Project PSA: The impact of project-based learning on engagement and writing

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Abstract: Project-based learning (PBL) is a constructivist framework that allows students to create artifacts to answer questions. PBL has fostered academic and behavioral benefits in secondary classrooms, but has been minimally researched in elementary education. This study measured whether engagement and writing skills increased as a result of PBL in a fourth grade English language arts class. Students' engagement increased at the onset of PBL, but decreased to baseline after PBL was completed. Writing skills did not change following PBL. Students reported greater science content knowledge, but some reported unsatisfactory levels of challenge during PBL. These results confirm previous findings that PBL increases engagement and extend findings on PBL's effectiveness at the elementary level.

Introduction and Justification

The COVID-19 pandemic profoundly impacted the quality of teaching and learning. From the shift to virtual learning to the uncertainty of day-to-day instruction, teachers grappled with numerous challenges as the pandemic unfolded (Daniel, 2020). Although the pandemic presented challenges to learning in many ways, the return to in-person instruction this year gave teachers the opportunity to reflect on their practice and rethink their priorities. Among these priorities was engaging students in their learning, as researchers have demonstrated that school engagement decreased during the pandemic for students of all ages (Salmela-Aro et al., 2020). One approach that has the potential to improve students' engagement is project-based learning (PBL), a constructivist approach in which students create artifacts to answer a driving question (Blumenfeld et al., 1991). PBL has consistently been found to increase engagement in the classroom (Almulla, 2020).

An important advantage of a project-based learning framework is that it can be used to meet curricular goals while providing opportunities for students to solve authentic problems (Thomas, 2000). In previous research, students were more likely to see class as valuable and demonstrate more concept understanding when project-based learning was utilized (Beier et al., 2018; Fillipatou & Kaldi, 2010). However, most of this research was conducted in secondary classrooms rather than elementary classrooms, where carrying out projects may require different types of support. Research on the use of PBL in English language arts classrooms is particularly sparse, perhaps because projects may lend themselves more easily to content knowledge in science, history, or math. However, studies conducted in elementary settings appear to support its efficacy, both in motivating students and increasing their achievement (Duke et al., 2021; Fillipatou & Kaldi, 2010). Because two

goals of my school's improvement plan were monitoring student engagement and integrating English language arts skills across disciplines, I realized that PBL could be a good way of addressing both of those goals at the same time.

I also observed the effectiveness of a single project in motivating and engaging my students, which piqued my curiosity in PBL as a way to increase student achievement. At the beginning of my placement, students created their own posters on Hispanic countries and presented them to their classmates for Hispanic Heritage Month. The process of doing research and synthesizing their findings excited them; many were eager to share their newfound knowledge with their peers. My mentor teacher and I both agreed that the days spent completing that project were the most productive days of the year at that point. Because this project was so engaging to them, I hoped to capitalize on their apparent motivation by implementing PBL during a unit with a science-related essential question. Students in my English language arts class engaged in the process of creating a podcast to learn about expository writing, speaking with clarity, and the peer review process. The purpose of my study was to examine how this PBL experience affected not only students' engagement, but their writing skills as well.

Literature Review

Conceptual Framework: Project-Based Learning

Blumenfeld et al. (1991) defined project-based learning (PBL) as a multi-step process in which students investigate a driving question in order to create an artifact that showcases their understanding of a topic. Expanding on Blumenfeld et al.'s (1991) original definition, Thomas (2000) suggested five tenets of PBL that distinguish it from other methods: (a) its centrality to the curriculum, (b) its use of a driving question, (c) the utilization of inquiry and goal setting, (d) its student-driven method, and (e) its authenticity to real life. Unlike traditional models of explicit teaching, PBL places students as facilitators of their own learning by doing a project as a way to investigate a concept. Namely, students come up with a plan to answer the open-ended driving question using evidence and creativity (Blumenfeld et al., 1991). However, this shift in responsibility from the instructor to the learner does not imply that teachers can simply watch the students' learning unfold. In a PBL approach, teachers still provide guidance, scaffolding the learning process so that students can reach their goals (Bell, 2010). This guidance is particularly important in an elementary school context, where explicit instruction is often utilized and preferred so that students can learn basic concepts (Mayer, 2004).

This is not to say, though, that PBL should be discouraged in elementary classrooms. Though there is limited research on PBL in these contexts, some scholars have suggested that the upper-elementary grades are an appropriate place to introduce PBL because students can self-regulate their learning more easily than younger students (Hung et al., 2012; Mayer, 1987). Additionally, Blumenfeld et al. (1991) noted that at any level, PBL will take substantial guidance and modeling of learning strategies. When PBL is consistent and well-structured, students reap numerous benefits (Duke et al., 2021). As detailed in the next section, two such potential benefits are improvements in students' engagement and writing ability.

Benefits of PBL

Student Engagement. PBL is often touted as an engaging method of learning (Bell, 2010; Blumenfeld et al., 1991; Thomas, 2000). However, there are several forms of engagement that require definitions, including behavioral, cognitive, and emotional engagement (Fredricks et al., 2004). Behavioral engagement refers to students' on-task behaviors, participation in class, and help-seeking actions. Cognitive engagement may sometimes look similar to behavioral engagement in terms of participation and discussion, but its focus is on students' meaning making while completing a task. Finally, emotional engagement is related to students' feelings about the work they do, and, by association, their affective state.

There has been extensive research on PBL's engagement benefits in a variety of settings (Almulla, 2020; Carrabba & Farmer, 2018; Stefanou et al., 2013). Because PBL requires student input and goal-setting, the approach inherently requires that students actively engage in their work and learning (Blumenfeld et al., 2006). However, there appear to be true benefits to PBL beyond its intended framework. In a study of three schools implementing PBL, students of all ages noted that the projects made them more excited about learning content and demonstrating that learning (Culclasure et al., 2019). Teachers, too, detailed a perceived increase in student participation and effort when interviewed about their experiences with PBL (Culclasure et al., 2019; Dole et al., 2017). But perhaps the biggest indicator of engagement through PBL is in its comparison with direct or traditional instruction. Secondary PBL students were more behaviorally engaged than their traditional counterparts, as measured by their completion of assignments, participation in class, and focus (Carrabba & Farmer, 2018; English, 2018). These findings make sense when compared to Almulla's (2020) recent model of PBL and college students' engagement, wherein learners' participation was a critical component of the engagement variable. Taken together, these findings suggest that PBL is an effective means by which students become engaged with their course material.

As mentioned previously, though, the majority of the studies referenced above took place in secondary schools, or even at colleges and universities. Although there is less research on PBL engagement at the elementary level, the evidence to date suggests that younger students can benefit from the approach as well. For example, when asked about the aspects of PBL they liked, elementary students with learning disabilities reported that the collaborative aspect of PBL helped them to be more engaged in the learning process (Filippatou & Kaldi, 2010). First grade students in low-income areas also developed a greater sense of engagement with the topics of study, demonstrating that PBL can work well even under challenging circumstances (Hertzog, 2007). Attitudes towards learning were also positively affected by PBL, as students explained that the projects they completed required more effort, but had more meaning to them (Filappatou & Kaldi, 2010; Hung et al., 2012). Nevertheless, one limitation of these studies was their reliance on purely self-report data. Even though student interviews and answers can provide some clarity, they have the potential to have self-report biases, which can cloud results. This suggests that observational measures are needed to triangulate the findings on engagement in elementary PBL classrooms.

Writing Skills. It is important to note that since PBL is not a teaching method in and of itself, simply completing a project will not automatically increase students' writing

abilities (Blumenfeld et al., 1991; Filippatou & Kaldi, 2010). However, there are a number of elements in effective PBL approaches that can improve students' writing. A clear asset of PBL generally lies in its authenticity, which provides students with a clear purpose and audience for their writing from the start (Diffily, 2001; Polman et al., 2012). Authentic writing pieces have been well-documented as ways to develop students' writing abilities (Duke et al., 2006; Esposito, 2012; Purcell-Gates et al., 2007). Additionally, because PBL normally takes place over a longer period of time rather than just one lesson, students have ample opportunities to receive feedback, revise, and edit their writing (English & Kitsantas, 2013). This feedback is crucial in order for students to understand how they can improve their writing before displaying it in public (Boardman et al., 2021). Although writing feedback is not a strategy specific to PBL, students described the collaborative nature of a PBL experience as helpful as they developed their writing skills (Filippatou & Kaldi, 2010).

Another major factor in PBL is the content that students are learning and researching; thus, PBL can be harnessed in order to increase content-area literacy and discipline-specific writing skills (Duke et al., 2012; Halvorsen et al., 2012). In secondary and tertiary classrooms, writing skills in science and foreign language increased during PBL experiences (Aghayani & Hajmohammadi, 2019; Wardani et al., 2020). Similar findings were discovered in primary social studies and science classes: students were better able to articulate content in their writing after PBL was completed (Halvorsen et al., 2012; Kersten, 2017). Some of the improved writing skills, though, could be more readily transferable in other contexts. For example, students who were exposed to a consistent PBL curriculum in science significantly improved both their informational and persuasive writing skills over the course of the intervention (Duke et al., 2021). These findings suggest that PBL may help to promote the writing practices of students as young as those in elementary grades, and across various disciplines.

Technology Integration. For as long as the PBL framework has existed, technology integration has been recommended as a vehicle for students to create meaningful artifacts that can be shared with others (Blumenfeld et al., 1991). Such integration has the potential to improve students' engagement, motivation, collaboration, and learning throughout the PBL process (Bell, 2010). Many teachers have successfully utilized a variety of technology in their PBL endeavors, including digital storytelling, websites, and slideshows (ChanLin et al., 2008; Hung et al., 2012). Generally, too, technology is ubiquitous for students in everyday research, reading, and writing activities. However, for technological tools to be effective, they must integrate well with the content students are learning (Swan & Hofer, 2011).

One tool that can be used across disciplines is podcasting, or creating audio recordings that can be downloaded and shared with others. Podcasting allows students to collaborate with one another while demonstrating their learning in a relevant format (Guertin, 2010; Swan & Hofer, 2011). In my research, students had the opportunity to podcast a public service announcement related to natural disasters as part of a science-integrated English language arts unit.

Present Study (Purpose Statement and Research Questions)

The purpose of this study was to examine PBL and its benefits for a group of fourth grade students in order to address the gap in the literature regarding PBL in elementary

schools. By implementing a technology-integrated, cross-disciplinary PBL lesson sequence for my students, I hoped to assess improvements in engagement and writing skills over time. To that end, my research questions were as follows:

1. How does PBL affect students' behavioral engagement in the English language arts classroom?
2. How does PBL affect the quality of students' writing?
3. What is the relationship between students' behavioral engagement and the quality of their writing?
4. What do students report gaining from the PBL experience?
5. How do students suggest the PBL experience could be improved?

Methods

Description of Sample/ Context

This study was conducted in a suburban elementary school in Southern Maryland. Participants were 32 fourth grade students (19 girls, 13 boys) in my two English language arts classes (the classes were almost identical in size); therefore, it was a convenience sample. Across both classes, students were racially diverse; ten were Black, nine were White, eight were biracial, and two were Asian. There were two students with IEPs who participated in the study. Neither class was classified as Gifted and Talented.

Intervention

The method for my study was based on the work of Duke et al. (2021), who argued that PBL in the elementary classroom must include high levels of scaffolding and explicit instruction. Thus, I compiled 90-minute lesson sequences for each day that included a whole group mini-lesson, project work time, and shared reflection at the end of each class period. For the project, students were asked to write and recite a public service announcement that informed their community about a natural disaster of their choice. Over the course of a week, I introduced the PSA project, helped students brainstorm topics and key ideas, led mini-lessons on each aspect of writing a successful PSA, allowed time for peer revisions, and recorded students' final products. Throughout the process, I also scaffolded students' explorations by providing resources, such as books, webpages, and example PSAs, that I knew would assist them in their research. See Appendix A for a lesson sequence and the standards that each lesson addressed.

Type of Methods

In this mixed-methods study, I first collected quantitative data on students' on-task behaviors during class. Using a behavioral checklist, my mentor teacher tallied each time she noticed a student exhibiting an on-task behavior (see Appendix B). This source of data allowed me to calculate numerical scores for class behaviors before and after the intervention. Another source of quantitative data was students' writing scores. I provided a writing rubric to one of my fellow interns, who was blind to condition and scored each students' informational writing (see Appendix C). In addition, I used open-ended questions at the conclusion of the project to gauge my students' perceptions of the PBL experience. Including these qualitative data allowed me to further understand my students' experiences and more holistically evaluate the effectiveness of PBL in my classroom.

Data Collection

The three sources of data I used during this intervention were behavioral checklists, writing samples, and student responses to an open-ended questionnaire. My goal was to examine whether PBL would impact students' engagement and writing skills over the course of the study. See Table 1 for a breakdown of each question and its data source.

Table 1:

Research Questions and Data Sources

	Data source 1	Data source 2
How does PBL influence students' behavioral engagement?	Pre-post behavioral checklists	
How does PBL influence the quality of students' writing?	Pre-post writing rubrics	
What is the relationship between students' behavioral engagement and the quality of their writing?	Pre-post behavioral checklists	Pre-post writing rubrics
What do students report gaining from the PBL experience? What do students believe could be changed regarding the PBL experience?	Open-ended questionnaire at the conclusion of the study	

Before collecting data, I received consent from all parents of the students in both of my classes. From there, I began data collection after the students returned from winter break. The first step before implementing the PBL lesson sequence was to observe my class in order to gather pretest data on their behavioral engagement. In order to mitigate my own biases, my mentor teacher observed my students and tallied their behaviors on a checklist (see Appendix B). She completed the behavioral checklist for each class before the intervention began, creating a total score for behavioral engagement. Another pretest that I administered to the students during their first week back was the informational writing measure. I gave students an informational writing prompt and had them write about a fictional or real person who they admired. As in Duke et al. (2021), the goal of the writing prompt was not to test students on their content knowledge of a specific subject; thus, it was important to mitigate the effect of unequal background knowledge by providing a prompt to which every student could respond. This consideration ensured that I truly

measured students' informational writing skills, rather than their content knowledge on a certain topic. The writing prompt was administered the same day that one of the behavioral observations took place.

After the pretest data was collected, I began the PBL lesson sequence. In the middle of the intervention, I collected data on students' behavioral engagement twice during independent writing time. I planned this intentionally so that I could track any change in engagement as a result of PBL implementation. Once students completed their recordings and shared them with their classmates, I gave them an opportunity to reflect on their feelings about the PSA project by completing an open- ended questionnaire. In this questionnaire, I asked students to explain their overall feelings about the PBL lesson sequence, as well as what they liked and disliked. The questions were as follows:

- How would you describe your experience with Project PSA?
- What did you like about Project PSA?
- What did you dislike about Project PSA?
- What did you learn by completing Project PSA?

Finally, during the week after the intervention concluded, I gave students the post-test writing prompt. This prompt was the same as the pretest prompt (i.e., "Write about a fictional character or real person who you admire."). However, I asked students who chose to write about a fictional character for the pretest to write about a real person on the post-test, and vice versa. This practice prevented students from simply copying what they wrote for their pretest again. I also administered the behavioral checklist once more during this time.

Data Analysis

In order to analyze differences in behavioral engagement throughout the intervention as well as writing scores before and after the intervention, I conducted multiple paired samples *t*-tests. I then used linear interpolation to make up for missing data points. However, since my third research question focused on the relationship between behavioral engagement and writing, I used a Pearson correlation analysis to evaluate the direction and strength of the relationship. An alpha of .05 was used for all tests. Lastly, to comprehend students' perceptions of the PBL lesson sequence, I thematically coded their responses to the feedback questionnaire. As aforementioned, the combination of these data analysis methods constituted a mixed-methods study.

Throughout my data collection and analysis, I took a number of steps to offset the potential impacts of my own biases on the data. For example, the behavioral checklists were administered by my mentor teacher, which helped to ensure that the observer was more objective. Additionally, the writing samples were scored by a fellow intern who was blind to condition, meaning that the scorer was unaware of whether a student wrote their response before or after the intervention. I also consulted my mentor teacher in order to provide rubrics that assessed writing in fair and accurate measures.

Results

How does PBL affect students' behavioral engagement in the English language arts classroom?

There was no statistically significant difference in students' behavioral engagement (i.e., on-task behaviors) in English language arts from pretest (M = 2.10, SD = 0.91) to posttest (M = 2.04, SD = 0.90), p = .845. There was also no significant difference between students' behavioral engagement before the PBL experience (M = 2.12, SD = 0.85) and during the second part of the PBL experience (M = 2.33, SD = 0.94), p = .356. Additionally, there was no significant difference in students' behavioral engagement during the first part of the PBL experience (M = 2.80, SD = 1.14) to the second part of the PBL experience (M = 2.35, SD = 0.96), or from the second part of the PBL experience (M = 2.39, SD = 0.95) to the post-test (M = 2.09, SD = 0.89), $p > .05$. However, there was a significant increase in students' behavioral engagement from before PBL was implemented (M = 2.21, SD = 0.89) to the first data collection phase during the PBL experience (M = 2.90, SD = 1.16), p = .027. This increase was associated with a moderate effect size; Cohen's d was 0.67. Furthermore, a Bayes factor of 1.91 provides anecdotal evidence that there was a significant difference in engagement before and during PBL. There was also a significant difference in students' behavioral engagement from the first data collection phase during PBL (M = 2.88, SD = 1.14) to their scores after the PBL experience was over (M = 2.09, SD = 0.88), p = .009. This decrease was also associated with a moderate effect size; Cohen's d was 0.77. Additionally, the Bayes factor of 4.63 provides substantial evidence that this change in behavioral engagement was significant. In other words, these findings suggest an interesting pattern; generally, students' engagement increased when PBL was first introduced, but after its initial stages, their behavioral engagement waned to its levels before PBL.

How does PBL affect the quality of students' writing?

There was no significant difference between the quality of students' writing on their pre-test (M = 6.60, SD = 3.02) and their post-test (M = 6.50, SD = 2.20), p = .792. In other words, the quality of students' writing did not increase or decrease as a result of PBL implementation.

What is the relationship between students' behavioral engagement and the quality of their writing?

Before PBL was implemented, there was a weak, negative correlation between students' behavioral engagement and the quality of their writing, $r(29) = -.29$. This correlation means that as students' behavioral engagement increased, the quality of their writing tended to decrease. However, because this was a weak correlation, there may not have been any real relationship here. After PBL implementation, though, there was a negligible, positive correlation between students' behavioral engagement and the quality of their writing, $r(18) = .13$. This correlation value suggests that there was no relationship between the students' engagement in class and their ability to write effectively after PBL took place.

What do students report gaining from the PBL experience?

Students reported a variety of positive feelings regarding the PBL experience. Because students were asked to write not only about what they liked, but what they learned, numerous themes emerged from students' feedback. The major benefits students reported from completing Project PSA included greater knowledge of science content, engaging in the process of research, and creating a meaningful product.

Science Content Knowledge. Multiple students reported that engaging in PBL helped them to learn more about their chosen natural disaster, which suggests that their science content knowledge improved as a result of PBL. Some students simply stated information that they remembered when asked to describe what they learned. One student's quote that represented this pattern was, "I learned how an earthquake starts like how the earth crust moves and then the plates would break witch (sic) would make energy to shake the ground." Other students, though, even discussed how their newfound science content knowledge could be valuable in the future. For example, a student wrote, "I learned how to stay safe before and after a tornado. So if there is ever a tornado here I would be prepeared (sic)." These types of responses were quite common; over half of participants made some mention of their natural disaster in their feedback, making this theme the most salient of the themes that emerged from the data.

Engaging in the Research Process. Many students reported enjoying the process of researching their natural disaster. From the early stages of the process when the students choose their topic, to reading about it, taking notes, and writing about it, students explained various aspects of the research process that helped them to engage in their learning. When asked what they liked about the PBL experience, a number of students enjoyed the autonomy they received in choosing their own topics, including one student who noted: "I liked it because I like natrual (sic) disasters and we got to pick our natrual (sic) disasters." Some students named "researching" as a key interest of theirs, which fueled their desire to keep working on the project even when it was challenging. A quote that encapsulated this interest was as follows: "I really liked [the project] and It was kinda (sic) hard but I had fun doing it and I liked it because I love researching about things." Finally, others referred to the writing process when discussing the project, like this student, who wrote, "I loved the part when we took notes because just the feeling of knowing that you know what your (sic) putting down is satisfying to me." Overall, students seemed to appreciate the chance to research and seek answers to their own questions.

Creating a Meaningful Product. One of the most common topics of discussion in students' feedback was the podcast/radio announcement itself as a memorable, meaningful way of learning. However, there were two types of responses that could be observed, the first of which pertained to the novelty of the technology itself. For instance, one student commented, "I liked it because I got to record for a project, which I've never done which was fun and intresting (sic)." However, whereas those types of responses shed light on the memorability of the project, the second type of response clarified that the radio broadcast was meaningful because of its authenticity. As an example, one student wrote, "I liked that we got to aksule [actually] ruckord (sic) it. I like inveching [inventing] and I like…radio and we get to do that to (sic)." The way that the student phrased his response (i.e., "actually record it") suggests that he found the experience to be meaningful because the product aligned with the project's goals. Furthermore, other students noted similar ideas, like "Miss

Young made it so real life," as well as learning "how to talk on the radio." Responses like these highlight that students did not just like the project because it aligned well with the content, but because it was authentic and provided them with an opportunity to practice real-world speaking skills.

How do students suggest the PBL experience could be improved?

In terms of suggested improvements to the PBL experience, students also reported a range of responses. However, the common themes that students noted included the perceived ease or challenge of the project, as well as the technical challenges associated with recording themselves.

Variations in Level of Challenge. Overall, there were many responses regarding students' perceptions of the difficulty of the project. However, their responses varied widely; some believed that the project was too easy, whereas others felt that the level of challenge was too high. From these variations, though, I was able to discern a few patterns. For instance, those who noted that the project was challenging referred to the amount of time it took to complete each step of the project. As a whole, I noticed that students who found the project challenging were those who also typically struggled in English language arts class. For example, one student who struggled to read and write reported, "I dislike rsr [research] bece [because] it wus (sic) to (sic) log (long)." On the other hand, students who described the project as easy were often performing well in the class at the time. For example, one student felt that, "I could just say some things I think are right along the way," when writing a script for her PSA, suggesting that it was easy for her to find information while researching. Another student who typically did well on English language arts assignments wrote, "What I dislike about Project PSA was that we had to write it and say it so we kind of did the same thing twice." These types of responses demonstrate a need for greater differentiation in the project's goals and timeline in order to meet the needs of all students.

Technical Challenges. Although the integration of technology did seem to enhance the project for some students, others thought that the costs to the technology integration outweighed the benefits. Some students confessed that they disliked recording and hearing themselves, like one student who wrote: "I didn't like recording because I'm shy and I never liked recording." Others, though, emphasized that the classroom environment when recording was a challenge. One student "wish[ed] that we would [have had] a few of us in the hallway doing the video and some in the classroom," highlighting that the project could have been more meaningful had the atmosphere been more conducive to a good recording.

Discussion of Results

Based on previous research, I hypothesized that PBL would increase students' behavioral engagement as well as their writing skills. Furthermore, because numerous researchers have demonstrated that increases in student engagement also relate to higher academic achievement, I hypothesized that there would be a positive correlation between students' behavioral engagement and writing skills as a result of PBL (Almulla, 2020; Culclasure et al., 2019). However, only some of my hypotheses were supported by my results. First, students' behavioral engagement increased from its baseline level at the start

of PBL implementation, but did not continue to increase; rather, it declined throughout the second phase of PBL data collection and returned to its baseline level after the project was over. Additionally, there was no evidence that PBL had an impact on student's writing skills, even though previous research on PBL and writing has demonstrated PBL's potential in this area (Duke et al., 2021; English, 2018). There was also little evidence of a connection between students' engagement and their writing scores as a result of PBL implementation. Finally, the qualitative results from students' feedback confirmed many previous findings on PBL's effectiveness as well as its downsides.

The pattern of engagement throughout the PBL process was perhaps the most striking finding in the data set. The spike in behavioral engagement at the onset of PBL implementation could be attributed to the topic exploration that took place on the day that data was collected (i.e., the second day of the project–see Appendix A for the lesson sequence). This finding does mirror the common piece of student feedback that they enjoyed choosing their topics and researching, as well as research that states that autonomy in PBL is one of its critical components (Blumenfeld et al., 1991; Stefanou et al., 2013). Additionally, when compared to the second half of data collection during PBL (i.e., on Thursday, when students were finishing their PSAs and peer reviewing them), it is feasible that students were more excited about the first part of Project PSA than they were the second part. Again, this finding not only is evident in the quantitative data, but in the themes that emerged from students' feedback regarding the PBL process. Whereas many students reported the research process (particularly the topic choice and note-taking) as engaging, few students commented on how it felt to write the PSA itself. Moreover, as detailed in the section on improvements to PBL, some students found the writing to speaking transition redundant, which could help to explain why they were less engaged on the day that they were writing out the end of their PSA and preparing to record. Although it is unsurprising that PBL resulted in gains in engagement as compared to baseline, it is eye-opening that these gains were not sustainable over the course of the project (Almulla, 2020). It may be worthwhile for future researchers to explore PBL longitudinally (as in this study), but over a longer period of time in order to draw conclusions about its effectiveness in engaging students at every stage.

In terms of writing skills, there could be a number of reasons why students' writing skills in informational writing were not significantly different from pre-test to post-test. First, as detailed in the literature review, PBL is not a teaching method, unlike explicit writing instruction or guided writing (Blumenfeld et al., 1991; Filippatou & Kaldi, 2010). As such, there are components of effective PBL that can improve writing skills, but may not be as effective as well-tested strategies specific to writing (Filippatou & Kaldi, 2010). The project that I conducted with students did include scaffolding and guided writing in order to assist in developing writing, which would suggest that it could have the potential to improve writing skills. However, this project lacked the consistent implementation of PBL over a long period of time that previous researchers referred to when detailing increases in writing abilities (Duke et al., 2021). I explained the components of good informational writing to students, but because students applied those skills to a specific context (i.e., writing the PSA), they may not have recognized the transferability of certain components (e.g., including facts and details) to other writing assignments, like discussing a person or character they admired. Future researchers may consider examining the connections

between PBL and writing further, particularly in elementary settings, where students are only starting to learn the fundamentals of writing. Likewise, if researchers are able to better understand how PBL impacts writing at the elementary level, it may assist them in understanding the relationship between engagement and writing further as well. In this study, there was only a slight positive correlation between engagement and writing after PBL was implemented. Since behavioral engagement and academic performance have been strongly related in previous studies, this finding does not align with previous research, which may suggest a need for more studies that test the relationship between all three variables in my study: PBL, engagement, and writing (Fredricks et al., 2004).

The last part of my research involved analyzing students' perceptions of PBL, as measured by thematic coding of their responses on the posttest questionnaire. Overall, students' feedback touched on many features of PBL detailed in prior research (Bell et al., 2010; Blumenfeld et al., 1991). The most common theme that emerged from their responses was in reference to science content knowledge, which confirms evidence that suggested that PBL is an effective way of incorporating content knowledge across disciplines (Duke et al., 2021; Filippatou & Kaldi, 2010; Halvorsen et al., 2012). Although I did not specifically measure students' content knowledge after PBL, their ability to articulate their knowledge of natural disasters in writing after the study points to PBL as a way to increase content-area literacy. Additionally, many students who enjoyed the project revealed that they liked the opportunity to choose their topic. Because my participants were elementary schoolers, the PBL process was more structured than other studies with older students; students received explicit modeling and guidance (Duke et al., 2021). Thus, the fact that students appreciated the small, yet important, choice of their topic and its subsequent resources highlights the notion that the student-driven aspect of PBL can be fostered even with high levels of scaffolding (Blumenfeld et al., 1991). Their focus on the project's authenticity (i.e., its purpose as well as its technology integration) also illustrated that PBL needs to provide real-world connections in order to sustain interest and enjoyment (Bell, 2010).

However, different groups of students also required heightened levels of differentiation in order to increase the project's meaning, as displayed in the variety of levels of challenge that different students mentioned. For example, students who struggled in English language arts class found the project challenging, which does fall in line with past research stating that PBL can be difficult for students with learning disabilities and other academic needs (Blumenfeld et al., 1991; Filippatou & Kaldi, 2010). In the past, though, PBL has worked to help underprivileged students attain similar levels of achievement as their peers (Filippatou & Kaldi, 2010; Hertzog, 2007; Halvorsen et al., 2012). One improvement to my study that previous studies relied on would be utilizing group work more often in order to scaffold students' understandings. Throughout this lesson sequence, students did have opportunities to share research findings with their peers who chose the same natural disasters, as well as opportunities to peer edit towards the end of the project. However, students who were already struggling with the main components of the project may not have been able to fully take advantage of the group aspects of the project if they were concerned about their own progress. A potential solution to this problem would be to utilize small-group instruction in order to scaffold PBL for students who need more guidance. Whole-group instruction has frequently been employed to go over a project's

goals, and heterogeneous groupings of students do have the potential to increase low-performing students' motivation for learning (Duke et al., 2021; Filippatou & Kaldi, 2010). However, though Duke et al. (2021) did employ small group work in their PBL framework, there is limited research otherwise regarding *teacher-led* small group instruction in elementary PBL (perhaps because the approach is meant to be primarily student-driven). Future research ideas could include comparisons of whole-group and small-group PBL implementation in order to determine how to best meet the needs of individual students during PBL. Additionally, testing various levels of teacher scaffolding empirically could shed light on how to make PBL more effective for all students.

Conclusions and Implications

The purpose of this study was to examine whether implementing project-based learning (PBL) in the English language arts classroom would influence students' behavioral engagement and writing skills, as well as to ascertain students' opinions on the PBL process. Overall, students demonstrated an increase in engagement from before PBL to the first part of the project. However, this engagement did not last through the duration of the project, declining significantly to baseline levels once the project ended. There were no significant changes in students' writing abilities as a result of PBL, but students reported that their knowledge of science content and their enjoyment of the project's authenticity were strong takeaways. Students also varied in their assessments of the project's level of difficulty, suggesting a need for heightened differentiation when PBL is implemented at the elementary level.

Limitations

There were a number of limitations that impacted the ability to generalize my results. Beyond the small sample size of my study to begin with, numerous absences due to COVID-19 and other illnesses made it difficult to follow the same group of students consistently throughout the study. As a result, data analysis proved to be a challenge. Additionally, numerous interruptions within the school building (i.e., an unplanned fire drill, club pictures) also contributed to an ability to obtain consistent data. Although I was able to make up for absences using linear interpolation in my data analysis, true data points from all students would have increased the validity of my results. As such, it is important to note that since PBL implementation was not as consistent as planned, such limitations may have impacted the findings. Furthermore, my study did not take place over a long period of time. My study of PBL, in total, took under two weeks. When compared to lengthier studies that took months to complete, my study could not provide the same level of long-term analysis. Moreover, I had to adjust aspects of my PBL plan in order to meet the immediate needs of my students. For example, the peer review process was not as scaffolded as I had intended because many partners were absent or out of the room during that lesson; therefore; I let some students review their own work and then move on to recording. Such challenges meant that my PBL implementation could have varied from student to student, which makes it difficult to make claims about the entire group's shared experience. Finally, a delimitation of my study was that it was conducted in the wake of the COVID-19 pandemic, when learning gaps were heightened by a variety of factors (Daniel et al., 2020).

This timing made it all the more interesting to study PBL, but it also may have had an impact on its implementation in my Title I school.

Implications

Despite the limitations above, my study does still provide some interesting findings. One unique feature of my study was that data was collected longitudinally for one class, allowing for the comparison of the same students throughout the PBL process (rather than cross-sectionally comparing a traditional classroom and a PBL classroom). As such, I was able to tell that PBL was effective in the short-term, but its effects did not last after PBL implementation was over. Future researchers may choose to continue to analyze long term gains (or declines) in a variety of factors due to PBL (including engagement, as my study did). Furthermore, one of the driving factors in conducting this study in the first place was the lack of research on PBL in elementary schools. This study adds to that limited research pool and confirms some exciting results, like increased engagement and student-reported enjoyment of the work they were doing (Hertzog, 2007). However, it also contributes to Duke et al.'s (2021) claim that PBL needs to be greatly scaffolded for an elementary population. In the future, the types of scaffolds that could increase PBL access, motivation for PBL, and academic achievement as a result of PBL could be an interesting topic of research, particularly at the elementary level.

Project-based learning has the potential to create meaningful learning experiences, which contributes to greater student engagement in their own learning (Blumenfeld et al., 1991). Traditionally, this type of instructional design has been reserved for secondary students, who have been viewed as more prepared to handle the challenges of self-driven inquiry and product creation. However, my study illuminates the promise of PBL for elementary students, too. By creating meaningful projects and giving students the chance to explore, teachers may find that their students, like mine, "like it some (sic) much [they] what (sic) to do it again."

References

Aghayani, B., & Hajmohammadi, E. (2019). Project-based learning: Promoting EFL learners' writing skills. *LLT Journal: A Journal on Language and Language Teaching*, *22*(1), 78-85.
Almulla, M. A. (2020). The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning. *Sage Open*, *10*(3), 1-15. https://doi.org/10.1177/2158244020938702
Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *83*(2), 39–43. https://doi.org/10.1080/00098650903505415
Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, *26*(3-4), 369-398. https://doi.org/10.1080/00461520.1991.9653139
Carrabba, C., & Farmer, A. (2018). The impact of project-based learning and direct instruction on the motivation and engagement of middle school students. *Language Teaching and Educational Research*, *1*(2), 163-174.
ChanLin, L. J. (2008). Technology integration applied to project-based learning in science. *Innovations in Education and Teaching International*, *45*(1), 55-65. https://doi.org/10.1080/14703290701757450
Culclasure, B. T., Longest, K. C., & Terry, T. M. (2019). Project-based learning (Pjbl) in three southeastern public schools: Academic, behavioral, and social-emotional outcomes. *Interdisciplinary Journal of Problem-Based Learning*, *13*(2), 5. https://doi.org/10.7771/1541-5015.1842
Daniel, S. J. (2020). Education and the COVID-19 pandemic. *Prospects*, *49*(1), 91-96. https://doi.org/10.1007/s11125-020-09464-3
Deveci, T. (2018). Student perceptions on collaborative writing in a project-based course. *Universal Journal of Educational Research*, *6*(4), 721-732. Retrieved November 3, 2021 from https://www.learntechlib.org/p/190223/.
Diffily, D. (2001). "Real-World Reading and Writing through Project-Based Learning."
Dole, S., Bloom, L., & Doss, K. K. (2017). Engaged learning: Impact of PBL and PjBL with elementary and middle grade students. *Interdisciplinary Journal of Problem-Based Learning*, *11*(2), 9. https://doi.org/10.7771/1541-5015.1685
Duke, N. K., Halvorsen, A. L., Strachan, S. L., Kim, J., & Konstantopoulos, S. (2012). Putting PjBL to the test: The impact of project-based learning on second graders' social studies and literacy learning and motivation in low-SES school settings. *American Educational Research Journal*, *58*(1), 160-200. https://doi.org/10.3102/0002831220929638
English, A. (2018). Utilizing project-based learning to increase engagement and performance in the high school classroom. *Prairie Journal of Educational Research*, 4.
English, M. C., & Kitsantas, A. (2013). Supporting student self-regulated learning in problem-and project-based learning. *Interdisciplinary Journal of Problem-Based Learning*, *7*(2), 6. https://doi.org/10.7771/1541-5015.1339
Esposito, L. (2012). Where to begin? Using place-based writing to connect students with their local communities. *English Journal*, 70-76. https://www.jstor.org/stable/41415476

Filippatou, D., & Kaldi, S. (2010). The effectiveness of project-based learning on pupils with learning difficulties regarding academic performance, group work and motivation. *International Journal of Special Education*, *25*(1), 17-26.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59-109. https://doi.org/10.3102/00346543074001059

Halvorsen, A. L., 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 & Research in Social Education*, *40*(3), 198-229. https://doi.org/10.1080/00933104.2012.705954

Hertzog, N. B. (2007). Transporting pedagogy: Implementing the project approach in two first-grade classrooms. *Journal of Advanced Academics*, *18*(4), 530-564. https://doi.org/10.4219/jaa-2007-559

Hung, C. M., Hwang, G. J., & Huang, I. (2012). A project-based digital storytelling approach for improving students' learning motivation, problem-solving competence and learning achievement. *Journal of Educational Technology & Society*, *15*(4), 368-379.

Kersten, S. (2017). Becoming nonfiction authors: Engaging in science inquiry. *The Reading Teacher*, *71*(1), 33-41.https://doi.org/10.1002/trtr.1577

Polman, J. L., Stamatis, K., Boardman, A., & Garcia, A. (2018). Authentic to whom and what? The role of authenticity in project-based learning in English language arts. *International Society of the Learning Sciences, Inc.*

Salmela-Aro, K., Upadyaya, K., Vinni-Laakso, J., & Hietajärvi, L. (2021). Adolescents' longitudinal school engagement and burnout before and during COVID-19—The role of socio-emotional skills. *Journal of Research on Adolescence*, *31*(3), 796-807. https://doi.org/10.1111/jora.12654

Stefanou, C., Stolk, J. D., Prince, M., Chen, J. C., & Lord, S. M. (2013). Self-regulation and autonomy in problem-and project-based learning environments. *Active Learning in Higher Education*, *14*(2), 109-122. https://doi.org/10.1177/1469787413481132

Swan, K., & Hofer, M. (2011). In search of technological pedagogical content knowledge: Teachers' initial foray into podcasting in economics. *Journal of Research on Technology in Education*, *44*(1), 75-98. https://doi.org/10.1080/15391523.2011.10782580

Thitivesa, D. (2014). The academic achievement of writing via project-based learning. *World Academy of Science, Engineering and Technology International Journal of Economics and Management Engineering*, *8*(9), 2986-2989.

Thomas, J. W. (2000). A review of research on project-based learning. Autodesk Foundation.

Wardani, D. S., Fauzi, M. R., Zafira, R., & Kurniawati, D. (2020). Creating props: Improving writing skills of teaching materials of elementary teacher education students through a project-based learning model. *Elementary School Forum*, *7*(2), 216-234.

Appendix A

PBL Lesson Sequence

Date	Instructional Plan	Standards Addressed

Thursday, January 6, 2022	• Administer behavioral checklist during work time (pretest) • Administer writing prompt (pretest)	W 4.2 (Write informative/explanatory texts to examine a topic and convey ideas and information clearly.)
Monday, January 10, 2022	• Whole Group: Introduce students to natural disasters via whole group reading. Discuss problem and solution text structure; students will practice identifying problems and solutions in a new text. • Explain Project PSA goals • Exit Ticket: Students will complete a discussion post about which natural disaster they would like to research and why.	RI 4.5 (Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.) RI 4.3 (Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.) W 4.4 (Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.)
Tuesday, January 11, 2022	• Whole Group: Scaffold note-taking graphic organizer using an example of a natural disaster no student is researching (floods) • Project PSA Work Time: Students research their natural disaster using provided resources on Schoology. They will write their responses on the online graphic organizer. • Administer behavioral checklist during work time. • Exit Ticket: Self-reflection on Project PSA progress	W 4.4 W 4.7 (Conduct short research projects that build knowledge through investigation of different aspects of a topic.)
Wednesday, January 12, 2022	• Whole Group: Students will first continue researching their natural disaster. Then, we will review an example PSA script together. • Mini-Lesson: Hook and Introductory Paragraph • Project PSA Work Time: Students will practice identifying elements	W 4.2 W 4.7

	of a new PSA before writing their introduction.	
Thursday, January 13, 2022	• Whole Group: Mini-lesson on facts and details/ body paragraphs, as well as the conclusion • Project PSA Work Time: Students will write the rest of the PSA and work with a partner to peer review. If some are finished, they may do a draft recording. • Administer behavioral checklist during work time.	W 4.2 W 4.7 W 4.5 (With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.)
Friday, January 14, 2022	• Whole Group: Mini-lesson on peer reviewing and recording PSAs • Project PSA Work Time: Students will peer review their writing before recording their final segment. Once they have recorded their PSAs, they will listen to their classmates' and write a discussion post responding to them. • Closure: Administer open-ended questionnaire.	W 4.2 W 4.7 W 4.5 SL 4.4 (Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.)
Tuesday, January 20, 2022	• Administer behavioral checklist during work time (posttest) • Administer writing prompt (posttest)	W 4.2

Appendix B

Behavioral Checklist

For the observer: During small group/independent writing time, focus on one student at a time. For 20 seconds, watch them as they work. Every time you observe them doing one of the listed behaviors, put a tally in that column. Once 20 seconds have passed, move on to

the next student. Twenty seconds for 18 students will take 6 minutes. Therefore, repeat the process of group watching one more time. This will lead to a 12 minute observation.

Observer: _____
Date: _____
Time started: _____
Time finished: _____

(See next page for checklist)

Student Number	**On-task writing** Pencil is moving; the student is concentrated on their paper. Student is not doodling/drawing. The student is in their seat or near it (standing and writing is okay).	**Raising hand to ask a question** Student raises hand and asks a question. Does NOT include the student holding up crossed fingers (sign for restroom) or three fingers (sign for water fountain). If the question ends up being one of those things, do not count it. Otherwise, do count it.	**Using resources** Using one of the resource books from the table OR their own book, using a dictionary or thesaurus from the shelf, looking at an anchor chart intently, or pulling out their writing folder to consult an outline or past worksheet.	**Consulting a neighbor** Asking a neighbor for help spelling a word or another class-related question. Does NOT include side conversations about unrelated material.	**Off-task behavior** Loudly talking about unrelated material, out of seat, staring into space, head down on desk/asleep.
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Appendix C

Writing Prompt and Rubric

Name: _____ Date: _____

Directions: Write about a fictional character or real person who you admire.

Informational Writing Rubric:

Score	0 (Not Yet)	1 (Not Yet)	2 (Partial Command)	3 (Strong Command)
Introduction	The student does not attempt an introduction.	The student writes a sentence to start their writing (e.g., This is my report about _____).	The student writes a sentence that introduces the topic, but it may be better suited in a body paragraph than as a topic sentence.	The student starts the introduction with a topic sentence or question to the readers. It also hooks the reader.
Facts and Details	The student does not write anything, or writes random facts/details that are unrelated to the topic.	The student writes only one or two facts or details about the topic.	The student writes two or three facts about the topic, but the facts are disconnected from each other (there is no logical organization/ the sentences are short and disjointed).	The student writes at least three facts about the topic that are connected and make sense. They may also include other information, like quotes.

Linking Words	The student does not include any linking words.	The student includes words like “and” to add ideas.	In addition to the last score, the student used words like “however” or “but” to show ideas that do not fit.	The student uses linking words that are stated in the fourth grade writing standard, which are, “another,” “for example,” “also,” and “because.” The linking words help the writing to flow.
Concluding Statement	The paragraph ends abruptly and leaves the reader confused/ with the need for more information.	The student ends with an appropriate remark, but it lacks much information (e.g., “That is what I know about…”	The student’s conclusion relates back to the topic sentence and main idea.	The student writes a conclusion that restates the main ideas and provides final thoughts.

Appendix D

Open-Ended Questionnaire

Directions: The questions below are about your experience with Project PSA. Please answer them as honestly as you can. If you get stuck at any time, feel free to ask Ms. Scrivener or me a question. If you feel uncomfortable while answering any of the questions, you may stop at any time.

1. How would you describe your experience with Project PSA?

2. What did you like about Project PSA?

3. What did you dislike about Project PSA?

4. What did you learn, if anything, during Project PSA?