Putting PBL to the Test: The Impact of Project-based Learning on Second-grade Students' Social Studies and Literacy Learning and Motivation

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Abstract

This cluster randomized controlled trial investigated the impact of project-based learning (PBL) on the social studies and literacy achievement and motivation of second-grade students from high-poverty, low-performing school districts. Forty-eight teachers were assigned at random in within-school pairs to the experimental or comparison group. Experimental group teachers were asked to teach four PBL units designed to address all state social studies standards and some state literacy standards. Comparison group teachers were asked to teach social studies as they normally would. The experimental group showed statistically significantly higher growth in social studies and informational reading, but not in writing or motivation. Higher fidelity to PBL session plans was associated with statistically significantly higher growth in writing, motivation, and reading.

Keywords:

project-based learning, social studies, informational reading and writing, high-poverty school districts

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Introduction

Project-based learning (PBL) has a long history in American education dating back to the turn of the twentieth century during the Progressive Era (Kliebard, 2004). Progressive educator John Dewey helped popularize, at least in theory, approaches to education that were student-centered, had practical meaning and application, and, in his view, promoted democracy by providing students with more educational opportunities and teaching citizenship skills (Dewey, 1902)—all characteristics associated with PBL. Another progressive educator, sociologist David Snedden, advocated the use of practical projects to engage students in learning by doing in the field of vocational education (Snedden, 1916). Soon thereafter, William Heard Kilpatrick (1918) encouraged the use of projects, such as designing a kite or presenting a play, in which students developed knowledge and skills and engaged in activities that, he argued, prepared them for life. Although educators in the Progressive Era disagreed on essential aspects of a project-based approach, they all viewed projects as a compelling alternative to traditional instructional approaches they considered to be dry, fact-based, and teacher-centered.

Throughout the twentieth and into the twenty-first century, PBL has been a presence in the educational literature, but in practice, educators have rarely adopted PBL. Recently, however, a spike in interest in project-based approaches has occurred (Ellison & Freedberg, 2015; Zubrzycki, 2016). In the past two years, several texts have been published for teachers about implementing PBL in their classrooms, including *Setting the Standard for Project Based Learning* (Larmer, Mergendoller, & Boss, 2015); *Transforming Schools Using Project-Based*

Learning, Performance Assessment, and Common Core Standards (Lenz, Wells, & Kingson, 2015), and *Project-Based Learning Across the Disciplines* (Warren, 2016).

Much of the existing research on PBL shows promise for the approach, yet there has been relatively little research rigorously testing its impact, particularly at the elementary level. Stemming from his review of the literature on PBL through the year 2000, Thomas (2000) called for additional research across grade levels examining the effectiveness of PBL in comparison to other methods in order to determine any "differential benefits of PBL for students of different age groups and what are the variations in design features that must be in place in order to achieve maximum benefit for these age groups" (p. 36). Although numerous studies on PBL have been published in the 15 years since the Thomas' (2000) review, recent reviews (Condliffe, 2015; Holm, 2011; Kokotsaki, Menzies, & Wiggins, 2016) reveal that the majority have taken place in middle- and high-school classrooms and have not been designed in such a way as to draw causal conclusions about the impacts of PBL. There is also a need for greater study of the effects of PBL on underserved student populations, including students living in poverty or dual language learners (Condliffe, 2015; Thomas, 2000). In his recommendations for future research on PBL, Thomas (2000) called for studies to examine possible "benefits of PBL for engaging and fostering the achievement of low-achieving students and for reducing the gap in achievement levels between socioeconomic groups" (p. 37).

Given the growing popularity of PBL, coupled with limitations in the research literature, especially with regard to young learners, we set out to determine the impact of PBL for second graders in low-SES schools by conducting a randomized controlled trial comparing the social studies and literacy (in particular, informational reading and writing) achievement and motivation of students receiving PBL instruction to students receiving business-as-usual social

studies and literacy instruction. We chose to focus on social studies and informational reading and writing because many opportunities exist for natural integration of these domains, early schooling is an opportune time to lay a strong foundation for social studies and informational reading and writing, and these areas are generally neglected in the primary grades (Duke, 2000; Fitchett & Heafner, 2010; Jeong, Gaffney, & Choi, 2010; McGuire, 2007; Pace, 2012; VanFossen, 2005; Vogler, et. al, 2007).

Literature Review

Defining Project-Based Learning

Educational researchers have expressed differing opinions about what PBL consists of or how it should be implemented (e.g., Barron et al., 1998; Krajcik et al., 1998). After sifting through literature on PBL, Thomas (2000) identified five traits that are commonly invoked: that projects are (a) central to the curriculum; (b) focus on questions or problems that drive learning; (c) involve the construction and transformation of students' knowledge; (d) are at least somewhat student-driven; and (e) take the form of authentic or real-world projects.

The Buck Institute (BIE), a non-profit organization developed in 1987 with a mission to improve twenty-first century teaching through disseminating products and professional development in PBL, identified similar but slightly different characteristics of PBL when establishing their "Gold Standard PBL"—what PBL looks like when it is done effectively (Larmer, Mergendoller, & Boss, 2015). The essential design elements of their Gold Standard PBL include: "(1) a challenging problem or question; (2) sustained inquiry; (3) authenticity; (4) student voice and choice; (5) reflection; (6) critique and revision; and (7) a public product" (Larmer et al., 2015, p. 37). In social studies education specifically, Parker and colleagues (2011, 2013) developed PBL curricula for the Advanced Placement U.S. Government and Politics

course according to five key principles: “rigorous projects as the spine of the course, quasi-repetitive project cycles (looping), engagement first, teachers as co-designers, and an eye for scaleability” (Parker et al., 2011, p. 538). The projects included in Parker and colleagues’ PBL curriculum also followed an inquiry-based learning approach; a “master question” unified all the projects and as students progressed through the projects, they revisited and attempted to answer the master question (Parker et al., 2013).

In our conceptualization of PBL, it is imperative that students work toward something (i.e., a project) for an extended period of time that is the primary driver of learning during a unit as well as the culmination of that unit. Throughout the unit, each activity in which students engage is not carried out for its own sake, or because the teacher told them to, but rather to contribute to meeting the project’s goals either directly or by developing knowledge and skills needed to carry out the project. Also essential in our approach to PBL is that the projects students work on have a purpose beyond “doing school”: addressing a real problem, need, or opportunity in the world.

Our previous work with second-grade students involved them in two projects designed to have a purpose, in students’ minds, beyond satisfying school requirements (Halvorsen et al., 2012). In one of the projects, students studied a local business and developed a flier the business could use to inform the public about the business. Then students identified an unmet economic want in their school community and produced and sold a good or service to meet that want in order to raise money for a cause they had identified (e.g., purchasing new equipment for the playground or providing a donation to a local charity). In the students’ minds, the purpose of the project was to help a local business and to raise money for an important cause, while in the teachers’ minds, it was also to teach economics concepts and literacy skills aligned with state

standards. The other project involved students in presenting a proposal to a local government official to improve a park or public space used by members of the community. After engaging in these projects, students in low-SES schools made statistically significant learning gains in social studies and informational reading and writing. Furthermore, students' post-scores were statistically the same as post-scores of students in very high-SES schools who had not experienced our units, suggesting that project-based learning may have promise to narrow the achievement gap (Halvorsen et al., 2012). These two project-based units, as well as two additional project-based units we have developed, are the subject of this paper.

With having a purpose beyond "doing school" often comes connections to the world outside of schools. For example, in the project on improving a park or public space, a visit to the park or public space provided the inspiration for the project and a local city government official who had purview over the park provided an authentic audience for the project. Students may also connect with the world outside of schools by engaging with experts in the community (or beyond), such as business owners in the economics project previously described.

As we have operationalized PBL, we have sought to include opportunities for students to influence and make choices in projects either individually or collectively, for example by determining which aspects of a business to highlight in the flier or which improvement(s) to a park or other public space to propose. We have also sought opportunities for student collaboration during projects, for example in working together to produce the good or service they would sell or by working in with a partner to analyze survey data related to the park or other public space. Within these parameters, our projects had three additional characteristics that have been less emphasized in the PBL literature: they were designed to address specific learning standards, in this case in nearly all state social studies standards and some state informational

reading and writing standards; they included regular opportunities for explicit instruction from teachers, for example of geography concepts and informational text features; and they included instructional practices that have been shown in research to build content knowledge and/or develop literacy skills (e.g., social-studies- and literacy-focused interactive read alouds [Strachan, 2016], explicit instruction in vocabulary [e.g., Beck & McKeown, 2007], and specific strategies for planning writing [Graham, McKeown, Kiuhara, & Harris, 2012]).

In sum, our projects involved addressing, over an extended period of time, a real problem, need, or opportunity in the world that provided the primary driver of learning during the unit as well as the culmination of the unit, with embedded opportunities for students to influence and make choices about the project and to collaborate with one another. Projects were designed to address specific standards, include explicit instruction, and make use of research-supported instructional practices. Additional information about the units is provided in the **Method** section.

Previous Research on Project-Based Learning

[TK]

Research Questions

We address these gaps in the literature through a randomized trial of PBL in second-grade classrooms in high-poverty, low-performing schools with a sample of teachers who have never carried out PBL—perhaps the most challenging context in which PBL has ever been tested. We address the questions:

1. What is the impact of being in classrooms of teachers randomly assigned to an integrated, project-based approach, as compared to business-as-usual instruction, on

the (a) social studies learning, (b) informational reading, (c) informational writing, and (d) motivation of second-grade students in low-SES school settings?

2. Among teachers randomly assigned to implement integrated, project-based units, is greater fidelity of implementation associated with greater student learning and motivation?

Method

Study Design

This study was a cluster randomized experiment in which 48 teachers were assigned randomly to an experimental (N=24) or a comparison (N=24) group within second grade in each school. This design was balanced; that is, the same number of teachers within a given school was assigned randomly to either the treatment or the comparison group. Teachers in the experimental group were provided with an initial professional learning workshop, subsequent follow-up workshops, coaching, and detailed session plans for 80 sessions within four project-based units, one each for economics, geography, history, and civics and government (with the fifth social studies strand in the state standards—public discourse, decision making, and citizen involvement—addressed primarily in the civics and government unit and somewhat in the economics unit). Comparison teachers were asked to teach their regular social studies curriculum (which in no case involved PBL), with a promise to teach 80 lessons over the course of the year. Teachers in both groups were systematically observed. To measure student growth, near the beginning and end of the school year, we administered pre- and post- standards-aligned measures of social studies, reading, and writing, and a Likert-scale motivation survey about social studies instruction, project-based learning, integrated instruction, and literacy instruction.

Participants

Participants were second-grade teachers (N=48) and their students (N = 684; comparison group = 289, experimental group = 395) from 20 elementary schools (18 schools with two participating second-grade classrooms and 2 schools with 4 participating second-grade classrooms) in 11 school districts. Classrooms were drawn from schools in a Midwestern state that met the following criteria: (1) at least 65% of the student population qualified for free or reduced-priced lunch; (2) below state average student performance on state exams in social studies (assessed at grade six in this state), reading (assessed in grade three), and writing (assessed in grade four); and (3) location within an hour's drive of either of the university sites where the principal investigators were located. The free or reduced-priced lunch rates of participating schools ranged from 65% to 100%, with a mean of 80.35%.

All second-grade teachers within qualifying schools were invited to participate; at least two teachers in each school needed to agree to participate in order to be included in the study. Teachers were paired within second grade in each school; one member of each pair was randomly assigned to implement four units of our integrated, PBL approach to teaching social studies and informational reading and writing (the experimental group) whereas the other was asked to teach social studies as he or she normally would during any other school year, with a promise to teach at least 80 lessons (the comparison group). There were no statistically significant differences between experimental teachers and comparison teachers in terms of years of teaching experience nor having received PD in PBL (see Table 1). Even among those reporting having received prior PD in PBL, there was no indication from observations and questionnaires that comparison group teachers actually used a PBL approach to teach social studies, nor, from interviews, that any experimental group teacher did so prior to the study year.

All students within participating classrooms were invited to participate through a parent/guardian consent form. The three whole-class-administered assessments were collected from all students whose parents provided consent. The two individually-administered assessments were given to only a randomly selected subset of students due to time and budget constraints. Sample sizes at post-test for each assessment were as follows: social studies: E = 305, C = 257; reading: E = 307, C = 252; writing: E = 358, C = 270; motivation: E = 343, C = 265. Demographic information for participating teachers and students and students' baseline/pre-assessment scores can be found in Table 1. Baseline equivalence of teacher or student measured covariates using data after attrition took place (i.e., using the analytic sample) is also reported in Table 1. As the independent samples t-tests shows in the last column of Table 1, the experimental and comparison groups were comparable on average in terms of demographic variables and pre-assessments, except for pre-assessments of student motivation; the mean of pre-assessment scores in motivation in the experimental group was significantly lower than that in the comparison group. However, we also checked for baseline equivalence of observed covariates at the teacher level (which is the level of random assignment), and we found no significant differences in pre-assessments, including pre-assessments of motivation, nor in any of the demographic variables across two groups. Thus, we can assume that the randomization of our study was realized as intended. It is noteworthy that there was no attrition at the teacher level. In terms of student attrition rate, the overall attrition rate is 7.89 percent. The differential attrition rate for experimental group is 9.37 percent, and 5.88 percent for comparison group, which indicates that their difference was less than four percentage points. Although the attrition rate for experimental group is higher than that of comparison group, the descriptive analysis and baseline equivalence of covariates from before attrition were very similar to those reported in Table 1.

That is, overall the sample of participating students was similar to the sample of students initially assigned to treatment or comparison conditions. In addition, the overall and the differential attrition at the student level were low and thus, we find no evidence that attrition had any influence on our estimation of the treatment effect.

Experimental Group Condition

The four project-based units used in this study were designed to involve children in PBL as defined earlier in this paper. A design experiment methodology was used for unit development (see Halvorsen et al., 2012 for a description of the methodology used to develop two of the units; a similar approach was subsequently used to develop the other two units). Collectively, units addressed all social studies standards for the state, which were largely aligned with the national C3 Framework (NCSS, 2013). Units also addressed a subset of standards from the Common Core State Standards for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects (CCSS; NGA & CCSSO, 2010), particularly those involving informational reading and writing. However, it was understood that, unlike in social studies, these standards should also be addressed in other parts of the day/outside our units, including in the reading block, writing block, and science instruction.

The four PBL units, taught in the following order, were (1) Producers and Producing in Our Community (economics); (2) Brochure about the Local Community (geography); (3) Postcards about the Community's Past (history); and (4) The Park/Public Space Proposal Project (civics and government). The project for the economics unit involved creating an informational flier about a local business for that business' use and creating and selling their own good or service to raise money for a cause. The geography project involved developing a brochure to persuade people visiting or considering settling in the local community that it has compelling

natural and human characteristics. In the history unit, the project involved students developing postcards about the history of the local community to display or sell in a local institution, such as a library or historical society. The civics and government project involved developing a proposal, conveyed in letters and in a group presentation, to persuade the local city government to make improvements to a local park or other public space. See Appendix A for abstracts of each project.

Each project-based unit was comprised of 20 sessions, and each session was designed to take approximately 45 minutes of instructional time. (We use the term "sessions" rather than "lessons" because only a portion of each session is what might traditionally be considered a "lesson," much of the sessions involved small group and individual work on the projects.) We designed session plans to clearly indicate learning objective(s) and standards addressed, any materials required, key vocabulary terms and definitions critical to the sessions, steps of the session, and additional notes for the teacher (e.g., potential pitfalls to avoid). With few exceptions, each session followed a similar format: (1) whole group instruction and discussion to generate and sustain student interest and excitement about the project as well as to provide explicit instruction (approximately 10 minutes); (2) guided small group or individual instruction in which students have opportunities to work individually, in pairs, or in small groups (approximately 20-30 minutes); and (3) whole class review and reflection, which included clarifying any confusions and reviewing key terms (approximately 10 minutes). For example, a session might involve the teacher reading aloud a text related to the unit project, with instruction in social studies content as well as literacy skills, such as how to use an index. In small groups, students might then use information learned from the text and other materials to complete portions of a graphic organizer that would guide their writing of the unit's final product. Then students might then come back together to share their graphic organizers and listen to the

teacher's review of key content from the beginning of the session. In addition to unit plans, teachers were provided with any texts, artifacts, or other materials, beyond typical school supplies, that were needed to carry out each unit.

Projects aligned with our conceptualization of project-based learning, described earlier in the paper. They occurred over an extended period of time, addressed a real problem, need, or opportunity in the world that provided the primary driver of learning during the unit as well as the culmination of the unit, and included embedded opportunities for students to influence and make choices about the project and to collaborate with one another. In addition, and seemingly less common for project-based learning, the projects were closely aligned to standards, included explicit instruction, and involved research-supported instructional practices.

Although we recognize that PBL is challenging to implement (Thomas, 2000), we were cognizant of the limited amount of support many districts or schools are likely to provide when introducing a new curriculum when a research team and grant is not involved. In an attempt to maintain a high level of ecological validity, we were relatively austere about the amount of outside-the-classroom PD provided with the PBL units: (1) three hours of initial professional development that introduced participants to PBL, to our research initiative, and to the first project-based unit; (2) three recorded webinars ranging between 22 and 40 minutes introducing the next three units; and (3) added for a subset of the classrooms, a brief five-minute video of several experimental teachers discussing strategies for addressing some common challenges with units. However, we did provide considerable in-classroom support in the form of on average, eleven visits from research assistants (RAs) who provided coaching for unit implementation (in addition to conducting observations, described later in the methods section), with additional communications, as necessary, by phone and/or e-mail. We believed that coaching support had a

high degree of ecological validity given the prevalence of instructional coaches in high-poverty school districts. Coaches were instructed to restrict their interaction with teachers to implementation of what was in the unit or session plans, rather than larger issues of instruction or classroom management that may impact PBL implementation.

Teachers signed a letter of consent in which they committed to teaching 80 social studies lessons over the course of the year, but the mean number of lessons/sessions taught by experimental group teachers was 66, with a standard deviation of .46 and a range of 48 to 86. In general, teachers who did not teach a full 80 lessons/sessions did not teach the civics and government unit (n = 6), taught an abbreviated version of the civics and government unit (n = 13), or taught an abbreviated version of the history unit (n = 13), but did teach up to four review sessions we provided. Our Discussion section addresses the causes and effects of this reduced amount of social studies education.

Comparison Group Condition

Teachers in the comparison group were asked to teach social studies as they normally would during any other school year. Of the 24 total teachers in the comparison group, 15 teachers taught social studies using a curriculum developed through two state education organizations by educators from school districts and subject area consultants and aligned to the state social studies standards. Typical units in this curriculum were comprised of several open-ended questions to guide inquiry during the course of study, key vocabulary concepts, and a series of 1-9 lesson plans. Common activities included read-alouds of children's literature, writing anchor charts, class discussion, small group activities, analyzing maps or timelines, video clips, vocabulary work, worksheets, and assessments. None of the units was project-based. Two teachers using these units supplemented them with magazines (*Social Studies Weekly; Scholastic*

News); two teachers added in an extended teacher-created unit at one point in the year; and two other teachers improvised all text-based lessons because they were not provided the texts called for in the unit plans.

Seven of the remaining nine teachers not using the curriculum described in the previous paragraph utilized district-created lessons or social studies textbooks as the primary mode of instruction, including TCI (*Social Studies Alive!)*, MacMillan/McGraw Hill, and Scott Foresman. The social studies textbooks were not specifically aligned with this state's standards, but there appeared to be considerable overlap with state expectations. Lessons consisted of discussing content vocabulary, reading the textbook, watching video, completing worksheets or written assignments, whole-class discussion, and small group work. The remaining two comparison teachers taught self-designed lessons; these teachers were not provided with any social studies curriculum or materials by their schools. Much like the lessons designed by the two state organizations, teacher-created lessons typically consisted of vocabulary instruction, whole-class discussion, read-alouds, independent reading, graphic organizers and visual aids, group work, and written activities.

Teachers signed a letter of consent in which they committed to teaching 80 social studies lessons over the course of the year, but the mean number of lessons taught by comparison group teachers was 51, with a standard deviation of .96 and a range of 30 to 85. This is statistically significantly fewer lessons than taught by the experimental group teachers (mean = 66 lessons, $t = -15.2166$, $p < .001$). However, as explained in the Discussion section, it does not appear that the 15-lesson difference in mean number of lessons taught is sufficient to explain the advantage of the experimental and comparison group in study results.

Data Sources

Our four outcome measures were: (1) a standards-aligned social studies assessment administered one-on-one; (2) a standards-aligned informational reading assessment administered one-on-one; (3) a writing assessment comprised of a group-administered paper and pencil persuasive writing assessment and a group-administered informative/explanatory writing assessment; and (4) a group-administered paper and pencil motivation assessment. Students were assessed near the beginning and end of the school year. Items from all assessments were piloted and refined before administration.

Social studies assessment. The social studies assessment was aligned with state content expectations and the C3 Framework (NCSS, 2013). Eleven items with multiple subparts measured student achievement in economics; geography; history; civics and government; and public discourse, decision making, and citizen involvement. Some questions were open-ended, such as: "What services does the local government provide?" and "Why do we use timelines?" Others were more close-ended, such as showing a map with a key and asking "Tell me which direction you would go to get from the child's house to the park?" and a question that requires children to sort pictures of items involved in the production of pizza into the categories of natural, human, and capital resources. Each item corresponded to all or part of a state standard for social studies for second grade. Without knowledge of whether a given assessment came from a child in the experimental or comparison classrooms (i.e., blind to condition), research team members scored the responses of the 11 questions on scale of 0 to 3, with a score of 3 indicating fully meeting the standard, for a total possible score of 30 (two questions measured the same standard and were thus averaged for one score for the standard). Students' raw scores were transformed to a percentage format; the raw scores were divided by total possible scores of each assessment.

The 10 social studies items had an acceptable internal consistency (α=0.72). As further evidence of assessment validity, five reviewers with expertise in social studies were asked to identify the question(s) that best aligned with each content expectation and had 96% agreement with our determination of the alignment of standards and assessment questions. Project members established a high inter-rater reliability at Fleiss' Kappa = 0.883 for scoring the assessment.

Informational reading assessment. This assessment was comprised of a total of 31 items that measured student achievement of six of the ten second-grade Common Core State Standards for Reading Informational Text (standards 4 through 9). Sample questions included: "What are reasons the author gives to support her point?" (Common Core State Standard for Reading Informational Text # 8, second grade) and "What is the writing under a picture called?" (Common Core State Standard for Reading Informational Text #5, second grade). The research team scored questions blind to condition on a scale of 0 to 3 with a score of 3 fully meeting the CCSS expectations for that standard. This provided a total possible score of 87 (it was not 93 because one trio of questions all dealt with one text feature and therefore were scored all together on the 0 to 3 scale).

Items had high internal consistency (α=0.86). Five experts in the field of early literacy reviewed the assessment and were asked to identify which Common Core State Standard in Reading Informational Texts corresponded with each assessment item. There was 95.5% agreement between these experts' reviews and our own identification of which CCSS best addressed each assessment item. Research team members established a high inter-rater reliability of Fleiss' Kappa = 0.87 when scoring this assessment.

Informational writing assessment. This assessment measured student achievement of writing for two distinct purposes detailed in the CCSS: to opine or persuade (writing standard 1) and to inform or explain (writing standard 2).

Persuasive writing. This prompt asked students to write independently for 30 minutes about "something you think people should change and why." Students were given a purpose and audience for the writing: "My friends and I will read what you write to get ideas about things we should try to change" and were provided with a list of potential areas of change. Student responses were scored blind to condition using a rubric aligned to the expectations included in CCSS writing standard 1 for second grade as follows: introduction (on a scale of 0 to 2), opinion (0 to 2), reasons (0 to 3), linking words (0 to 1), concluding statement (0 to 2), for a total possible score of 10.

Informative/explanatory writing. This prompt asked students to write an article for up to 30 minutes about a community job (e.g., firefighter) for a class magazine. This topic was chosen because it was not addressed in the project-based units so would not inappropriately advantage students in the experimental group and because students would likely to be able to draw on considerable background knowledge/information in responding (thus it would serve as a test of informational writing skill, not knowledge/information). Students were provided with a list of potential jobs. Student responses were scored blind to condition using a rubric aligned to the expectations included in CCSS writing standard 2 for second grade as follows: introduction (on a scale of 0 to 2), information (0 to 3), definition (0 to 1), concluding statement (0 to 2), for a total possible score of 8.

An overall informational writing achievement score was created by combining scores for responses to the persuasive and informative/explanatory prompts for a total score of 18. An inter-

rater reliability of Fleiss' Kappa = 0.73, which is considered high, was established by project members for scoring of this assessment.

Motivation assessment. The motivation assessment was modeled after validated motivation assessments (e.g., McKenna & Kear, 1990) and measured student motivation to engage in and participate in (a) social studies learning, (b) literacy learning, and (c) integrated social studies and literacy learning (there were also items on PBL, but those were not included in analyses given that students in the comparison group did not participate in PBL). Children were read 24 statements such as, "When I use maps to learn new things, I feel…" and "When our class learns about social studies and reading at the same time, I feel . . ." After each statement, they were asked to circle one of four images of a character, each in different emotional states ranging from "very happy" to "very upset." Responses were scored on a scale of 1 (very happy) to 4 (very upset) for a total score of 96. Cronbach's alpha reliability for the assessment is 0.88, which is high.

Observations. RAs completed observation forms during their visits to classrooms, which included an average of 11.208 visits to experimental classrooms and 5.42 visits to comparison classrooms. The forms entail running notes on the sessions completed during the observations. The forms for the experimental teachers also included ratings completed by observers at the end of each visit to the classroom about the degree to which the teacher followed each of the major parts of the session plan (whole group instruction and discussion, guided small group or individual instruction, and whole group review and reflection) on a scale of 1 to 3, for which 1 = follows fewer than 50% of the steps in the session plan for that section of the session, 2 = follows 50% - 80% of the steps, and 3 = follows 80% or more of the steps for that section of the

session. Variables stemming from the teacher observations achieved an interrater reliability in mean Fleiss' Kappa of .66, which indicates substantial agreement.

Other data. Other data collected include students' demographic/background information (minority status, gender, and parent education level), teacher background characteristics (years of teaching experience and whether they received professional development in PBL), classroom rate of consent, and interviews with experimental group teachers (with the interviews not included in this paper except with respect to teachers' responses regarding their experience with PBL prior to the data collection year and number of sessions taught).

Data Analysis

Descriptive statistics. We used descriptive statistics to examine student achievement and motivation in the experimental and comparison groups and inferential statistics (t-tests) to determine any significant differences in raw scores on pre-assessments of student achievement and motivation between students in the experimental and comparison groups. We also generated descriptive statistics regarding fidelity of implementation in the experimental group.

Hierarchical linear modeling. To take into account the nested relationships in the study (i.e., students nested within teachers), we used hierarchical linear models (HLM) (Bryk & Raudenbush, 1992). Using a two-level hierarchical linear model (level 1: student and level 2: teacher), we explored the effects of the intervention (controlling for female status, minority status, parent education, and pre-assessment) on social studies achievement, informational reading, informational writing, and motivation and, for the experimental teachers, the relationship between fidelity of implementation and social studies achievement, informational reading, informational writing, and motivation. The two-level model matches the research design and is appropriate for the data. This analytic strategy and the detailed data we collected about

instruction in the experimental classrooms meant that analyses could examine not only the impact of the project-based units by condition but also whether certain instructional factors were associated with greater or lesser learning (e.g., do children show greater gains in social studies achievement in classrooms in which the teacher implements project sessions with a higher degree of fidelity?).

First, we examined the treatment on treated effects of the intervention (i.e., using the analytic sample of students). The first-level model for student i in teacher j is

$$Y_{ij}=\beta_{0j} + \beta_{1j}(\text{FEMALE})_{ij} + \beta_{2j}(\text{MINORITY})_{ij} + \beta_{3j}(\text{PARENT EDU})_{ij} + \beta_{4j}(\text{PRE\_Y})_{ij} + \varepsilon_{ij}$$

where Y_{ij} represents four outcomes of interest (i.e., social studies learning, informational reading, informational writing, and motivation) for student i in teacher j. FEMALE_{ij} is a dummy variable for gender, and MINORITY_{ij} is a dummy variable for minority status. PARENT EDU_{ij} is equal to 1 if a student's mother and father both have higher than a high school diploma. PRE_Y_{ij} is the pre-assessments of the outcome. A student-specific residual is ε_{ij}. At the second-level the teacher specific intercepts are modeled as

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{EXPERIMENTAL})_j + u_{0j}$$

in which γ_{00} is the average outcome of students in the comparison group and u_{0j} is a teacher-specific random effect. The variance of u captures the nesting of students within teachers. EXPERIMENTAL is a dummy variable equal to 1 if a student was in the experimental group. The coefficient γ_{01} represents the average difference in the outcome between treatment and comparison groups (adjusted for covariates).

Second, we examined the impact of fidelity of implementation on the outcomes. As explained earlier, each session observed was rated on a scale of 1 to 3 for each of the three major session components, for a total score of 9 for a session that was closely aligned to the session

plan provided and a total score of 3 for a session that was not well aligned to the session plan provided for any of the three major session components. The model used for the analysis was the same as the previous one shown in the previous section except that a) we dropped the EXPERIMENTAL variable, (b) only included experimental group students for the analysis, and c) added the FIDELITY variable at teacher level (i.e., the second level).

Results

Our report of results is organized into two major sections. The first addresses the first question: What is the impact of being randomly assigned to an integrated, project-based approach, as compared to business-as-usual instruction, on the (a) social studies learning, (b) informational reading, (c) informational writing, and (d) motivation of second-grade students in low-SES school settings? The second major section addresses the second research question: Among teachers randomly assigned to implement integrated, project-based units, is greater fidelity of implementation associated with greater student learning and motivation?

Comparing Achievement

Social studies. Controlling for female status, minority status, parent education, and pre-assessment, the experimental group scored statistically significantly higher than the comparison group on the social studies measure (Effect Size [ES] = 0. 482, $p < .001$ [two-tailed here and throughout]). That is, the mean difference between treatment and comparison groups in social studies is 0.482 standard deviations even after controlling for their baseline scores. See Table 2.

Informational reading. Controlling for female status, minority status, parent education, and pre-assessment, the experimental group scored statistically significantly higher than the comparison group on the informational reading measure (ES = 0.181, $p = 0.085$). That is, the

mean difference between treatment and comparison groups in informational reading is 0.181 standard deviations even after controlling for their baseline scores.

Informational writing. Controlling for female status, minority status, parent education, and pre-assessment, the experimental group did not score statistically significantly higher than the comparison group on the writing measure (ES = -0.045, $p = 0.594$).

Motivation. Controlling for female status, minority status, parent education, and the pre-assessment, the experimental group declined less than the comparison group at a non-statistically significant level (ES = 0.135, $p = 0.198$).

Relationship to Fidelity of Implementation

Descriptive statistics for teachers' fidelity of implementation are provided in Table 3. Higher ratings of the degree to which the teacher followed each of the major parts of the session plan were associated with higher scores on all measures (see Table 2), with the follow effect sizes and p-values: social studies (ES = 0.251, $p = 0.309$), reading (0.562, $p = 0.029$), writing (ES = 0.242, $p = 0.080$), and motivation (ES = 0.287, $p = .015$).

Discussion

Project-based learning has a long history and appears to be experiencing a surge of popularity. Although PBL has been the subject of considerable research, and consistently appears to be a promising educational approach, few studies have tested the impact of PBL with a randomized controlled trial research design, particularly in the early grades of schooling. This study was designed to help fill this gap with a carefully designed version of four PBL units that address nearly all state second-grade standards for social studies and some second-grade standards for informational reading and writing.

Our test of PBL was designed to be stringent not only with respect to research methodology but also with respect to the circumstances in which PBL was enacted. The study was carried out in schools with a high proportion of children of poverty and a history of low student achievement in social studies, reading and writing. Although an instructional approach of this complexity most likely benefits from experience (e.g., Condliffe, 2015; Kokotsaki, Menzies, & Wiggins, 2016; Mergendoller & Thomas, 2000), no teachers participating in the study had previous experience implementing project-based learning and data was collected in their first year of PBL implementation. Teachers were provided with a limited amount of initial professional development (3 hours), and minimal subsequent webinar-based PD (~ 100 minutes total). Teachers were visited an average of eleven times by coaches, but coaches were also engaged in collecting observation data during visits and were instructed to restrict their interaction with teachers to implementation of what was in the session-by-session unit plans, rather than larger issues of instruction or classroom management that may impact PBL implementation or their teaching more generally. That said, the unit or session plans themselves do provide a degree of support that is not found in all PBL enactments, perhaps serving as a form of professional development in their own right (e.g., Davis & Krajcik, 2005).

Even in these challenging circumstances, PBL proved to have a positive impact on social studies (ES = 0.482) and informational reading (ES = 0.181). Given that all four units center on social studies, an effect in that domain was most expected and is most promising. Indeed, the effect size in this domain is nearly twice what the Institute of Education Sciences What Works Clearinghouse considers to be "substantively important" (2014, p. 23).

In contrast to social studies, informational reading and writing were addressed in fewer sessions and one would not expect them to be addressed only in the social studies portion of the

day. Still, the fact that writing was not impacted even to a small degree by the PBL units was surprising given that each unit involved writing, that other research indicates that students grow more when writing for authentic purposes (Purcell-Gates, Duke, & Martineau, 2007), as in these units, and that other research indicates that children write better for an audience beyond the teacher (Block, 2013), as in these units. It is possible that the amount of writing included in the units simply was not sufficient for effects. The Institute of Education Sciences What Works Clearinghouse Practice Guide for *Teaching Elementary Students to be Effective Writers* (Graham, Bollinger, et al., 2012) calls for 60 minutes per day of writing education, whereas writing comprised only a portion of the 45-minute sessions in our units, and was involved in only a subset of the twenty sessions within each unit. Students' scores in writing in both groups indicated that they were a long way from attaining their grade level's CCSS for Writing Standards 1 and 2. Perhaps a much greater amount of time and support is necessary within project-based units to affect writing, at least in contexts like those involved this study. Of course, it is also possible that PBL simply is not an efficacious context for developing writing, although the fidelity findings, discussed later in this section, draw that interpretation into question.

Motivation of students in the PBL classrooms appeared to decline less than in comparison classrooms (ES = 0.135), but not at a level of statistical significance. This result may also be seen as surprising in light of claims and some prior evidence about the positive motivational benefits of PBL. Further research should investigate under what circumstances PBL does and not show measurable motivational benefits in rigorous research designs.

Overall, causal inferences are warranted in this study because of the quality with which the experiment was conducted. There was no attrition at the cluster level and attrition at the student level was low. Our post-hoc tests for baseline equivalence of observed covariates using

the analytic sample suggested that random assignment was successful by and large and in agreement with the intention of the research design. In addition, attrition was not a threat to the internal validity of the results because its rate was low and because the students, teachers and schools that eventually participated in the experiment in either the treatment or the comparison groups were very similar to those who initially participated in the random assignment process. Nonetheless one potential threat to the internal validity in this study was the fact that the comparison teachers taught, on average, 15 fewer lessons/sessions than experimental group teachers—a statistically significant difference. However, it does not appear that this could explain the results of the study. The relationship between the number of lessons/sessions taught and social studies growth was 0.0112 and the relationship for reading was 0.0077. In contrast, the effect sizes for achievement in each of these areas were 0.482 and 0.181 respectively.

The fidelity results for the study were quite consistent. For every variable, greater adherence to the project-based unit session plans was associated with higher year-end achievement, controlling for pre-assessments and other factors, in three of the four cases at a level of statistical significance. Future research might examine factors that lead teachers to greater or lesser adherence to sessions plans or, more broadly, factors that characterize the practice of teachers whose students experience higher and lower growth within a project-based approach.

Limitations

[TK]

References

Barron, B. J. S., Schwartz, D. L., Vye, N. J., Moore, A., Petrosino, A., Zech, L., & Bransford, J. D. (1998). Doing with understanding: Lessons from research on problem- and project-based learning. *The Journal of the Learning Sciences, 7*(3-4), 271-311.

Beck, I. L., & McKeown, M. G. (2007). Increasing young low-income children's oral vocabulary repertoires through rich and focused instruction. *The Elementary School Journal, 107*, 251-271.

Block, M. K. (2013). *The impact of identifying a specific purpose and external audience for writing on second graders' writing quality* (Unpublished doctoral dissertation). Michigan State University, East Lansing, MI.

Bryk, A., & Raudenbush, S. W. (1992). *Hierarchical linear models for social and behavioral research: Applications and data analysis methods*. Newbury Park, CA: Sage.

Condliffe, B. (2015). *Project-based learning: A literature review*. Unpublished manuscript, George Lucas Educational Foundation, San Rafael, CA. Available from https://s3-us-west-1.amazonaws.com/ler/MDRC+PBL+Literature+Review.pdf

Davis, E. A., & Krajcik, J. S. (2005). Designing educative curriculum materials to promote teacher learning. *Educational Researcher, 34*(3), 3-14.

Dewey, J. (1902). *The child and curriculum*. Chicago, IL: The University of Chicago Press.

Duke, N. K. (2000). 3.6 minutes per day: The scarcity of informational texts in first grade. *Reading Research Quarterly, 35,* 202-224.

Ellison, K., & Freedberg, L. (2015). Project-based learning on the rise under the Common Core. *EdSource*. Retrieved from https://edsource.org/2015/project-based-learning-on-the-rise-under-the-common-core/78851

Fitchett, P. G., & Heafner, T. L. (2010). A national perspective on the effects of high-stakes testing and standardization on elementary social studies marginalization. *Theory and Research in Social Education, 38*(1), 114-130.

Graham, S., Bollinger, A., Booth Olson, C., D'Aoust, C., MacArthur, C., McCutchen, D., & Olinghouse, N. (2012). *Teaching elementary school students to be effective writers: A practice guide* (NCEE 2012- 4058). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/ wwc/publications_reviews.aspx - pubsearch.

Graham, S., McKeown, D., Kiuhara, S., & Harris, K. R. (2012). A meta-analysis of writing instruction for students in the elementary grades. *Journal of Educational Psychology, 104*, 879–896.

Halvorsen, A., Duke, N. K., Brugar, K. A., Block, M. K., Strachan, S. L., Berka, M. B., & Brown, J. M. (2012). Narrowing the achievement gap in second-grade social studies and content area literacy: The promise of a project-based approach. *Theory and Research in Social Education, 40*, 198-229.

Holm, M. (2011). Project-based instruction: A review of the literature on effectiveness in prekindergarten through 12th grade classrooms. *River Academic Journal, 7*(2), 1-13.

Jeong, J., Gaffney, J. S., & Choi, J.-O. (2010). Availability and use of informational texts in second-, third-, and fourth-grade classrooms. *Research in the Teaching of English, 44*, 435-456.

Kilpatrick, W. H. (1918). The project method. *Teachers College Record*, *19*, 319–334.

Kliebard, H. (2004). *The struggle for the American curriculum 1893–1958* (3rd ed.). New York: Routledge.

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools, 19*(3) 267-277.

Krajcik, J. S., Blumenfeld, P., Marx, R. W., Bass, K. M., Fredricks, J., & Soloway, E. (1998). Middle school students' initial attempts at inquiry in project-based science classrooms. *Journal of the Learning Sciences, 7*(3&4), 313-350.

Larmer, J. Mergendoller, J., & Boss, S. (2015). *Setting the standard for project based learning: A proven approach to rigorous classroom instruction.* Alexandria, VA: ASCD.

Lenz, B., Wells, J., & Kingston, S. (2015). *Transforming schools using project-based learning, performance assessment, and Common Core Standards.* San Francisco, CA: Jossey-Bass.

McGuire, M. E. (2007). What happened to social studies? The disappearing curriculum. *Phi Delta Kappan, 88*, 620-624.

McKenna, M. C., & Kear, D. J. (1990). Measuring attitude toward reading: A new tool for teachers. *The Reading Teacher, 43*, 626-639.

Mergendoller, J., & Thomas, J. W. (2005). Managing project-based learning: Principles from the field. Retrieved March 14, 2016, from http://bie.org/images/uploads/general/f6d0b4a5d9e37c0e0317acb7942d27b0.pdf

National Council for the Social Studies (2013). *The college, career, and civic life (C3) framework for social studies state standards: Guidance for enhancing the rigor of K-12 civics, economics, geography, and history*. Silver Spring, MD: Author.

National Governors Association Center for Best Practices [NGA], & Council of Chief State School Officers [CCSSO]. (2010). *Common core state standards for English language*

arts & literacy in history/social studies, science, and technical subjects. Washington DC: National Governors Association for Best Practices, Council of Chief State School Officers.

Pace, J. L. (2012). Teaching literacy through social studies under No Child Left Behind. *The Journal of Social Studies Research, 36*(4), 329-358.

Parker, W., Mosborg, S., Bransford, J., Vye, N., Wilkerson, J., & Abbott, R. (2011). Rethinking advanced high school coursework: Tackling the depth/breadth tension in the AP US Government and Politics course. *Journal of Curriculum Studies, 43*, 533–559.

Parker, W., Lo, J., Yeo, A.J., Valencia, S. W., Nguyen, D., Abbott, R. D. . . . Vye, N.J. (2013). Beyond breadth-speed test: Toward deeper knowing and engagement in an Advanced Placement course. *American Educational Research Journal, 50*(6), 1424-1459.

Purcell-Gates, V., Duke, N. K., & Martineau, J. A. (2007). Learning to read and write genre-specific text: Roles of authentic experience and explicit teaching. *Reading Research Quarterly, 42*(1), 8-45.

Snedden, D. (1916). The "project" as a teaching unit. *School and Society, 4*, 419-423.

Strachan, S.L. (2015). Kindergarten students' social studies and content literacy learning from interactive read-alouds. *Journal of Social Studies Research, 39*(4), 207-223.

Thomas, J. W. (2000). *A review of research on project-based learning.* San Rafael, CA: The Autodesk Foundation. Available from: http://www.bobpearlman.org/BestPractices/PBL_Research.pdf

VanFossen, P. J. (2005). "Reading and math take so much time…": An overview of social studies instruction in Indiana. *Theory and Research in Social Education, 33*(3), 376-403.

Vogler, K. E., Lintner, T., Lipscomb, G. B., Knopf, H., Heafner, T. L., & Rock, T. C. (2007). Getting off the back burner: Impact of testing elementary social studies as part of a state-mandated accountability program. *Journal of Social Studies Research, 31*(2), 20–34.

Warren, A. M. (2016). *Project-Based Learning Across the Disciplines.* London: SAGE.

What Works Clearinghouse. (2014). *What Works Clearinghouse Procedures and Standards Handbook Version 3.0.* Washington, DC: Author. Retrieved from https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_procedures_v3_0_standards_handbook.pdf

Zubrzycki, J. (2016). As project-based learning gains in popularity, experts offer caution. *Education Week*. Retrieved from http://blogs.edweek.org/edweek/curriculum/2016/07/as_project-based_learning_gain.html

Table 1

Demographic information about teachers and students and raw pre- measure results

	Mean		Standard Deviation		Minimum		Maximum		T-test
Teacher characteristics	Exp	Comp	E	C	E	C	E	C	
Years of teaching experience	16.67	17.29	2.01	1.74	4	5	50	38	0.24
PD in PBL	0.13	0.29	0.07	0.09	0	0	1	1	1.42
Student characteristics									
Parents' education	0.466	0.496	0.500	0.501	0	0	1	1	0.742
Female	0.5	0.526	0.501	0.500	0	0	1	1	0.639
Minority	0.55	0.598	0.498	0.491	0	0	1	1	1.157
Primary Language Other Than English	0.062	0.082	0.242	0.275	0	0	1	1	0.94
Student Pre-assessments									
Social Studies	0.25	0.252	0.122	0.114	0	0.028	0.667	0.6	0.159
Informational reading	0.263	0.27	0.14	0.131	0	0	0.742	0.656	0.586
Informational writing	0.202	0.195	0.145	0.134	0	0	0.6	0.563	-0.569
Motivation	0.785	0.805	0.114	0.116	0.333	0.333	1	1	2.083*

Note: Parents' education, female, minority, and PD in PBL are dummy variables. Parents' education is equal to 1 if a student's mother and father both have higher than high school diploma. Female is equal to 1 if a student is female and 0 if a student is male. Minority is equal to 1 if a student is from a racial group underrepresented in U.S. higher education (not White or Asian) and 0 otherwise. Pre-and post-measures are expressed as percentage scores that each student achieved compared to the highest possible scores. All tests are two-tailed.
† $p < .10$ *$p < .05$ **$p < .01$ ***$p < 0.001$

Table 2

Intervention effects and the relationship between fidelity and children's achievement

	Coefficient	SE	P-value	Effect Size	Observations
Effects of intervention					48 teachers 20 schools
Social Studies	0.078	0.018	<0.001***	0.482	522
Informational Reading	0.031	0.018	0.085†	0.181	521
Informational Writing	-0.007	0.014	0.594	-0.045	580
Motivation	0.017	0.013	0.198	0.135	542
Relationship of fidelity					24 teachers 20 schools
Social Studies	0.043	0.042	0.309	0.251	290
Informational Reading	0.098	0.045	0.029*	0.562	291
Informational Writing	0.041	0.023	0.080†	0.242	333
Motivation	0.037	0.015	0.015*	0.287	308

†$p < .10$ *$p < .05$ **$p < .01$ ***$p < .001$ (All tests are two-tailed.)

Table 3

Experimental Group Teachers' Fidelity of Implementation, as Scored by Observers, for the Three Parts of the Lesson

Teacher ID	Whole Group Instruction and Discussion		Guided Small Group or Individual Instruction		Whole Group Review and Reflection	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
2	2.64	(.497)	2.79	(.426)	2	(.877)
3	2.5	(.707)	2.7	(.675)	1.9	(.876)
4	1.44	(.500)	1.67	(.866)	1.22	(.667)
6	2.5	(.798)	2.58	(.798)	1.33	(.779)
7	2.9	(.316)	2.6	(.699)	2.4	(.699)
11	2.92	(.277	2.69	(.630)	2.46	(.877)
12	2.85	(.376)	2.69	(.630)	2.54	(.776)
13	2.09	(.700)	1.91	(.302)	1.36	(.505)
19	2.89	(.333)	2.89	(.333)	2.11	(1.054)
24	3	(0)	2.92	(.289)	2.67	(.492)
25	3	(0)	2.9	(.316)	2.8	(.422)
28	2.57	(.513)	2.43	(.646)	2.57	(.756)
31	2.69	(.630)	2.31	(.855)	1.69	(.751)
34	2.5	(.675)	2.6	(.699)	2	(.738)
40	2.3	(.483)	2	(.471)	1.6	(.516)
41	2.83	(0)	2.83	(.816)	2.5	(.837)
42	3	(0)	2.86	(.378)	2	(.816)
43	2.22	(.441)	2.39	(.527)	1.44	(.726)
44	3	(0)	2.92	(.289)	2.58	(.669)
45	2.38	(.806)	2.63	(.619)	2.33	(.816)
48	3	(0)	2.92	(.289)	2.83	(.389)
49	2.31	(.751)	2.54	(.519)	1.54	(.660)
52	2.77	(.439)	2.69	(.480)	2.08	(.862)
53	2.73	(.647)	2.55	(.688)	2.00	(.894)
TOTAL	**2.63**	**(0.401)**	**2.58**	**(0.552)**	**2.08**	**(0.727)**

Note. 1=follows fewer than 50% of the steps in the session plan for that section of the session, 2 = follows 50% - 80% of the steps, 3 = follows 80% or more of the steps for that section of the session. Mean Fleiss' Kappa for interrater reliability of .66, which indicates substantial agreement.

Appendix A

Producers and Producing in Our Community (Economics): This 20-session interdisciplinary project involves students in determining an unmet economic want in their school community and producing and distributing a good or service to meet that want, with profits going to a cause identified by the students. The project teaches students economic concepts (e.g., *business, producer, consumer, goods, services, natural, human, and capital resources, scarcity, trade, profit, loss, opportunity cost*, *wants*, and *specialization*) and content literacy skills. With the ultimate goal of selling their own good or service, students begin by studying some key economics concepts and the goods or services a local business produces or provides, the resources needed to produce those goods or provide those services, the means of distributing those goods or services, and the market for those goods or services. Students then take a field trip (or a virtual field trip) to a local business during which they learn first-hand about how the business identified an unmet economic want and how the business engages in production and distribution. Students write an informational flier about the business for the business to distribute to customers. Students then draw upon what they learned studying the local business to develop their own good or service to sell. Students write advertisements for their good or service, as well as procedural or how-to text about how to make the good or provide the service. Through the unit's writing experiences, students develop their knowledge of persuasive (the advertisements) and informative/explanatory text (the flier and the procedural or how-to text). Along the way, they are also engaged in reading a number of informational texts.

Brochure about the Local Community (Geography): In this 20-session interdisciplinary project, each student creates his or her own brochure that includes a map of several student-selected human and natural characteristics of the local community. The target audience for the brochure is people who are visiting or considering moving to the community. To reach that audience, brochures are given to a person or group that interacts with people considering visiting or moving to a community (e.g., the community's visitors bureau, real estate agents, representatives from local chamber of commerce). Through the study of their community, students learn about the geographical concepts of human and natural characteristics, the ways humans both positively and negatively affect the natural environment, cultural diversity, movement (of people, goods, and ideas), and urban/suburban/rural environments. They also learn about land use: different purposes for land (e.g., residences, farming, industry, commercial). Students reinforce their understanding of these geographical concepts by examining similarities and differences between their community and another community. During the course of the project, as students create a detailed map of their community, they also develop skills in map construction and map reading (understanding and applying the following map features: key/legend, direction, distance, relative location, and scale). Students study state maps to locate their community and learn that it is part of a larger series of communities (e.g., county and state). Through developing the brochure, students develop their skill in reading informative/explanatory text and their skill in writing persuasive text.

Postcards about the Community's Past (History): In this 20-session interdisciplinary project, each student creates a set of historical postcards about the local community that could be sold, displayed in the community (e.g., at a local historical museum), or given to community members. On one side of each postcard is an image of community life in the past and on the other side is a

short informative/explanatory text written by the student that includes an introduction, facts and definitions about the topic, and a conclusion. In the course of the project, students learn historical content (the history of their local community) and historical thinking skills (chronological thinking and primary source interpretation) by studying the following aspects of life in the history of their community: schooling, transportation, and other noteworthy aspects of the community. Students read a variety of informational texts during the unit, including informative/explanatory texts, procedural texts, and biographies. As they learn about different aspects of community life, and how they have changed over time, students learn how to "do the work" of historians: how to create and interpret a timeline and how historians make sense of the past through the examination and analysis of sources (such as objects from the past, photographs, and interviews with older family members or friends). Students also learn how individuals work to address problems in their community and about ways individuals make significant and lasting contributions. In addition, students develop an understanding of point of view/perspective, and how point of view/perspective influences the ways in which people interpret events.

The Park/Public Space Proposal Project (Civics and Government): This 20-session interdisciplinary project involves students in writing a proposal to improve a local park or public space in ways that enhance its value and use for community members. Students create and deliver a persuasive multimedia presentation for a local governmental official (e.g., a city council member or a representative from the city parks and recreation department). They also write their own letters for the government official to distribute to other government personnel. The presentation and letter use information obtained from a survey that is created by the students to assess what members of the local community think about a local park or public space and how it should be improved. During the unit, students learn about the purposes of government and about the responsibilities of both citizens and the local government. They also learn what a public issue is and why people can have different opinions about an issue. They read informational texts about civic leaders, responsibilities of the local government, and effective communication skills. Students develop their writing skills and their public speaking skills and expand their use of technology as a medium of research and communication. Students use the letter writing and presentation skills developed in this unit to effectively communicate with community members about the reasons for improving a community park or public space, using data to support their findings. In summary, students learn through the project that—and how—they can play an active role in improving their local community.