.

Civic Content Knowledge

The evidence from this study is consistent with findings of prior research indicating that students in classes that use project-based approaches have greater gains in civic knowledge than those who take a traditional civics or social studies course. The mean post-program civic knowledge scores of middle and high school students who participated in PC were higher than those of students in standard classes. The results were statistically significant ($p \leq .01$) across the board.

Students' civic knowledge was based on twenty multiple choice items relating to general knowledge of the public policy process, federalism, branches of the U.S. government, government departments involved in the policy process, interest groups, and nongovernmental organizations. All of these content areas are addressed by the PC curriculum. However, the items were not overly aligned with the intervention and were based on established measures with known reliability. Each item had four response categories and a "don't know" option. One point was given for each correct answer. The civic knowledge items were combined into pretest and posttest indexes. Scores on the indexes ranged from 0 to 20 points. The internal consistency reliability of the indexes based on Cronbach's α was acceptable for all three cohorts. (See Table 2.)

Table 2
Student Civic Knowledge Index Range and Reliability

	Middle School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	0-20	.668	.663
Cohort 2	0-20	.629	.659
Cohort 3	0-20	.682	.653
	High School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	0-20	.744	.764
Cohort 2	0-20	.715	.747
Cohort 3	0-20	.727	.771

Middle school students who received the PC intervention gained more civic knowledge than students in the control condition. (See Table 3.) The trend was apparent across all three cohorts, although the size of the difference varied. The knowledge scores of the PC students increased markedly from pretest to posttest. Scores improved 44% in cohort 1, 76% in cohort 2, and 66% in cohort 3. The improvement index scores were +23, +43, and +24 percentile points, respectively. In comparison, the control group students' civic knowledge gains were smaller across the board. Scores increased 33% from pretest to posttest in cohort 1, 17% in cohort 2, and 52% in cohort 3. The improvement index scores were +18, +11, and +19 percentile points.

Table 3
Middle School Students' Civic Knowledge by Condition
Difference of Means

	Cohort 1		Cohort 2		Cohort 3	
	PC	Control	PC	Control	PC	Control
Pretest $\bar{\chi}$	4.73	4.35	4.15	5.88	3.68	3.22
Pretest SD	2.91	2.68	2.43	2.96	2.73	2.67
Posttest $\bar{\chi}$	6.83	5.79	7.37	6.85	6.11	4.88
Posttest SD	3.30	3.02	3.06	3.32	3.00	2.96
$\bar{\chi}$ Difference	2.10	1.44	3.22	1.00	2.43	1.65
Sign. Difference	.00	.00	.00	.00	.00	.00
Percentage Change	44%	33%	76%	17%	66%	52%
Effect Size	.63	.48	1.51	.28	.67	.51
Improvement Index	+23	+18	+43	+11	+24	+19
Pre/Post Correlation	.44	.45	.72	.41	.22	.33
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	382	390	375	461	552	449

The knowledge scores of the middle school PC intervention and control groups were not equivalent at baseline. (See Table 4.) The ANCOVA model estimates the adjusted posttest mean scores for each group and the difference of means. Posttest knowledge was the dependent variable in the model, PC/control group was a fixed factor, and school and pretest knowledge were covariates. The adjusted mean posttest scores for the students who received the PC intervention were significantly higher than those of the control group across cohorts. The PC students' posttest score was 12% higher than that of the control group in cohort 1. The improvement index, computed from the effect size based on Hedge's g, was +10 percentile points. The PC group mean score was 25% greater than the control group mean in cohort 2 and the improvement index was +23 percentile points. In cohort 3, the percentage difference was 45% and the improvement index was +35 percentile points. In all three models, pretest knowledge was the strongest predictor of posttest knowledge. PC or control group condition was a statistically significant predictor in all of the models. The school a student attended was a significant variable only in cohort 3.

Table 4
ANCOVA Analysis of Middle School Students' Civic Knowledge

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	4.73	.15	6.83	.17	6.73	.14	382
Control	4.35	.14	5.79	.15	5.89	.14	390

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.84	.20	.00	12%	.27	+10

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	134.49	1	134.49	16.66	.00	.02
School	1.52	1	1.52	.19	NS	.00
Pretest Knowledge	1540.00	1	1540.00	190.76	.00	.20

Cohort 2

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	4.15	.14	7.37	.17	8.01	.17	375
Control	5.88	.14	6.85	.15	6.00	.19	461

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
2.00	.27	.00	25%	.63	+23

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	387.56	1	387.56	58.82	.00	.09
School	9.79	1	9.79	1.36	NS	.00
Pretest Knowledge	1750.91	1	1750.91	243.15	.00	.30

Cohort 3

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	3.68	.11	6.11	.13	6.96	.17	552
Control	3.22	.13	4.88	.14	3.83	.19	449

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
3.12	.31	.00	45%	1.04	+35

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	779.37	1	779.37	99.99	.00	.09
School	484.06	1	484.06	62.10	.00	.06
Pretest Knowledge	397.97	1	397.97	51.06	.00	.05

Consistent with the findings for middle school, civic knowledge gains were greater for high school students who participated in PC than for control group students in cohorts 1 and 2. (See Table 5.) The average scores of the PC students improved by 32% in cohort 1 and 56% in cohort 2. In contrast, the control group mean scores increased by 17% and 7%, respectively. The improvement index for the PC group in cohort 1 was +24 percentile points compared to +13 percentile points for the control group. In cohort 2, the improvement index for the PC group was

+44 percentile points versus +4 percentile points for the control group students. The percentage change for both groups was 32% in cohort 3. However, the pretest/posttest mean difference was higher for the PC group (2.03) than the control group (1.80). The improvement index for the PC group was +22 percentile points compared to +16 percentile points for the comparison group students.

Table 5
High School Student Civic Knowledge by Condition
Difference of Means

	Cohort 1		Cohort 2		Cohort 3	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	7.77	6.61	6.96	7.18	6.35	5.70
Pretest SD	3.62	3.27	3.11	3.46	3.37	3.24
Posttest $\bar{\chi}$	9.88	7.75	10.86	7.65	8.39	7.50
Posttest SD	3.83	3.65	3.29	4.31	3.79	3.82
$\bar{\chi}$ Difference	2.11	1.14	3.90	.47	2.03	1.80
Sign. Difference	.00	.00	.00	.01	.00	.00
Percentage Change	27%	17%	56%	7%	32%	32%
Effect Size	.66	.34	1.63	.12	.61	.44
Improvement Index	+24	+13	+44	+4	+22	+16
Pre/Post Correlation	.64	.54	.72	.53	.58	.35
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	642	340	462	365	564	376

The ANCOVA analysis for high school students reveals statistically significant differences in mean posttest scores favoring the PC group. (See Table 6.) In cohort 1, the PC group's mean posttest score was 14% higher than that of the control group. The improvement index was +14 percentile points. The percentage difference in PC/control group scores in cohort 2 was 31% in cohort 2, with an improvement index of +35 percentile points. In cohort 3, the PC students' mean score was 16% greater than that of the control group, and the improvement index was +14 percentile points. As was the case for the middle school model, pretest knowledge had the strongest relationship to posttest knowledge. PC/control group was statistically significant in all three models. School was a significant predictor in the model for cohorts 2 and 3.

Table 6
ANCOVA Analysis of High School Students' Civic Knowledge

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	7.77	.14	9.88	.15	9.59	.11	642
Control	6.61	.17	7.75	.19	8.25	.17	340

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.34	.21	.00	14%	.36	+14

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	385.83	1	385.83	42.81	.00	.04
School	.10	1	.10	.00	NS	.00
Pretest Knowledge	4987.33	1	4987.33	553.42	.00	.36

Cohort 2

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	6.35	.14	8.39	.18	11.02	.13	462
Control	5.70	.18	7.50	.22	7.58	.28	365

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
3.44	.33	.00	31%	1.04	+35

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	688.73	1	688.73	103.24	.00	.15
School	71.90	1	71.90	10.77	.00	.02
Pretest Knowledge	3007.23	1	3007.23	450.78	.00	.43

Cohort 3

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	6.43	.14	8.45	.16	8.59	.19	564
Control	5.99	.16	7.73	.19	7.20	.26	376

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.40	.40	.00	16%	.37	+14

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	133.11	1	133.11	12.11	.00	.01
School	75.81	1	75.81	276.32	.00	.23
Pretest Knowledge	3036.60	1	3036.60	6.89	.01	.01

Perceived Civic Competence

The study examined the extent to which students felt prepared to engage in political life. The perceived civic competence of middle school students who participated in PC increased significantly across all three cohorts. There was no change in the control group students' belief that they were ready to engage. High school students in both the PC and control groups became more confident about their ability to engage. The PC group students' perceptions of their civic competence increased more than that of the control group students.

Perceived civic competence was measured by combining students' scores on three items. Students were asked how much they agreed with the following statements: 1) I have a pretty good understanding of the important political issues facing our country, 2) I am well prepared to participate in political and public life, and 3) I can find the government official or branch of government that is responsible for solving a problem in my community. The respondents could 1 strongly disagree, 2 disagree, 3 neither agree nor disagree, 4 agree, and 5 strongly agree. The three items were combined to form an additive index that ranged from 1 (low perceived civic competence) to 13 (high perceived civic competence). The perceived civic competence index reliability is acceptable across all three cohorts. (See Table 7.)

Table 7
Perceived Civic Competence Index
Range and Reliability

	Middle School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	1-13	.754	.754
Cohort 2	1-13	.772	.744
Cohort 3	1-13	.736	.756
	High School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	1-13	.787	.787
Cohort 2	1-13	.748	.796
Cohort 3	1-13	.669	.750

Middle school students who had taken PC had more positive perceptions of their civic competence after the curriculum. (See Table 8.) The pretest/posttest mean differences of .58, .93, and .46 were statistically significant ($p \leq .01$) across all three cohorts. The percentage change was 8% for cohort 1, 13% for cohort 2, and 6% for cohort 3. The effect sizes (Hedge's g) were small at 24, .33, and .15. The improvement index scores were +6, +13, and +6 percentile points, respectively. In contrast, the differences in the mean pretest/posttest scores of the control group students were small and nonsignificant.

Table 8
Middle School Students Perceived Civic Competence by Condition
Difference of Means

	Cohort 1		**Cohort 2**		**Cohort 3**	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	7.70	7.64	7.23	7.94	7.33	7.11
Pretest SD	2.39	2.56	2.63	2.68	2.50	2.54
Posttest $\bar{\chi}$	8.28	7.79	8.16	8.07	7.79	7.15
Posttest SD	2.51	2.59	2.36	2.48	2.62	2.61
$\bar{\chi}$ Difference	.58	.15	.93	.12	.46	.04

Sign. Difference	.00	NS	.00	NS	.00	NS
Percentage Change	8%	2%	13%	2%	6%	<1%
Effect Size	.24	.06	.33	.05	.15	.01
Improvement Index	+6	+2	+13	+2	+6	0
Pre/Post Correlation	.52	.50	.39	.47	.33	.23
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	314	351	347	433	504	381

The ANCOVA analysis found that the adjusted mean posttest scores for middle school students who took part in PC were significantly higher on the perceived civic competence index than those of the control group students in cohorts 1 and 2. (See Table 9.) The percentage difference was 5% for both cohorts. The effect sizes were small, .16 for cohort 1 and .19 for cohort 2, with improvement index scores of +6 and +8 percentile points. The difference in adjusted mean posttest scores between the PC and control groups was nonsignificant in cohort 3.

Table 9
ANCOVA Analysis of Middle School Students' Perceived Civic Competence

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	7.70	.13	8.28	.13	8.24	.12	314
Control	7.64	.14	7.79	.14	7.83	.12	351

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.41	.17	.02	5%	.16	+6

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	27.13	1	27.13	5.66	.02	.01
School	31.57	1	31.57	6.59	.01	.01
Pretest Duty to Vote	1127.56	1	1127.56	235.35	.00	.27

Cohort 2							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	7.23	.14	8.16	.13	8.33	.13	347
Control	7.94	.13	8.07	.12	7.88	.16	433

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.45	.23	.05	5%	.19	+8

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	19.12	1	19.12	3.98	.05	.01
School	9.90	1	9.90	2.06	NS	.00

Pretest Duty to Vote	512.14	1	512.14	106.72	.00	.16	
Cohort 3							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	7.33	.11	7.79	.11	7.66	.15	504
Control	7.11	.13	7.15	.14	7.31	.19	381

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.34	.31	NS	4%	.13	+5

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	7.83	1	7.83	1.22	NS	.00
School	5.27	1	5.27	.84	NS	.00
Pretest Duty to Vote	498.43	1	498.43	79.16	.00	.08

High school students' perceptions of their ability to engage competently in civic life improved significantly after participating in PC across all three cohorts. (See Table 10.) The difference in pretest/posttest means was .59, .80, and .71. The percentage change was 7% for cohort 1, 10% for cohort 2, and 9% for cohort 3. The effect sizes (Hedge's g) were small at .25, .33, and .38. The associated improvement index scores were +6, +13, and +15 percentile points. The perceived civic competence scores of high school students in the control group increased significantly in cohorts 2 and 3, but not in cohort 1. The pretest/posttest mean differences were notably smaller than for the PC group students, as were the percentage change, effect size, and improvement index scores.

Table 10
High School Students Perceived Civic Competence by Condition
Difference of Means

	Cohort 1		**Cohort 2**		**Cohort 3**	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	8.29	8.31	7.87	7.78	7.56	7.82
Pretest SD	2.41	2.77	2.48	2.55	2.18	2.28
Posttest $\bar{\chi}$	8.89	8.43	8.67	8.27	8.26	8.36
Posttest SD	2.36	2.75	2.36	2.56	2.334	2.35
$\bar{\chi}$ Difference	.59	.12	.80	.48	.71	.53
Sign. Difference	.00	NS	.00	.00	.00	.00
Percentage Change	7%	1%	10%	6%	9%	7%
Effect Size	.25	.04	.33	.19	.38	.20
Improvement Index	+6	+1	+13	+7	+15	+8
Pre/Post Correlation	.56	.50	.48	.47	.33	.36
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	642	293	440	323	533	347

The ANCOVA analysis finds that the difference in adjusted posttest means is significantly higher for the PC group than the control group in cohorts 1 and 2, but not in cohort 3. (See Table 11.) The mean difference is .46 for cohort 1 and .53 for cohort 2. These differences are small, with the percentage differences of 5% and 6%, effect sizes (Hedge's g) of .19 and .22, and improvement index scores of +8 and +9 percentile points.

Table 11
ANCOVA Analysis of High School Students' Perceived Civic Competence

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	8.29	.09	8.89	.09	8.89	.08	642
Control	8.31	.16	8.43	.16	8.42	.12	293

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.46	.14	.00	5%	.19	+8

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	42.49	1	42.49	10.01	.00	.01
School	22.58	1	22.58	5.32	.02	.01
Pretest Competence	1821.51	1	1821.51	429.32	.00	.32

Cohort 2							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	7.86	.12	8.67	.11	8.67	.11	440
Control	7.79	.13	8.27	.14	8.13	.23	323

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.53	.28	.05	6%	.22	+9

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	15.67	1	15.67	3.47	.06	.01
School	4.55	1	4.55	1.01	NS	.00
Pretest Competence	629.99	1	629.99	139.73	.00	.20

Cohort 3							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	7.56	.09	8.26	.11	8.46	.13	533
Control	7.82	.11	8.36	.12	8.11	.18	347

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index

.34	.27	NS	4%	.15	+6

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	7.40	1	7.40	1.53	NS	.00
School	12.65	1	12.65	2.61	NS	.00
Pretest Competence	574.44	1	574.44	118.42	.00	.12

Problem-Solving Skills

Problem-solving skills are SEL competencies that are a focal outcome of curricula that employ PBL. Both middle and high school students had relatively high scores on problem-solving at the outset. Middle and high school students who participated in PC made modest, statistically significant gains in their perceptions of their ability to solve problems.

Students were asked whether they were able to perform a variety of tasks if they faced a problem in their community. The items measure civic skills that are conducive to students' development of SEL competencies. The problem-solving items asked if students would be able to: 1) identify the problem, 2) research the problem, 3) get other people to care about the problem, 4) work cooperatively with others to solve the problem, 5) develop a plan of action for addressing the problem, 6) evaluate alternative solutions to the problem, and 7) attend a meeting about the problem. For each item, students could respond: 1 I definitely could not, 2 I probably could not, 3 I'm not sure if I could, 4 I probably could, and 5 I definitely could. These items were combined in an additive index of problem-solving skills. The problem-solving index ranged from 1 (definitely could not) to 29 (definitely could). The index meets WWC standards for reliability for both study years. (See Table 12.)

Table 12
Problem-Solving Index Range and Reliability

	Middle School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	1-29	.874	.870
Cohort 2	1-29	.876	.900
Cohort 3	1-29	.883	.873
	High School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	1-29	.873	.906
Cohort 2	1-29	.879	.872
Cohort 3	1-29	.890	.893

The gains in problem-solving schools for middle school students who experienced the PC curriculum were modest, but they exceeded those of students in the control group. (See Table 13.) Students' pretest mean scores for both groups were at the higher end of the scale, especially in cohorts 1 and 2. The increase in pretest/posttest mean scores for the PC students was .57, .85, and .93 across the three cohorts. The difference of means was statistically significant at $p \leq .01$ across the board. The pretest/posttest percentage change for the PC group in each cohort was

small at 3%, 4% and 5%, respectively, and the improvement index scores were +4, +5, and +5 percentile points. In comparison, the pretest/posttest mean differences were not statistically significant for the control group in cohort 1 and 2. The difference of means of .61 approached statistical significance for the control group in cohort 3. The pretest/posttest percentage change was 3% and the improvement index was +3 percentile points.

Table 13
Middle School Students' Problem-Solving Skills by Condition
Difference of Means

	Cohort 1		Cohort 2		Cohort 3	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	20.87	19.82	19.12	19.60	17.69	17.64
Pretest SD	5.27	5.29	6.10	5.90	6.08	6.03
Posttest $\bar{\chi}$	21.45	19.85	19.89	19.96	18.62	18.25
Posttest SD	5.00	5.06	5.53	5.02	6.05	5.83
$\bar{\chi}$ Difference	.57	.03	.85	.36	.93	.61
Sign. Difference	.02	NS	.00	NS	.00	.06
Percentage Change	3%	<1%	4%	2%	5%	3%
Effect Size	.12	.01	.14	.06	.14	.08
Improvement Index	+4	+1	+5	+2	+5	+3
Pre/Post Correlation	.44	.52	.49	.41	.43	.26
Sign. Correlation	.00	,00	.00	.00	.00	.00
n	303	325	309	404	445	314

An ANCOVA analysis examines the difference in adjusted posttest mean scores for the middle school PC and control group students. (See Table 14.) The adjusted posttest mean difference was small and statistically significant for cohort 1. However, the difference of mean scores between the groups was not statistically significant for the subsequent cohorts.

Table 14
ANCOVA Analysis of Middle School Students' Problem-Solving Skills

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	20.87	.30	21.45	.29	21.14	.24	303
Control	19.82	.29	19.85	.28	20.13	.24	325

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.01	.34	.00	5%	.20	+8

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	157.14	1	157.14	8.65	.00	.02

School	44.97	1	44.97	2.47	NS	.00	
Pretest Prob-Solve	494.60	1	494.60	253.01	.00	.29	

Cohort 2

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	19.12	.34	19.89	.32	20.12	.29	309
Control	19.60	.29	19.96	.25	19.96	.36	404

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.16	.76	NS	5%	.03	+1

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	2.21	1	2.21	.10	NS	.00
School	1.03	1	1.03	.05	NS	.00
Pretest Prob-Solve	2903.03	1	2903.03	128.62	.00	.20

Cohort 3

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	17.69	.29	18.62	.28	18.63	.35	445
Control	17.64	.34	18.25	.32	18.23	.46	314

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.39	.70	NS	2%	.07	+3

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	9.60	1	9.60	.31	NS	.00
School	.23	1	.23	.01	NS	.00
Pretest Prob-Solve	3560.08	1	3560.08	115.01	.00	.13

The trends for high school students were similar to the middle school findings. (See Table 15.) High school students' pretest scores were near the upper end of the index, indicating that they generally felt capable of acting to solve a problem in their community prior to taking their civics class. The improvement in PC students' mean scores on the problem-solving index was modest and statistically significant for all three cohorts. The difference of means was .36 for cohort 1, .42 for cohort 2, and .65 for cohort 3. The percentage change and improvement index scores were small for each cohort. The control groups' pretest/posttest mean differences were not statistically significant for cohorts 1 and 2. Cohort 3 was the only instance where the increase in the control group's scores was slightly higher than that of the PC group.

Table 15
High School Students' Problem-Solving Skills by Condition
Difference of Means

	Cohort 1		Cohort 2		Cohort 3	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	21.91	21.02	21.11	20.86	19.73	19.20
Pretest SD	4.50	5.33	4.75	4.83	5.21	5.53
Posttest $\bar{\chi}$	22.27	20.79	21.54	20.73	20.39	19.90
Posttest SD	4.57	5.64	5.06	5.31	5.63	5.69
$\bar{\chi}$ Difference	.36	-.23	.42	.13	.65	.70
Sign. Difference	.02	NS	.05	NS	.00	.00
Percentage Change	2%	-1%	2%	<1%	3%	4%
Effect Size	.08	-.04	.08	.02	.12	.10
Improvement Index	+3	-2	+3	+1	+5	+4
Pre/Post Correlation	.52	.37	.38	.48	.47	.27
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	631	287	420	311	501	325

The ANCOVA analysis for high school students revealed that the adjusted posttest mean scores for the PC group were significantly higher than the control group scores for cohorts 1 and 2. (See Table 16.) The percentage difference was 5% in cohort 1, with an effect size (Hedge's g) of .27 that corresponded to an improvement index of +10 percentile points. In cohort 2, the percentage difference was 8%, the effect size was .34, and the improvement index was +13 percentile points. The difference in adjusted PC and control group posttest means was not statistically significant in cohort 3.

Table 16
ANCOVA Analysis of High School Students' Problem-Solving Skills

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	21.91	.18	21.02	.31	22.14	.17	631
Control	22.27	.18	20.79	.33	21.10	.15	287

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.03	.31	.00	5%	.27	+10

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	209.18	1	209.18	11.06	.00	.02
School	189.38	1	189.38	10.01	.00	.01
Pretest Prob-Solve	4856.63	1	4856.63	256.75	.00	.22

Cohort 2							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	21.11	.23	21.54	.24	21.58	.24	420
Control	20.86	.27	20.73	.30	19.78	.53	311

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.79	.64	.00	8%	.34	+13

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	171.34	1	171.34	7.82	.01	.02
School	48.42	1	48.42	2.12	NS	.00
Pretest Prob-Solve	3909.17	1	3909.17	91.37	.00	.15

Cohort 3							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	19.73	.23	20.39	.25	20.40	.32	501
Control	19.20	.31	19.90	.31	19.91	.44	325

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.48	.66	NS	2%	.09	+4

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	14.28	1	14.28	.525	NS	.00
School	3.69	1	3.69	.156	NS	.00
Pretest Prob-Solve	3930.89	1	3930.89	144.56	.00	.14

Civic Expression Skills

Students' ability to express and share their views is a central element of the PC curriculum. Students' average pretest scores on the civics expression index were near the center of the distribution. The civic expression skills of both middle and high school students who received the PC intervention improved significantly. The gains for middle school students in the control group were smaller across cohorts, and nonsignificant in cohort 1. The civic expression skills of high school students in the control group did not change significantly from pretest to posttest in cohorts 1 and 2. The improvement in scores was comparable to the PC group in cohort 3.

The study included a battery of six items measuring civic expression skills. Students were asked if they felt they could: 1) express their views in front of a group of people, 2) write a letter to a local news outlet, 3) organize a petition, 4) contact a government official, 5) use social media to publicize the problem, and 6) use social media to organize people to take action to solve the problem. The responses to the individual items were 1 I definitely can't, 2 I probably can't, 3 I am not sure if I can, 4 I probably can, and 5 I definitely can. The six items were added to form a

civic expression index that ranged from 1 (definitely cannot) to 25 (definitely can). The index reliability (Cronbach's α) was over .860 or greater for all cohorts and grade levels. (See Table 17.)

Table 17
Civic Expression Index Range and Reliability

	Middle School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	1-25	.865	.860
Cohort 2	1-25	.880	.863
Cohort 3	1-25	.870	.877
	High School		
	Index Range	**Pretest Cronbach's α**	**Posttest Cronbach's α**
Cohort 1	1-25	.872	.891
Cohort 2	1-25	.880	.895
Cohort 3	1-25	.875	.905

Middle school students who took part in PC had greater gains in civic expression skills than those in the control group. (See Table 18.) The pretest/posttest increases in PC students' scores on the civic expression skills index were 1.22, 1.50, and 1.50, and were statistically significant ($p \leq .01$) across the three cohorts. The percentage change was 9% for cohort 1, 11% for cohort 2, and 13% for cohort 3. The improvement index score was +9 percentile points across the board. In comparison, the pretest/posttest mean differences were notably smaller for the control group at .40, .66, and .81, and were statistically significant for cohorts 2 and 3. The percentage change was 3% in cohort 1, 5% in cohort 2, and 7% in cohort 3, with improvement index scores of +3, +4, and +4 percentile points.

Table 17
Middle School Students' Civic Expression Skills by Condition
Difference of Means

	Cohort 1		**Cohort 2**		**Cohort 3**	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	14.29	13.85	13.24	13.58	12.02	11.86
Pretest SD	5.98	6.11	6.31	6.27	6.23	6.15
Posttest $\bar{\chi}$	15.52	14.25	14.75	14.24	13.53	12.67
Posttest SD	5.82	.56	5.79	5.59	6.20	6.16
$\bar{\chi}$ Difference	1.22	.40	1.50	.66	1.50	.81
Sign. Difference	.00	NS	.00	.02	.00	.03
Percentage Change	9%	3%	11%	5%	13%	7%
Effect Size	.23	.07	.24	.11	.22	.10
Improvement Index	+9	+3	+9	+4	+9	+4
Pre/Post Correlation	.58	.54	.45	.46	.38	.21
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	289	315	300	389	439	316

At the middle school level, the ANCOVA analysis indicated that the adjusted mean difference in posttest civic expression skills was statistically significant in cohorts 1 and 3. (See Table 18.) The percentage difference between the PC and control group adjusted posttest mean scores was 6% with an improvement index of +7 percentile points. The findings for cohort 3 were similar, as there was a 6% difference in the adjusted posttest means scores between the groups and an improvement index of +6 percentile points. The difference of adjusted posttest means in cohort 2 was small and nonsignificant.

Table 18
ANCOVA Analysis of Middle School Students' Civic Expression Skills

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	14.29	.35	15.52	.34	15.35	.28	289
Control	13.85	.34	14.25	.32	14.40	.26	315

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.95	.39	.01	6%	.17	+7

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	134.65	1	134.65	5.94	.01	.01
School	111.06	1	111.06	4.90	.03	.01
Pretest Expression	6319.09	1	6319.09	278.85	.00	.32

Cohort 2							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	13.24	.36	14.75	.33	14.78	.32	300
Control	13.58	.28	14.29	.28	14.51	.39	389

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.26	.55	NS	2%	.05	+2

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	5.76	1	5.76	.23	NS	.00
School	6.65	1	6.65	.26	NS	.00
Pretest Expression	3990.57	1	3990.57	156.82	.00	.24

Cohort 3							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	12.02	.29	13.53	.29	13.57	.37	439
Control	11.86	.34	12.67	.35	12.64	.48	316

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.92	.74	.00	7%	.15	+6

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	53.89	1	53.89	1.55	NS	.00
School	.72	1	.72	.02	NS	.00
Pretest Expression	2713.83	1	2713.83	78.11	.00	.10

High school students' scores on the civic expression skills index improved significantly for the PC group in every cohort. (See Table 19.) The pretest/posttest mean difference was 1.08 for the PC group and .34 for the control group in cohort 1. The PC group mean difference was 1.24 compared to .09 for the control group in cohort 2. The difference of means was not statistically significant for the control group in cohorts 1 and 2. The control group mean difference (1.35) exceeded that of the PC group (1.06) in cohort 3. Both difference scores were statistically significant. The percentage in average civic skills scores from pretest to posttest for the PC students was 7%, 8%, and 8%, compared to 2%, <1%, and 10% for the control group. The improvement index scores were +9, +8, and +7 percentile points for the PC group and +2, +1, and +8 percentile points for the control group.

Table 19
High School Students' Civic Expression Skills by Condition
Difference of Means

	Cohort 1		**Cohort 2**		**Cohort 3**	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	16.32	15.33	15.32	15.33	13.74	13.00
Pretest SD	5.24	5.83	5.45	5.65	5.81	6.20
Posttest $\bar{\chi}$	17.41	15.67	16.57	15.42	14.80	14.36
Posttest SD	4.99	5.99	5.51	5.62	6.12	6.27
$\bar{\chi}$ Difference	1.08	.34	1.24	.09	1.06	1.35
Sign. Difference	.00	NS	.00	NS	.00	.00
Percentage Change	7%	2%	8%	<1%	8%	10%
Effect Size	.24	.05	.21	.02	.17	.20
Improvement Index	+9	+2	+8	+1	+7	+8
Pre/Post Correlation	.61	.44	.43	.47	.48	.44
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	627	285	417	313	497	319

Comparing the adjusted posttest mean scores from the ANCOVA analysis, the PC students' scores on the civic expression skills index were significantly higher than the control groups' scores for cohorts 1 and 2. (See Table 20.) The percentage difference in the groups' scores was 7% in cohort 1 and 11% in cohort 2. The effect size (Hedge's g) in cohort 1 was .25 corresponding to an improvement index of +6 percentile points. In cohort 2, the effect size was

.31 and the improvement index was +12 percentile points. The difference in adjusted posttest means between PC and control group students was nonsignificant in cohort 3.

Table 20
ANCOVA Analysis of High School Students' Civic Expression Skills

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	16.32	.21	17.41	.19	17.24	.17	627
Control	15.33	.34	15.56	.35	16.04	.26	285

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.20	.32	.00	7%	.25	+6

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	279.49	1	279.49	14.03	.00	.02
School	66.08	1	66.08	3.31	.07	.00
Pretest Expression	7656.38	1	7656.38	384.33	.00	.30

Cohort 2							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	15.32	.26	16.57	.26	16.61	.26	417
Control	15.33	.31	15.42	.32	14.87	.56	313

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
1.74	.67	.00	11%	.31	+12

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	163.48	1	163.48	6.68	.01	.01
School	27.77	1	27.77	1.13	NS	.00
Pretest Expression	2922.07	1	2922.07	119.45	.00	.18

Cohort 3							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	13.75	.26	14.80	.27	14.68	.34	497
Control	13.00	.34	14.36	.35	14.55	.47	319

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.12	.71	NS	1%	.02	+1

Source	SS	df	Mean Square	F	Sig.	Partial η^2

PC/Control	.92	1	.92	.03	NS	.00
School	.28	1	.28	.01	NS	.00
Pretest Expression	6662.33	1	6662.33	220.87	.00	.21

Duty to Vote

Middle and high school students generally had a strong sense of duty to vote prior to taking their PC or traditional civics class. However, PC students' sense of duty to vote increased after participating in the program for all three cohorts. For the most part, middle and high school students sense of duty to vote did not change from pretest to posttest.

Students were asked how responsibility they felt to exercise their right to vote in election if they were eligible. The item was coded 1 not much responsibility, 2 a great deal of responsibility, and 3 a top priority. Middle school students' initial scores on this item indicated that they felt a great deal of responsibility to exercise their right to vote. (See Table 21.) The PC students' average scores on this item improved significantly from pretest to posttest across all cohorts. The pretest/posttest difference for the control group was negligible and nonsignificant across the board. The percentage change for the PC group was 10%, 6%, and 10%, respectively. The effect sizes (Hedge's g) were small at .24, .14, and .19. The corresponding improvement index scores were +9, +6, and +8 percentile points.

Table 21
Middle School Students' Duty to Vote by Condition
Difference of Means

	Cohort 1		Cohort 2		Cohort 3	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	1.97	1.98	1.93	1.98	1.73	1.72
Pretest SD	.77	.77	.78	.81	.75	.76
Posttest $\bar{\chi}$	2.17	2.02	2.05	2.02	1.91	1.76
Posttest SD	.77	.77	.81	.78	.78	.72
$\bar{\chi}$ Difference	.19	.04	.12	.04	.18	.04
Sign. Difference	.00	NS	.00	NS	.00	NS
Percentage Change	10%	2%	6%	2%	10%	2%
Effect Size	.24	.04	.14	.04	.19	.04
Improvement Index	+9	+2	+6	+2	+8	+2
Pre/Post Correlation	.44	.41	.39	.39	.25	.19
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	308	348	349	431	502	374

The ANCOVA model found a statistically significant difference in the adjusted mean posttest scores between the middle school PC and control group students in cohort 1. (See Table 22.) The PC group's adjusted mean score was higher than that of the control group. The percentage difference was 7%, the effect size (Hedge's g) was .19, and the improvement index

was +8 percentile points. The adjusted mean differences between the PC and control group scores were small and nonsignificant for cohorts 2 and 3.

Table 22
ANCOVA Analysis of Middle School Students' Duty to Vote

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	1.97	.04	2.17	.04	2.17	.04	308
Control	1.98	.04	2.02	.04	2.02	.04	348

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.15	.05	.01	7%	.19	+8

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	3.51	1	3.51	7.07	.01	.01
School	.199	1	.199	.402	NS	.00
Pretest Duty to Vote	71.56	1	71.56	144.38	.00	.18

Cohort 2							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	1.93	.04	2.05	.04	2.06	.04	349
Control	1.98	.04	2.02	.04	2.01	.05	431

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.05	.07	NS	2%	.06	+2

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	.200	1	.200	.374	NS	.00
School	.046	1	.046	.085	NS	.00
Pretest Duty to Vote	53.33	1	53.33	56.33	.00	.16

Cohort 3							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	1.73	.03	1.91	.03	1.87	.05	502
Control	1.72	.03	1.76	.04	1.83	.05	374

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.04	.03	NS	<1%	.00	.00

Source	SS	df	Mean Square	F	Sig.	Partial η^2

PC/Control	.09	1	.09	.171	NS	.00
School	1.10	1	1.10	2.04	NS	.00
Pretest Duty to Vote	25.24	1	25.24	46.48	.00	.05

On average, high school students in both the PC and control group felt a great deal of responsibility to vote prior to their civics classes. (See Table 23.) The PC groups' mean scores on duty to vote increased slightly from pretest to posttest. The difference of means was statistically significant for cohorts 1 and 3; it approached significance for cohort 2. The control group differences were nonsignificant for cohorts 1 and 2. In cohort 3, the pretest/posttest improvement in mean scores on duty to vote was slightly higher for the control group than the PC group.

Table 23
High School Students' Duty to Vote by Condition
Difference of Means

	Cohort 1		**Cohort 2**		**Cohort 3**	
	PC	**Control**	**PC**	**Control**	**PC**	**Control**
Pretest $\bar{\chi}$	2.27	2.27	2.09	2.11	2.06	1.93
Pretest SD	.76	.77	.80	.74	.77	.79
Posttest $\bar{\chi}$	2.34	2.22	2.15	2.11	2.15	2.04
Posttest SD	.75	.78	.77	.77	.77	.80
$\bar{\chi}$ Difference	.07	-.05	.06	.00	.09	.11
Sign. Difference	.01	NS	.09	NS	.01	.01
Percentage Change	3%	-2%	3%	0%	4%	6%
Effect Size	.09	-.06	.06	.00	.10	.11
Improvement Index	+4	-2	+2	.00	+4	+4
Pre/Post Correlation	.46	.37	.49	.42	.36	.35
Sign. Correlation	.00	.00	.00	.00	.00	.00
n	641	294	441	322	537	343

The ANCOVA analysis shows that the difference in adjusted posttest mean scores on duty to vote was higher for the PC group than the control group. (See Table 24.) The difference of adjusted means was statistically significant for cohort 1, approached significance for cohort 2, and was nonsignificant for cohort 3. While the effect sizes are small, the improvement index scores are +6, +9, and +10 percentile points.

Table 24
ANCOVA Analysis of High School Students' Duty to Vote

Cohort 1							
	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	2.27	.03	2.27	.04	2.34	.03	641
Control	2.34	.03	2.22	.04	2.22	.04	294

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.112	.04	.01	5%	.15	+6

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	3.05	1	3.05	6.48	.01	.01
School	.19	1	.19	.42	NS	.00
Pretest Duty to Vote	99.50	1	99.50	211.20	.00	.19

Cohort 2

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	2.09	.04	2.15	.04	2.14	.03	441
Control	2.11	.04	2.11	.04	1.97	.07	322

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.17	.09	.06	8%	.22	+9

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	1.66	1	1.66	3.56	.06	.01
School	.57	1	.57	1.22	NS	.00
Pretest Duty to Vote	65.64	1	65.64	140.64	.00	.20

Cohort 3

	Pretest		Posttest (Unadjusted)		Posttest (Adjusted)		n
	Mean	SE Mean	Mean	SE Mean	Mean	SE Mean	
PC	2.06	.03	2.15	.03	2.15	.04	537
Control	1.93	.04	2.04	.04	2.02	.06	343

Adj. $\bar{\chi}$ Group Diff.	SE Difference	Sig. Difference	Percentage Difference	Effect Size	Improvement Index
.13	.09	NS	6%	.25	+10

Source	SS	df	Mean Square	F	Sig.	Partial η^2
PC/Control	1.11	1	1.11	2.05	NS	.00
School	.456	1	.456	.457	NS	.00
Pretest Duty to Vote	69.03	1	69.03	69.03	.00	.13

Conclusion

While often an effective approach for imparting civic knowledge, skills, and dispositions, PBL can be challenging to execute under the best of circumstances. The PCRP was implemented during the height of the COVID-19 pandemic. Each cohort of teachers and students faced a shifting set of challenges. The classroom environment—virtual, in-person, or in between—was unsettled. Quarantines and school closures kept teachers and students out of the classroom, as absenteeism rose to astronomical levels. Valuable instructional time was lost. Teachers had to adjust their lesson plans and pedagogical approaches rapidly. Students faced disruptions in their

schooling and mental health challenges that adversely affected their learning. The pandemic has had substantial, persistent negative impacts on students' academic performance and classroom climate that continue to this day (Kuhfeld, et al., 2022).

The PCRP was not immune to these negative circumstances and their effects. Teachers in the PC and control conditions dropped out of the study, indicating that they were having difficulty keeping up with even the basics of day-to-day classroom instruction. Some teachers even left the profession. Instructors struggled to use PBL virtually, especially when students turned off their videos, played on their phones, or got up and walked away from the computer. Managing students doing group work in virtual breakout rooms was a challenge. Presenting the project to stakeholders using a video conferencing platform was difficult for some students, while others were more comfortable expressing themselves in this environment.

The Center adapted the PCRP to meet the pandemic-created conditions that were unanticipated when the program was planned. The teacher PD program took place online in cohort 1 and combined in-person and virtual formats in cohorts 2 and 3. Novel active learning strategies for implementing PC in the virtual classroom were developed and have lasting value. Projects were modified so that they addressed problems that could be tackled and were meaningful in the pandemic environment. Students' projects focused on issues such as the proliferation of pet adoptions, increasing substance abuse among young people, food insecurity and lack of access to resources for those living in poverty, and mental health problems.

The findings of this study offer encouraging evidence that PC was effective in producing positive civic outcomes during the pandemic. PC students' gains in civic knowledge were consistent with the outcomes of prior research. Large improvements in knowledge were observed for both middle and high school students. The knowledge increases were significantly greater for the PC students than the control group students. Conveying civic dispositions and skills through classroom civics is notoriously difficult (Jamieson, 2013; Owen and Irion-Groth, 2022). The modest gains in civic dispositions and skills would be noteworthy even without the complications of the pandemic. The study found that PC students' perceptions of their ability to take part in civic life improved. They gained civic skills connected to SEL, including problem solving and expression skills. Students' civic dispositions were heightened, as they were more inclined to consider voting as a civic duty.

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