

PROJECT BASED LEARNING IN MIDDLE SCHOOL SCIENCE
AND THE IMPACT ON STUDENT AGENCY

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TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND.....	1
Introduction to Research.....	1
Significance of Study.....	2
Research Questions.....	3
2. CONCEPTUAL FRAMEWORK.....	5
Overview of Relevant Research.....	5
General Findings and Themes.....	9
Applications for Action Research.....	10
3. METHODOLOGY.....	11
Introduction.....	11
Demographics.....	12
Treatment.....	13
Research Methods.....	19
4. DATA ANALYSIS: CLAIMS AND EVIDENCE.....	21
Results for Focus Question #1.....	211
Results for Focus Questions #2.....	27
Results for Focus Question #3.....	34
5. VALUE: REASONING AND REFLECTION.....	40
Claims from the Study.....	40
Value of the Study and Consideration for Future Research.....	42
Impact of Action Research on the Author.....	44
REFERENCES CITED.....	47
APPENDICES.....	500
APPENDIX A: IRB EXEMPTION.....	51
APPENDIX B: ACTIVE LEARNER PRE AND POST SURVEY.....	53
APPENDIX C: ECOLOGY PRE AND POST TEST.....	59
APPENDIX D: GUEST SPEAKER SURVEY.....	62
APPENDIX E: FLATHEAD WATERSHED PROJECT OVERVIEW.....	65
APPENDIX F: FLATHEAD WATERSHED RESOURCE PAGE.....	69
APPENDIX G: PRESENTATION RUBRIC.....	73
APPENDIX H: FINAL PRESENTATION SURVEY.....	76

LIST OF TABLES

Table	Page
1. Table 1. Treatment Schedule for Flathead River Watershed Project	14
2. Table 2. Data Collection Methods for the three Focus Questions	20
3. Table 3: Statistical Comparison of Student Agency Pre and Post Surveys (N=79).....	22
4. Table 4: Results of Paired T-Test (N=79).....	24
5. Table 5: Thematic Analysis of Weekly Reflections (N=696)	25
6. Table 6: Theme Aligned Student Quotes (N=79).....	26
7. Table 7: Statistical Comparison of Pre and Post Tests (N=79)	28
8. Table 8: Results of Ecology Assessment Paired T-Test (N=79).....	30
9. Table 9: Frequency and Percentage of Proficiency (N=79).....	32
10. Table 10: Guest Speaker Effects on Student Learning (N=79).....	34
11. Table 11: Guest Speaker Effects on Student Motivation to Learn (N=79)	35
12. Table 12: Final Presentation Effects on Student Motivation (N=75).....	37
13. Table 13: Interview Responses (N=15).....	38

LIST OF FIGURES

Figure	Page
1. Figure 1: Buck Institute Gold Standards of Project Design and Teaching Practices	7
2. Figure 2. VARK and Multiple Intelligences Survey Results (N=79)	12
3. Figure 3. Student Examples of Watershed Inquiry Activity	16
4. Figure 4: Examples of Student Projects to teach others outside of school	17
5. Figure 5: Examples of Student Presentations	18
6. Figure 6: Average Score Comparison for Active Learner Pre and Post Surveys (N=79).....	23
7. Figure 7: Distribution of Average Pretest Scores (N=79).....	29
8. Figure 8: Distribution of Average Posttest Scores (N=79)	29
9. Figure 9: Pretest Scores and Normalized Gains (N=79).....	31
10. Figure 10: Distribution of Proficiency Scores (N=79)	33

ABSTRACT

Traditional classrooms are teacher-centered learning environments that rely on teachers making decisions about what is going to be learned and how it will be learned. Students become passive participants with limited opportunities to make choices, feel ownership of the learning process, or experience collaborative activities. In a more student-centered learning environment, the teacher facilitates students to become active participants in the learning process by empowering them to drive the learning process. Collaboration, self-assessment, and choice lead to a sense of ownership and engagement that benefit students in school and beyond.

The purpose of this study was to determine whether Project-Based Learning (PBL) is an effective student-centered learning strategy that can impact student agency, learning, and motivation in middle school science students. The PBL unit began with local outdoor professionals sharing authentic career experiences and science methods with students, who then selected a topic to research. Students created projects to teach others about the importance of the local watershed and ecosystem before presenting their work to school staff, parents, and the same outdoor professionals.

Throughout the unit, students completed learning surveys, self-reflections, and assessments to determine the impact of student-centered strategies on learning and engagement. The results showed significant impact on student agency in the areas of student voice, choice, ownership, reflection, and collaboration. Analysis of surveys and reflections showed an increase in motivation to learn science resulting from authentic connections to the community and real-world topics. Students reported they enjoyed having choices in their learning, collaborating with classmates, and creating projects connected to relevant environmental issues in their community.

This study showed that Project-Based Learning strategies have a positive impact on student agency, motivation, and learning in middle school science classrooms. Authentic community connections, student choice, and collaborative learning experiences increased students' sense of ownership and engagement in the learning process.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

Introduction to Research

Traditional learning relies on the teacher to deliver content through direct instruction with students relegated to passive learners instead of active participants in the learning process. Students have a limited voice in how the classroom operates, and the content, pace, and structure of the lessons are decided by the teacher. In the teacher-centered classroom, the students typically have very little choice on the process and product of their learning. Students feel little ownership of the learning process without time to self-assess and reflect on their learning. Feedback comes in the form of final grades and students do not get opportunities to make improvements or correct mistakes. Collaboration comes in the form of short activities or group work, with the teacher guiding the decisions of time management and teamwork.

In contrast, a student-centered classroom positions the teacher as a facilitator and places students at the center of the learning process as active learners. Students are encouraged to use their voices to ask questions and contribute to the learning of others. Students choose topics to explore with the guidance of the teacher and work independently or in groups to create projects for an authentic audience beyond the classroom. Students develop a sense of ownership as they make decisions about what they learn and how they complete their work. Teachers support students as they reflect on their work, make improvements, and think critically about solving real-world problems. In student-centered learning environments, students engage in collaboration by managing their own workflow and decision-making.

Project-Based Learning (PBL) is a student-centered teaching method in which students “learn by actively engaging in real-world and personally meaningful projects” (Buck Institute for Education, n.d.). This method creates an engaging classroom where students become agents of their own learning. They have voice and choice in what is learned and how it is learned and develop a sense of ownership when they reflect on what they learn and receive feedback from others in a collaborative setting. The project they create is presented to an authentic audience to help students connect with others and with the community outside the classroom (Archer, 2024).

This action research project examines the impact of Project-Based Learning within a Kalispell Middle School seventh-grade ecology curriculum centered on the Flathead Watershed near Kalispell, Montana. The research took place over a seven-week period, beginning with guest lectures by local professionals and culminated in a student-centered project that students presented to an authentic audience of students, parents, staff, and community members. The purpose of the project was to understand how PBL influences student agency, content mastery, and motivation within an authentic learning environment.

Significance of Study

This study addressed the need to increase student agency and deepen students’ understanding of science concepts through more authentic, student-centered learning experiences. The lessons gave students opportunities to engage with real-world data sets, interact with community members, and create authentic projects to share with the community. Student involvement can increase their competency in academics and 21st-century skills such as collaboration and problem solving. More importantly, the authentic aspects of the project helped

students become stewards of the local environment by learning to appreciate the ecosystem in which they live.

Using a mixed-methods design, the study incorporates pre- and post-surveys, student reflections, student interviews, and content knowledge assessments to capture changes in student perceptions and academic performance. These methods provided a complete picture of how PBL supports deeper understanding of watershed ecology while promoting student agency and motivation to learn. Findings from this study will inform best practices for integrating PBL into middle school science instruction, strengthen Personalized Competency-Based Education (PCBE) implementation in our school district, and promote authentic learning experiences connected to real issues in the Flathead community in northwest Montana.

For colleagues in my district, this project provides a model for how to plan and implement PBL effectively in the science classroom. Kalispell SD #5 is shifting toward more experiential and performance-based learning through PCBE, and this action research can offer insight into experiential strategies. On a broader level, this project contributes to a growing body of research on the implementation of PBL to support best practices that promote student agency. Student agency is the process through which students take ownership of their learning by setting goals, choosing how they learn, and developing a growth mindset (KnowledgeWorks, n.d.).

Research Questions

Research Question #1: How does the implementation of Project-Based Learning affect student agency in middle school science?

Research Question #2: How does PBL impact students' ability to learn and comprehend Montana Science Standard MS-LS2?

Research Question #3: How do authentic experiences in a PBL unit influence student motivation and learning compared to traditional instruction?

CHAPTER TWO

CONCEPTUAL FRAMEWORK

Overview of Relevant Research

There has been extensive research over the last 20 years on the effectiveness of Project-Based Learning and its positive impact on student agency and learning. Four relevant sources were especially valuable while creating and designing this action research project. First, I reviewed past MSSE capstones and found one by Pamela Dresher on the effects of implementing PBL in middle school. Her capstone paper provided insight into project design and methods of data collection. Second, a book titled *Hacking Project-Based Learning: 10 Easy Steps to PBL and Inquiry in the Classroom* by Cooper and Murphy (2017) provided a framework for designing my unit with students and was an important resource for understanding the essential components of authentic PBL. Third, information from the PBLWorks website provided insight into the Gold Standard Practices of PBL and its implementation in the classroom. Finally, *A Handbook for Personalized Competency-Based Education* (PCBE) provided valuable insight into the overlap between PBL and PCBE with regard to engaging students in authentic learning experiences.

Pamela Dresher's action research study, *The Effects of Implementing Project-Based Learning in the Middle School Science Classroom* (2013), explored whether fully implementing Project-Based Learning (PBL) could improve learning compared to traditional hands-on instruction. Working with five seventh-grade classes, she shifted from isolated activities to purposeful, inquiry-driven lessons grounded in authentic scientific problems. Her PBL approach emphasized meaningful questions, collaboration, clear learning goals, and ongoing formative

assessment. Dresher used surveys and interviews to find that both treatment and non-treatment groups maintained positive attitudes toward science, though PBL students reported a deeper connection to nature and their field investigations. Post-assessment scores were similar, but the treatment group achieved these results with minimal direct instruction, relying instead on research and real-world observation. The study suggests that while test scores may not differ significantly, PBL strengthens engagement, relevance, and authentic learning experiences.

Hacking Project-Based Learning by Cooper and Murphy (2017) provided a practical guide for implementing Project-Based Learning (PBL) in classrooms through ten "hacks" that address common challenges. This book emphasizes clarity in defining learning goals while fostering a “culture of inquiry” where students take ownership of their learning. It outlines strategies for scaffolding PBL into manageable phases, incorporating student voice and choice, and assessing learning effectively through formative assessments and rubrics. The authors illustrated the importance of establishing community partnerships and authentic audiences within a PBL unit. Integrating these principles into the lessons gives students a sense of relevance and connection to increasing quality of work and accountability. Finally, they highlight the importance of time management, collaboration, and iterative learning to encourage students to refine their work based on feedback.

The third relevant source for information on Project-Based Learning is the PBLWorks website created by the Buck Institute for Education. The resources on the website support the research of Cooper and Murphy (2017) by emphasizing the importance of the same fundamental principles of student-centered learning. The website further defines the Seven Gold Standards for

PBL Project Design and the Seven Gold Standards for PBL Teaching Practices (Buck Institute for Education, n.d.).

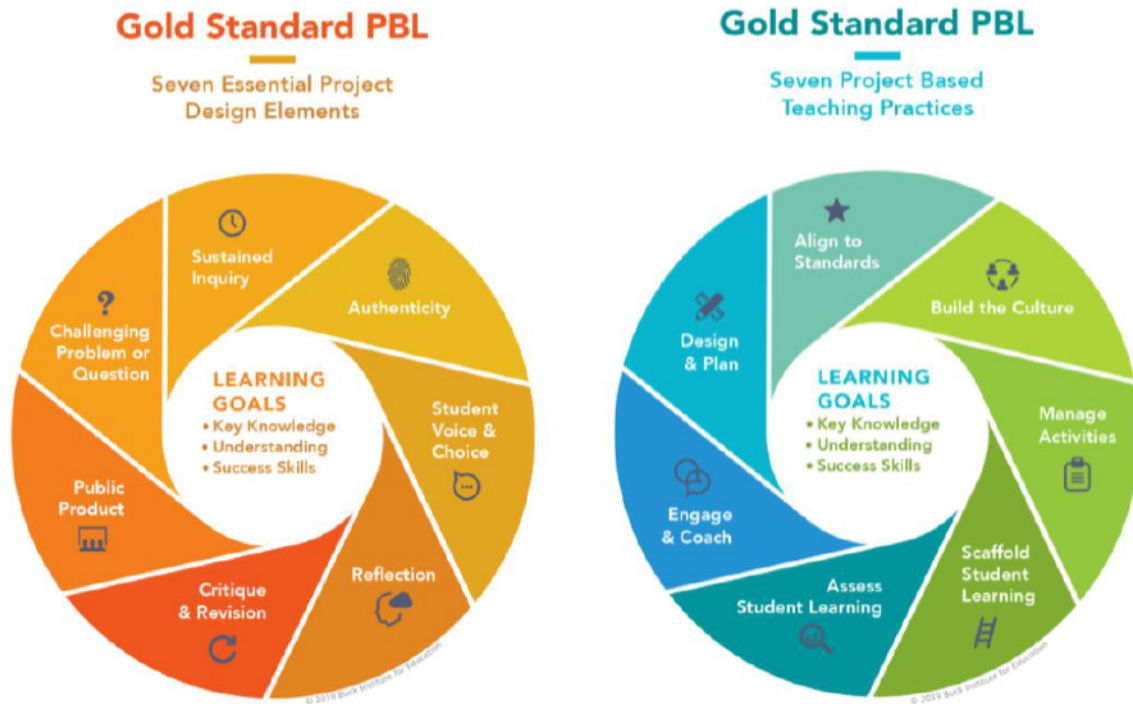


Figure 1: Buck Institute Gold Standards of Project Design and Teaching Practices

The first image in Figure 1 shows the Gold Standard Project Design elements in Project-Based Learning (Buck Institute for Education, 2019a). Project design usually begins with a challenging problem for students to investigate through inquiry-driven experiences. This enables students to find resources for information and opportunities to apply the information. Authenticity, student voice, student choice, and reflection are also essential components that create ownership. Critique and revision are processes through which students give, receive, and apply feedback from teachers and classmates. Finally, the students create a product to share their findings beyond the classroom (Buck Institute for Education, 2019a).

The second image in Figure 1 shows the Gold Standard Teaching Practices in Project-Based Learning (Buck Institute for Education, 2019b). Teaching practices usually start at the design and plan phase, in which teachers create and plan for a project launch, including aligning the content to standards. Once the project is launched, teachers need to “explicitly and implicitly promote student independence and growth” (Buck Institute for Education, 2019b). As the project continues, teachers manage activities to help students stay on task, use resources, and meet deadlines. Scaffolding includes meeting one-on-one with students or employing other small-group instructional strategies to help students reach goals. Summative and formative assessments are used to determine student progress toward learning goals and may include self- and peer evaluations as well. The final teaching practice suggests that teachers act to engage and coach students throughout the project to promote a student-centered learning environment rather than a teacher-centered approach (Buck Institute for Education, 2019b).

Finally, *A Handbook for Personalized Competency-Based Education* by Robert J. Marzano, Jennifer S. Norford, Michelle Finn, and Devon Finn III (2017) emphasizes that education should be guided by competencies that students master. For this action research project, there is less focus on the use of PCBE competency scales and more emphasis on principles of personalized learning and student agency. Marzano et al. (2017) define student agency as “the capacity and propensity to take purposeful initiative—the opposite of helplessness” (p. 37). Teacher strategies to “assist students in developing agency include... integrating student voice and choice into the teaching and learning process” (Marzano et al., 2017, p. 38). They continue by saying that in PCBE, students develop a sense of ownership and “identify behavioral traits necessary to meet classroom goals, create tools for measuring

progress, and establish processes for setting goals, monitoring progress, and reflecting” (Marzano et al., 2017, p. 38). The focus of PCBE is like PBL in that both promote student engagement in real-world projects where students apply their knowledge to solve problems. Both educational frameworks place a high value on student agency by empowering students to make decisions and take ownership of their learning in a student-centered environment.

General Findings and Themes

There are many key components of Project-Based Learning (PBL) and Personalized Competency-Based Education (PCBE) that overlap. PBL is defined as a teaching method in which students learn by actively engaging in real-world and personally meaningful projects (Buck Institute for Education, n.d.). According to the HQPBL website, PBL is “an important instructional approach that enables students to master academic skills and content knowledge, develop skills necessary for future success, and build the personal agency needed to tackle life’s and the world’s challenges” (High Quality Project Based Learning, 2018, p. 1). Similarly, PCBE focuses on authentic projects with an emphasis on building student agency. The Foundation for Excellence in Education defines PCBE as a system that promotes higher-level learning through mastery of concepts and authentic project-based learning that enhances student agency (Marzano et al., 2017, pp. 1–7).

The essential concepts that connect PBL and PCBE can be summarized into five major themes that stand out as guides for transitioning from traditional teacher-centered learning methods to student-centered learning. The first theme states that learning is an authentic student-centered experience in which students have voice and choice in the focus of their community-based projects (Marzano et al., 2017, p. 58). The second theme is the development of

collaboration skills, so students learn to be effective communicators within a group (High Quality Project Based Learning, 2018, p. 4). The third theme focuses on the importance of reflection and feedback for students to think critically about the product and process of their project (High Quality Project Based Learning, 2018, p. 5). Building student agency is the fourth theme, in which students take ownership of their learning through self-assessment and project management (Marzano et al., 2017, p. 68). Finally, the fifth theme is creating intellectual challenges by engaging students in answering community-based problems through analysis, inquiry, and critical thinking (High Quality Project Based Learning, 2018, p. 3).

Applications for Action Research

The Flathead Watershed PBL action research project has several important applications for improving instructional design and supporting deeper learning in middle school science. By engaging students in the investigation of the local watershed, the project teaches students ecology standards by studying local environmental issues that directly apply to our community. The project also supports the goals of PCBE by enhancing student agency and mastery learning. Learning from an authentic audience of community members encourages students to take ownership of their work, make meaningful choices, and track their progress toward a goal for the presentation to those same community members. As a result, the PBL unit enhances student agency with real-world problem-solving aligned with PCBE strategies that Kalispell School District #5 is implementing.

CHAPTER THREE

METHODOLOGY

Introduction

The purpose of this research is to implement a PBL unit into the middle school classroom to determine the value it has in building student agency and student-centered learning.

Traditional instruction puts the student in the role of passive learner with the teacher as the decision maker. Teachers still need to enforce the rules and manage behaviors in a classroom, but the students should be empowered to drive their learning to mirror the real world. The PBL unit will introduce the students to student-centered learning in hopes of motivating them to take ownership of their learning and increase their awareness of authentic learning experiences.

Using mixed-methods design, data were collected to determine the impact of student-centered PBL on student agency, acquisition of content knowledge, and students' motivation to learn. Qualitative data were collected using several Likert surveys, student reflections, and interviews. Each of these sources provided quotes from students about their feelings on various aspects of the treatment. The surveys and reflections were also analyzed quantitatively to find frequencies and percentages of students who felt similar. Quantitative data were also collected from the pre- and post-test used to measure the impact of the treatment on science knowledge.

Since the students in this study fell under the protection of the IRB (Institutional Review Board), paperwork was submitted to ensure the study was ethical, safe, and protected participant

privacy. This study #2026-2377 received exemption in January 2026 prior to the start of the treatment (Appendix A).

Demographics

According to the 2024 U.S. Census website, the city of Kalispell, Montana, had a population of about 31,300 people and was predominantly White (U.S. Census Bureau, n.d.). Kalispell Middle School (KMS) is the largest middle school in Montana, with about 1,060 students in grades 6–8, and the ethnicity of the students mirrors that of the city (Kalispell Middle School, n.d.). For the treatment in this action research project, there were three class periods totaling 79 seventh-grade students. The group was composed of 40 boys and 39 girls, none of whom had an Individualized Education Plan (IEP) for learning or behavior issues.

Earlier in the year, students participated in two different learning surveys that were pertinent to this Action Research treatment. The first metric was a VARK survey that asked a series of questions to determine whether students were visual, auditory, reading/writing, or kinesthetic learners. The second survey determined each student's multiple intelligences as proposed by Howard Gardner.

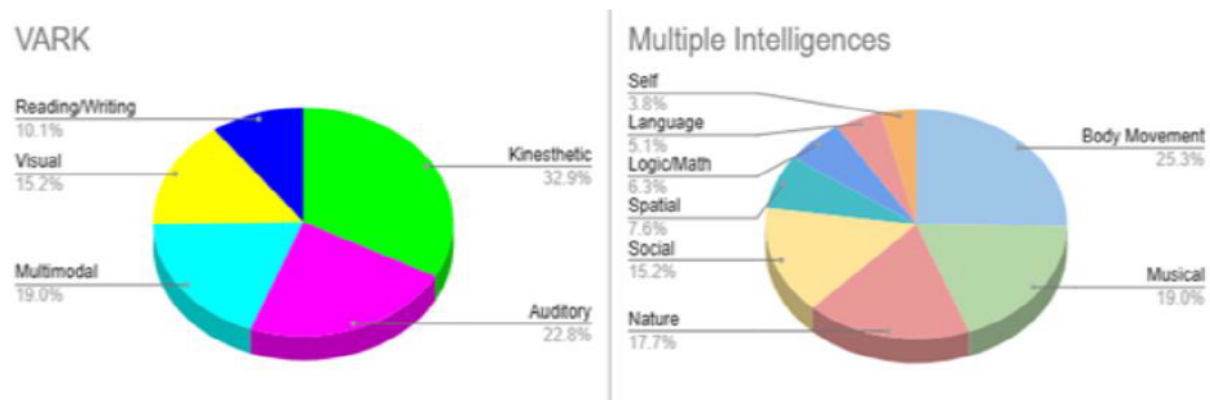


Figure 2: VARK and Multiple Intelligences Survey Results (N=79)

The surveys shown in Figure 2 were given during an advisory period in October 2025 to help students identify their learning styles, increase student agency, and prepare for student-led conferences. The results were pertinent to this action research because both surveys show that students with kinesthetic and bodily movement intelligence will likely do well with the active, hands-on activities of PBL. The high percentage of naturalistic and social intelligences supports the science content and collaborative nature of the Flathead River Watershed PBL project in the treatment. A lower percentage of students scored high in reading/writing and linguistic intelligence. These students may struggle with the hands-on nature of PBL but may thrive with the reading, writing, and abstract reasoning required during the treatment.

Treatment

The treatment in this action research involved the design and implementation of a seven-week PBL unit aligned with Montana State Ecology Standard MS-LS2. This middle school life science standard emphasizes interactions among living things in ecosystems, cycles in nature, and environmental problems and solutions. At the beginning of the year, several months before the treatment, students participated in lessons that previewed the school year and introduced basic vocabulary about communities of living things and environmental factors in ecosystems. As a result, it was assumed they would have very little content knowledge before beginning the treatment. The three phases of the treatment included guest presentations from local professionals, student research and project planning, and presentations to staff, parents, and community members.

Table 1: Treatment Schedule for Flathead River Watershed Project

Guest Presentations Phase		
Week	Focus	Key Activities
Week 1	Data Collection	- Active Learner pre survey to assess student perceptions of student agency - Ecology pretest on Montana Standard MS-LS2
	Begin guest speaker presentations	Guest Speakers from the Community to discuss the Flathead Watershed
Week 2	Guest speaker presentations	Guest Speakers from the Community to discuss the Flathead Watershed
Week 3	Guest speaker presentations finish	- Guest Speakers from the Community discuss Flathead River Watershed. - Guest Speaker Survey
Student Research and Project Phase		
Week 4	Project Launch	- Watershed Inquiry Activity - Project Overview to introduce essential questions, project expectations, and project timeline
	Students Research	- Students brainstorm project ideas and topics to research - Students complete daily and weekly Active Learner reflections - Teacher Conduct Student Interviews
Week 5	Students Research and at-home Project	- Teams or individuals choose research topics and begin their research - Students begin at-home Project to share research findings with family, friends, or community members - Students complete daily and weekly Active Learner reflections - Teacher Conduct Student Interviews
Presentation Phase		
Week 6	Create Final Product	- Students synthesize their research and Project findings into a poster or digital presentation - Students engage in self-assessment, peer review, and receive teacher feedback.

		Students complete daily and weekly Active Learner reflections
Week 7	Project Fair Culminating Event	Teams or individuals present Posters or digital slideshow to share findings with parents, teachers, and community members
Week 8	Data collection	Collect data from Active Learner post survey, Final Presentation Survey, Ecology posttest on Montana Standard MS-LS2

Table 1 shows the Guest Presentation Phase for the first three weeks of the treatment. The Flathead River Watershed unit began with an Active Learner pre-survey (Appendix B) to collect qualitative and quantitative data on student experiences with student agency. Students were introduced to the concepts of voice, choice, ownership, reflection, and collaboration earlier in the year during schoolwide lessons in an advisory period. One class period was spent reviewing the concepts, and students completed the survey in Google Forms the next day. The following day, students took the Ecology pretest on Montana Standard MS-LS2 (Appendix C), and we reviewed their pretest scores the next day.

The first phase of the treatment continued with eight guest speakers from the local community giving presentations and leading activities on different days over a two-and-a-half-week period. The guest speakers were outdoor professionals representing the Audubon Society, Montana FWP (Fish, Wildlife, and Parks), Flathead Lake Biological Station, the Forest Service, and the Flathead Rivers Alliance. Students used journals to write notes on the goals of each profession, how science is used on the job, native species of interest, and environmental problems in the ecosystem. This part of the treatment concluded with a survey about student perceptions of the guest speakers and their activities (Appendix D).

Starting in Week 4, the Student Research and Project Phase began with an introduction to the Flathead River Watershed after students reviewed notes from all of the guest speakers. Students then participated in an inquiry activity to build a watershed based on what they had learned. They worked in groups to use materials such as binders, markers, and Chromebooks to build a watershed that included mountains, valleys, streams, rivers, and lakes. Figure 3 shows two examples of student-created watershed models.

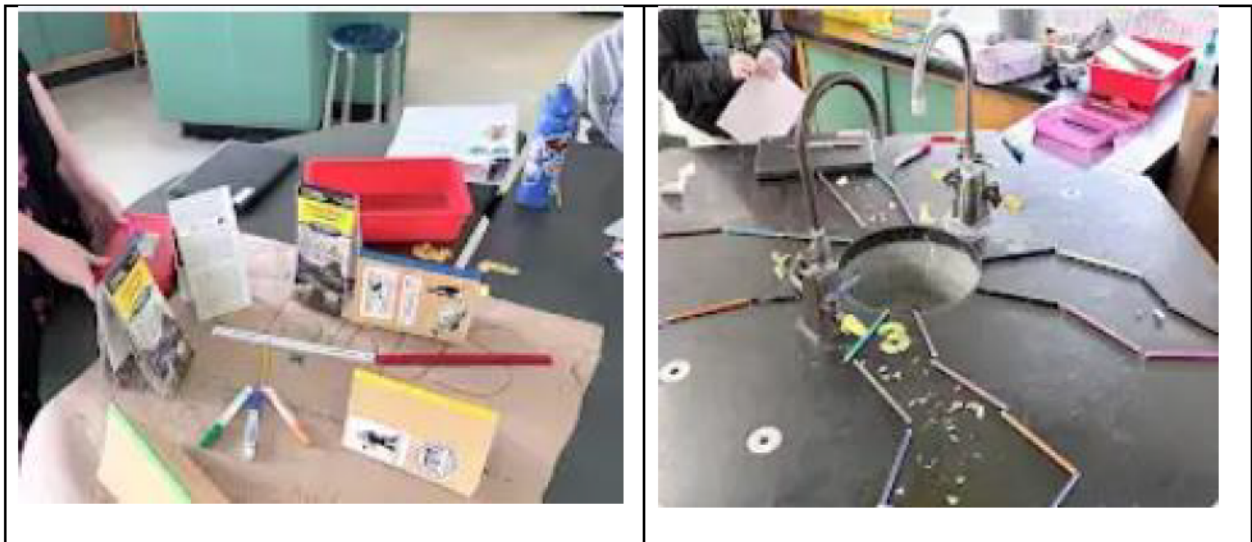


Figure 3: Student Examples of Watershed Inquiry Activity

Also in Week 4, the Flathead River Watershed Project was launched using an Overview page to preview the project (Appendix E) and a Resource page to help focus their research (Appendix F). Students then began to brainstorm research topics based on the notes taken during the guest lectures before they chose a topic of interest. At this time, they also decided to work on their own or to join small groups to complete their at-home project. Students chose three research items from a choice board included on page 3 of the Overview to learn more about their topic. Students also started daily reflections in their journal to track their level of participation and

student agency for that day and plan for the next day. At the end of the week, they reviewed each day's reflection and used Google Forms to complete a summative weekly reflection.

During Week 5, students continued to research their topics in class while designing an at-home project to share their findings with others. Students chose from a list of project ideas on page 3 of the Overview (Appendix E) to complete outside of school. Figure 4 shows examples of an informational poster about Glacier National Park and a 3D model of Hungry Horse Reservoir. The goal was for students to share their research, their answers to the essential questions, and the value of the Flathead River Watershed with others outside of school. Students also continued daily and weekly reflections in their journals. Student interviews were also conducted during this time to collect feedback on the impact of student-centered learning environments compared to teacher-centered environments.



Figure 4: Examples of Student Projects to Teach Others Outside of School

The final two weeks of the Flathead River Watershed Project were the Presentation Phase of the treatment. Students chose to create a poster or slideshow presentation to display their research

and summarize their project and how it was shared outside of school. Students used the rubric (Appendix G) to self-assess and collaborated with classmates to peer review one another's work. The teacher also gave each student feedback using the same criteria outlined in the rubric. Students completed their final set of daily and weekly reflections during this phase.



Figure 5: Examples of Student Presentations

To finish the Flathead River Watershed Project, most of the students participated in the culminating event where each student set up their poster or slideshow around the school library. Figure 5 shows examples from the “project fair” where parents, staff, and community members were invited to attend and rotate around the room to visit with students. Students had the opportunity to present their information and answer questions with several people or small groups during the 45-minute session.

In the days following, students took the Active Learner post survey (Appendix B), completed a Final Presentation Survey (Appendix H), and took the Ecology Posttest (Appendix

C). This ended the treatment, and data were analyzed for the purposes of studying the impact of the treatment.

Research Methods

In this study, the independent variable is the PBL instructional strategy of implementing a seven-week PBL unit centered on environmental issues in the Flathead Watershed. The PBL unit was designed to provide students with authentic, inquiry-driven experiences that emphasize collaboration, critical thinking, and the development of student agency. The dependent variables were the measures of student learning and agency. These include students' ability to apply ecological concepts, collaborate effectively in groups, and demonstrate critical thinking through their projects and presentations. Student agency was also measured through surveys and reflective journals that focused on how motivated and involved students feel during the learning process. Self-assessments and peer feedback were used to capture their perceptions of the learning experiences during the unit. Classroom culture served as an important contextual variable because supportive environments that foster interest are essential to PBL. These variables provided a comprehensive understanding of how implementing PBL impacts student agency, student learning, and student motivation. Table 2 shows the data collection methods for the three focus questions in this action research project.

Table 2: Data Collection Methods for the Three Focus Questions

Focus Question	Data Collection Method 1	Data Collection Method 2	Purpose
How does the implementation of Project-Based Learning impact student agency in middle school science?	Pre and post student surveys	Student Weekly Self Reflection	• Surveys capture student perceptions of student agency before and after treatment • Weekly Reflection form captures ongoing self-assessment by students
How does PBL impact students' ability to learn and comprehend Montana Science Standard MS-LS2?	Pretest and Posttest scores	Standards Based Proficiency Scores	• Pretest and Summative Posttest provide quantitative data • Summative scores for research, project, and final poster show levels of proficiency
How do authentic experiences in a PBL unit influence student motivation and learning compared to traditional instruction?	Student survey	Student Interviews	• Surveys provide qualitative data on student experiences • Interviews allow for deep exploration of motivation and work ethic

CHAPTER FOUR

DATA ANALYSIS: CLAIMS AND EVIDENCE

Results of Focus Question #1

To address the primary focus question of how the implementation of Project-Based Learning impacted student agency in middle school science, students participated in a pre- and post-survey and completed weekly reflections regarding student agency. All surveys were administered using Google Forms. The surveys provided quantitative data for each student to determine whether there was an increase in awareness and ability related to student agency, or the ability to feel purposeful and active in one's own learning. In addition to the pre- and post-surveys, weekly reflections during the treatment provided quantitative and qualitative data about students' changing perceptions of student agency.

All 79 students completed a student agency pre-survey at the beginning of the unit to assess their perceptions of being "agents of their own learning." The five categories of student agency in the survey included voice, choice, ownership, reflection, and collaboration. Each category had five statements in which students self-assessed their proficiency using a scale from 0–4, for a total score of 20 if they "strongly agreed" they were proficient. Total scores of 0–5 indicate novice abilities, scores of 5–10 indicate developing abilities, scores of 10–15 indicate some proficiency, and scores of 15–20 indicate higher proficiency.

At the end of the seven-week unit, students took the survey again to collect data on their perceptions after the student-centered Project-Based Learning treatment. Raw data show that 74 students showed improvement in their student agency abilities, while only five students self-

assessed a slight decrease or no change. These results showed the positive impact of the treatment on developing student agency skills.

Table 3: Statistical Comparison of Student Agency Pre and Post Surveys (N=79)

Category	Average Score	Median Score	Mode	Lowest Score	Maximum Score	Standard Deviation
Voice Pre	12.2	13	13	5	18	3.33
Voice Post	13.6	14	13	5	19	3.24
Choice Pre	9.4	10	11	0	18	3.28
Choice Post	15.6	16	15	8	20	2.98
Ownership Pre	11.7	12	14	2	17	3.39
Ownership Post	13.8	14	15	4	20	3.47
Reflection Pre	11.8	12	12	3	18	3.36
Reflection Post	13.9	14	15	6	20	3.20
Collaboration Pre	13.1	13	15	4	18	3.02
Collaboration Post	13.9	15	15	5	20	3.08

Table 3 shows the average scores, median scores, mode, and range of the pre- and post-surveys. All categories showed increases from the pre-survey to the post-survey in average score, median score, and maximum score. This suggests that the treatment played a role in improving students' abilities. The Voice category showed moderate improvement in average scores, but 13 remained the most common score. The Choice category showed the greatest growth, with a large increase in minimum score and median score, indicating that students felt more engaged in their learning during the treatment. Ownership and Reflection had similar results, indicating moderate increases in ability. Increases in the median and mode for both categories show a positive shift in the abilities of most students. The final category, Collaboration, showed very little change except for an increase in the median score from 13 to 15. The increase in median scores in this category indicates that improvements in student agency were experienced by most students, not just a

small group of high achievers. The average standard deviation for all five categories was 3.3, suggesting low variability in the scores because students' scores clustered around the average. The similar standard deviation values for both surveys show that the overall spread or variance in scores remained consistent across both surveys, adding to the validity of the results.

Further analysis was used to determine whether the increase in student survey scores was statistically significant or due to random chance or circumstance. All 79 students responded to the pre-survey and post-survey for a total score of 100 points for each survey. The average score increased 12.3%, from a pre-survey average of 58.2 to a post-survey average of 70.5. This indicates that most students felt they had some student agency skills before the unit and that those skills increased because of the treatment. The results of this analysis indicate that the treatment had a positive impact on student perceptions of their abilities to be agents of their own learning.

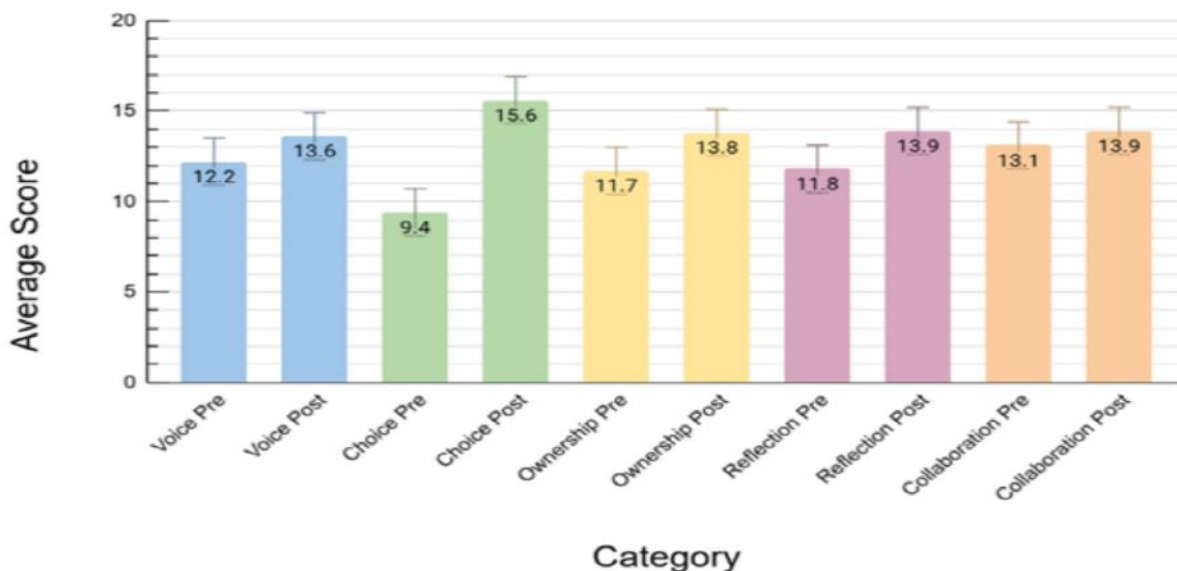


Figure 6: Average Score Comparison for Active Learner Pre and Post Surveys (N=79)

Figure 6 shows an increase in average scores in all categories, with Choice showing the greatest change with +6.2 increase in self-assessed ability. This result showed that students are aware of how seating choice, choosing work groups, and choosing project topics positively impact their learning. Their skills in the Collaboration category showed the least improvement with an increase of +0.8. In a traditional teacher-centered classroom, the teacher defines the roles and rules within groupwork, compared to a student-centered classroom where the group members create the roles and enforce the “rules.” There were only 21 students in total who chose to collaborate with one or more partners, so the development of these skills may have been minimal. Finally, the standard error shown is equal to 1.1 for both surveys, indicating that the averages for both surveys are precise estimates with relatively low variability in the samples.

Table 4: Results of Paired T-Test (N=79)

Statistic	Value
t-statistic	11.4
Degrees of Freedom (N-1)	78
p-value	2.83×10^{-18} (<.0001)
Effect Size (Cohen’s d)	1.28

Table 4 shows the results of a paired t-test, indicating that the results are statistically significant and not the result of random chance. The t-statistic of 11.4 shows that the treatment between the two surveys resulted in an increase in student agency scores rather than random changes. Having a large group size of 79 students results in degrees of freedom equal to 78, which further adds reliability to the results because of the large sample size. The p-value

represents the probability that the results occurred due to random chance. The actual p-value of 2.83×10^{-18} shows a very low probability ($<.0001$) and indicates near certainty that the change in scores is a result of the treatment. Finally, an effect size of 1.28 shows that the treatment had a substantial positive effect on student learning and student agency. The treatment was very effective and potentially had a long-term impact on student agency for most students.

In addition to the quantitative data collected in the student agency pre- and post-surveys, qualitative data were collected through student weekly reflections during several weeks of the treatment. For the three-week research and project phases of the treatment, students completed handwritten daily reflections in their journals and then completed weekly Google Form reflections every Friday. On Fridays, they reflected on their journal entries from each day that week to create a summative weekly reflection that captured their self-assessment for the week. Students reflected on their level of preparation and participation, and these three sets of weekly responses were later coded and analyzed for themes of voice, choice, ownership, reflection, and collaboration. Table 5 shows the results of a thematic analysis of 226 individual student reflections generated by 79 students over the three-week period. This created a total of 696 separate statements aligned to one of the themes (Google, 2026). Google Gemini was used to assist in interpreting the qualitative data collected in the weekly reflections based on teacher-created theme definitions and data collected and organized by the teacher.

Table 5: Thematic Analysis of Weekly Reflections (N=696)

Student Agency Code	Frequency	Percentage	Theme Definition
Collaboration	184	26%	• Staying focused within a group • Sharing group responsibilities • Task Management

Ownership	165	24%	• Responsibility • Independence • Staying on task
Choice	125	18%	• Time management • Creating a plan • Decision Making
Reflection	118	17%	• Work completion • Planning • Achieving goals
Voice	104	15%	• Asking questions • Sharing thoughts with others • Communicating Needs

The results of the thematic analysis of student reflections shown in Table 5 add to the data from the pre- and post-surveys and help reinforce the positive impacts of the treatment. While the reflections do not necessarily imply that students improved during the treatment, they indicate that students were conscious of these abilities during the treatment. Collaboration and Ownership were the top two themes, combining to represent 50% of all student reflections as students reflected on tasks to complete and responsibilities. The themes of Choice, Reflection, and Voice were present in reflection statements focused on planning, decision-making, and sharing information.

Table 6: Theme Aligned Student Quotes (N=79)

Theme	Student Quotes
Collaboration	“I worked with my team and helped others when they needed it.” “I gave [student name] feedback when we presented and stayed focused on completing our project together.”
Ownership	“I worked every day this week at school and at home. I think I did a good job staying on task and getting everything done!”

	"This week I took responsibility for my work, stayed focused most of the time, and met my goals for the project."
Choice	"I figured out what I wanted to do so made a plan for my project and used class time to lock in and get work done." "I finally made time to do my project at home and stayed on track during work time and WIN period."
Reflection	"I thought about the goals for daily work then worked toward finishing it each day. A little work each day helps. There is a lot of work to do." "I looked at what I had done since I fell behind after missing school. I made progress but I need to work at home some."
Voice	"I asked Mr. Eash a couple of questions which helped me understand my project better. The rubric doesn't make sense." "I got some help from [student name] which helped a little."

Table 6 shows student quotes aligned with each theme of student agency. The quotes are a representative sample of descriptions given throughout the three-week period of student reflections. These samples highlight the students' willingness to self-assess and their progress in utilizing voice, choice, ownership, reflection, and collaboration. Combined with the results from the thematic analysis and the surveys, the results support the conclusion that student-centered PBL treatment is very effective in promoting student agency in middle school.

Results of Focus Question #2

To address the second focus question of how PBL impacted students' ability to learn and comprehend Montana Science Standard MS-LS2, students participated in a pre- and post-assessment on the principles of ecology. The pre- and post-assessments provided quantitative data for each student to determine whether there was an effective increase in knowledge of basic

ecology concepts and comprehension of the five Montana State Ecology Standards. The middle school standards address energy in ecosystems, interdependent relationships, natural cycles, ecosystem dynamics, and biodiversity (The Wonder of Science, n.d.). All 79 students took the pretest before any content was presented by the teacher or guest speakers. Students took the posttest after the treatment but before the culminating Project Fair at the end of the unit.

Table 7: Statistical Comparison of Pre and Post Tests (N=79)

	Average Score	Median Score	Mode	Minimum Score	Maximum Score	Expected Average Score
Ecology Pretest	18	16	8	0	52	20
Ecology Posttest	55	57	43	13	94	80

Table 7 shows the cumulative results of the Ecology pretest and posttest. The average score increased by 37 points from the pretest to the posttest. An increase of 41 points in the median score indicates that the typical student made gains during the treatment as well. The mode shows the most common score for the two tests, and there was a 35-point increase, indicating an overall increase in scores for the group. The range shows improvement for the 79 students, as the maximum scores show a percentage increase of about 81%. Based on prior knowledge before the pretest, the teacher determined the target score for students to be 20. Based on the expected student learning during the treatment, a target score of 80 would show reasonable gains in student learning. The final averages for both tests were below the expected scores, especially the post-test, which had an average score about 25 points lower than expected.

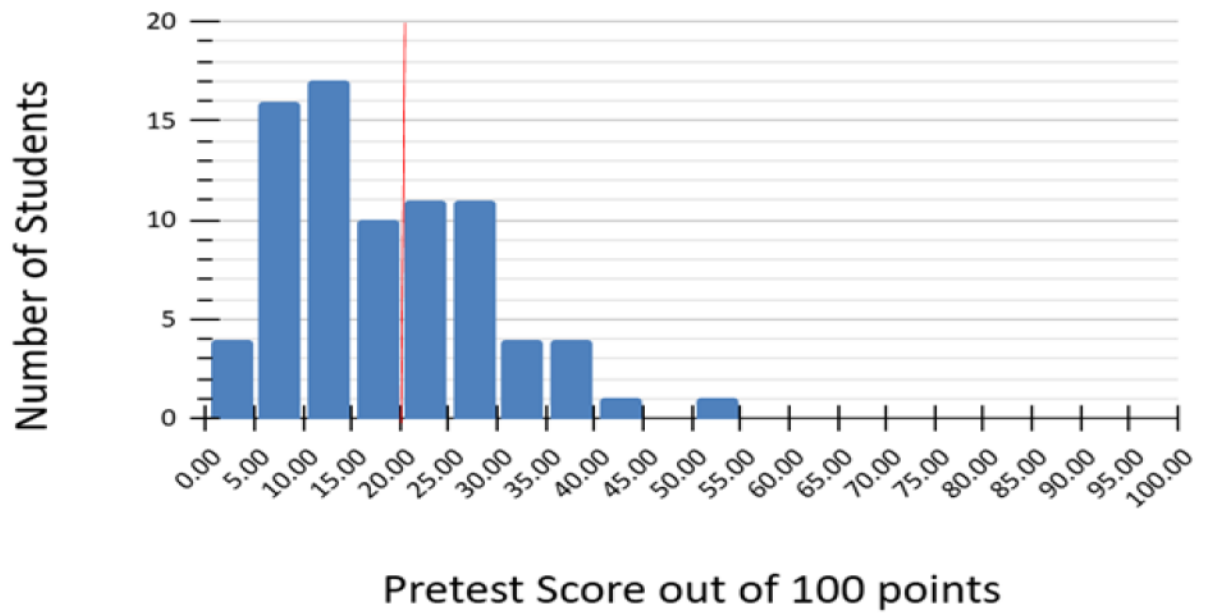


Figure 7: Distribution of Average Pretest Scores (N=79)

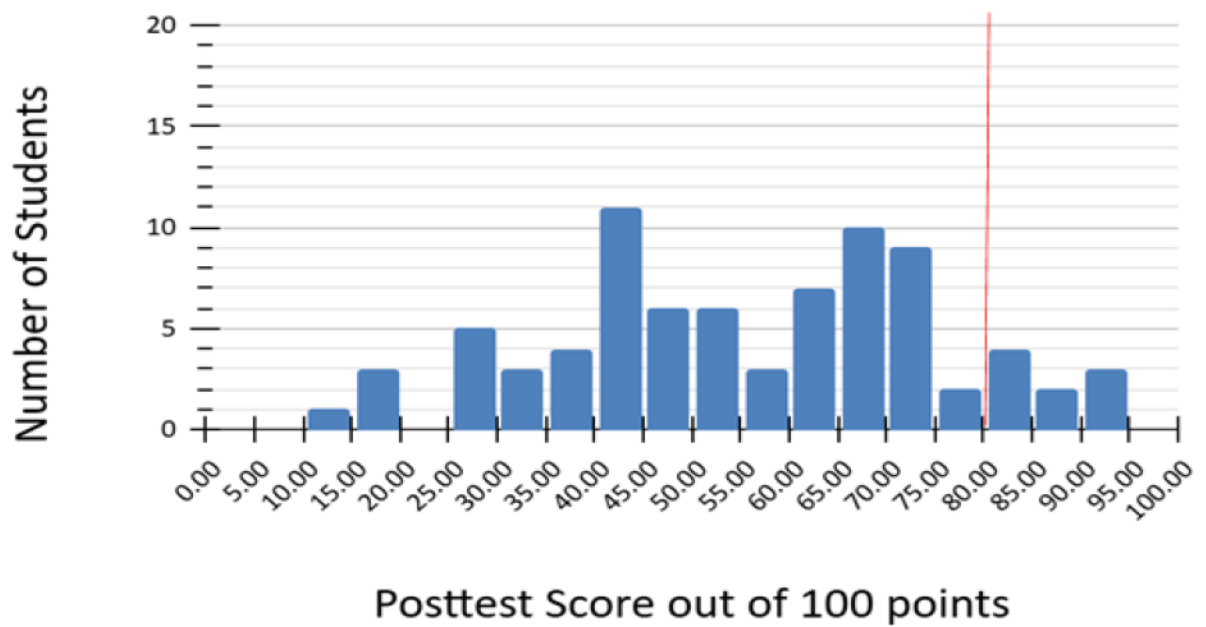


Figure 8: Distribution of Average Posttest Scores (N=79)

Figures 7 and 8 show the distributions of the scores for the Ecology pretest before the treatment and the posttest after the treatment, respectively. The pre-test scores in Figure 7 show most test scores clustered below 30 points. The red line shows the target score of 20 points expected by the teacher and 32 out of 79 (41%) of students were at or above this score. The posttest scores in Figure 8 show most test scores clustered between 40 and 75 points. The red line shows the target score of 80 points expected by the teacher and 9 out of 79 (11%) of students were at or above this score.

Table 8: Results of Ecology Assessment Paired T-Test (N=79)

Statistic	Value
t-statistic	18.5
Degrees of Freedom (df)	78
p-value	$1.3 \times 10^{-30} (<.0001)$
Effect Size (Cohen's d)	2.1

Table 8 shows the results of a paired t-test, indicating that the results are statistically significant and not the result of random chance. The t-statistic of 18.5 is very high and shows that the treatment between the two tests resulted in an increase in comprehension scores rather than random changes. Having a large group of 79 students results in $df = 78$ ($N - 1$), which further adds reliability to the results because of the large sample size. The p-value represents the probability that the results occurred due to random chance. The actual p-value of 1.3×10^{-30} shows a very low probability ($<.0001$) and indicates near certainty that the change in scores is a result of the treatment. Finally, the effect size of 2.1 shows that the treatment had a substantial

positive effect on student learning. The treatment was highly effective for most students, although the posttest scores were well below the expected target score.

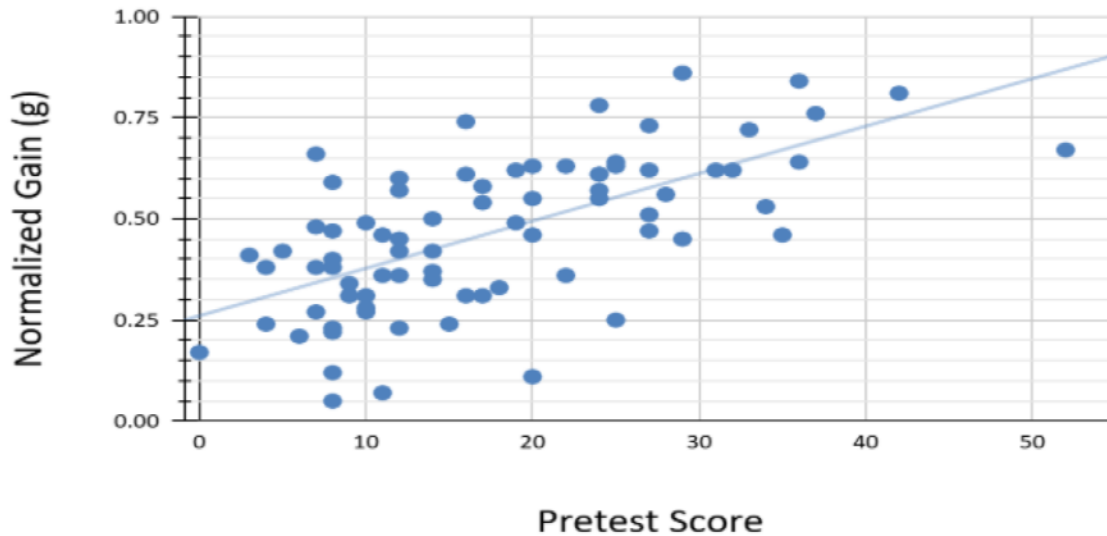


Figure 9: Pretest Scores and Normalized Gains (N=79)

Raw data from the pre- and post-tests were analyzed to calculate the normalized gains for each student (Google, 2026). Google Gemini was used to assist in interpreting the raw data and calculating normalized gains based on the data collected and organized by the teacher. Figure 9 shows the normalized gains of students relative to their pretest scores. Normalized gains are calculations that show the percentage of increase in score from the pretest to the posttest. For example, the student on the far right of the graph who scored a 52 on the pretest scored an 84 on the posttest, resulting in a 0.67 normalized gain and indicating a 67% improvement.

The average normalized gain for the group is 0.47, which indicates medium gains because it falls in the range of 0.3–0.7 (Hake, 1998). Nine out of 79 students (11%) had normalized gains above 0.7, and 15 out of 79 students (19%) had normalized gains below 0.3. This indicates higher-than-expected gains and lower-than-expected gains, respectively, according to Hake (1998). The overall distribution of scores shows that the treatment was moderately effective for students learning science content.

In addition to the Ecology assessments, students were evaluated on their research notes, unit project, and final poster/slides. Kalispell Middle School uses standards-based grading on a 4-point scale with a score of three being considered “proficient.” The final score for the research notes was determined only by the teacher, while the scores for the project and poster/slides were a combination of scores determined by the teacher and student together. For the purposes of this action research, the three scores for notes, project, and poster/slides were averaged to find a total score rounded to the nearest tenth to determine proficiency for content knowledge and comprehension.

Table 9: Frequency and Percentage of Proficiency (N=79)

Range of Average Score	Frequency	Percentage
Score 0 - 0.9 “Novice”	3	4%
Score 1.0 - 1.9 “Novice”	4	5%
Score 2.0 - 2.9 “Nearing Proficient”	19	24%
Score 3.0 - 3.9 “Proficient”	39	49%
Score 4.0 “Advanced”	14	18%

Table 9 shows that 53 out of 79 (67%) of the students are proficient or advanced when the score for their research notes, project, and poster/slides are averaged. In addition, nine of the nearing proficient students had an average score of 2.7, which means they achieved proficiency in two out of the three items being assessed. This shows a high percentage of students working at proficiency on all or most of their work during the treatment. Finally, the calculated average for all 79 students was 3.0, which also indicates that most students achieved proficiency for the research and project phase of the treatment.

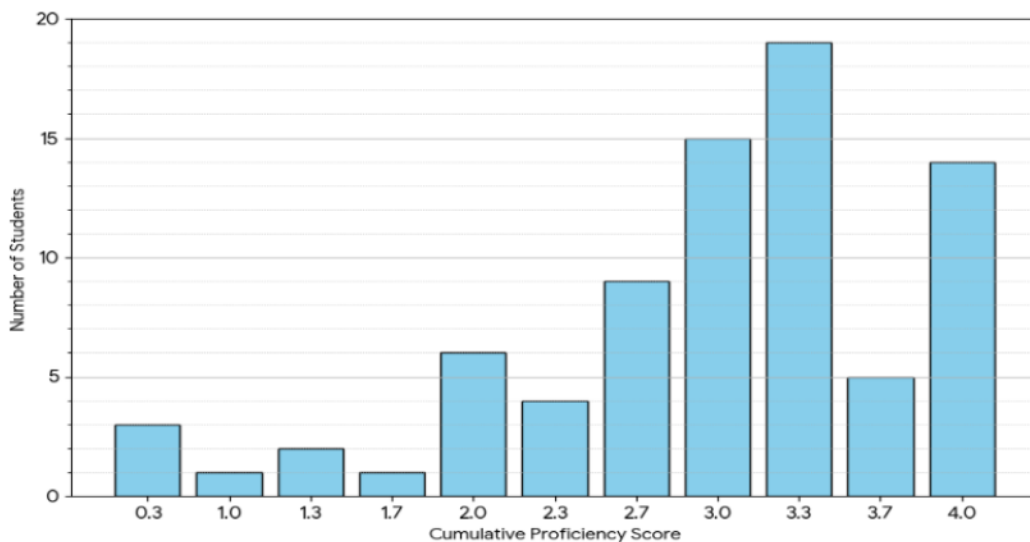


Figure 10: Distribution of Proficiency Scores (N=79)

Figure 10 shows the distribution of scores rounded to the nearest tenth. For example, a student who scored one 3 and two 4s for their work received an average score of 3.7. Another student who achieved two 2s and a 3 received an average score of 2.3. The data collected for the research and project phase of the treatment clearly show that the treatment had a positive impact on student proficiency for Montana Science Standard MS-LS2, assuming low levels of

proficiency before the treatment. These results, combined with the results of the pre- and posttest, show that the treatment moderately increased comprehension and knowledge related to Montana Standard MS-LS2.

Results for Focus Question #3

To address the final focus question of how authentic experiences in a PBL unit influence student motivation and learning, students participated in two separate surveys. In addition to the surveys, students were asked to volunteer to be interviewed, and several were chosen to provide feedback. The first survey was administered three weeks into the treatment at the end of the Guest Presentation Phase. The survey provided data on students' perceptions of learning and motivation from the guest lecturers and their activities. The second survey was given at the end of the seven-week treatment after the final presentations at the end of the Project Phase. The survey provided data on students' feelings of motivation, knowing they were presenting to an authentic audience. Finally, several students volunteered to be interviewed during the four weeks of the Research and Project Phase. The interviews provided data on student perceptions of PBL and student-centered learning experiences during the treatment.

Table 10: Guest Speaker Effects on Student Learning (N=79)

Student Answer	Frequency	Percentage
Strongly Disagree	0	0%
Disagree	1	1%
Neutral	16	21%
Agree	45	57%
Strongly Agree	17	21%

Table 10 shows the results of the Guest Speaker Survey given three weeks into the treatment at the end of the lectures given by eight different local outdoor professionals. Students were asked three Likert survey questions about how well they thought the guests helped them learn about careers, native species, and environmental issues compared to traditional instruction. The results show that 78% of students agreed or strongly agreed that career professionals helped them learn science content related to the Flathead Watershed.

In the survey, students were also asked to explain their answers. One student responded that “the slideshows were very informational and helped me understand how things work, especially with the pictures and explanations.” Another student wrote, “The activities were fun and helped me better understand the topic, especially when we got to do hands-on things like the invasive species or river activities.” Another student added to this idea by writing, “I really liked how they brought in real-life objects and examples from their jobs. It helped me understand what they actually do and made the learning more interesting.” The responses of the 22% of students who did not feel they learned as well from the guests centered around the guests presenting too quickly, not speaking clearly, or the student not being interested in the topic.

Table 11: Guest Speaker Effects on Student Motivation to Learn (N=79)

Student Answer	Frequency	Percentage
Strongly Disagree	1	1%
Disagree	10	13%
Neutral	25	32%
Agree	34	43%
Strongly Agree	9	11%

Table 11 shows the results of the two additional Likert survey questions from the Guest Speaker Survey regarding how students felt the guests motivated them to learn more about their careers and local environment. The results show that 54% of students agreed or strongly agreed that the guest speakers helped motivate them to learn more or created interest in studying the local ecosystem. One student responded that “I really liked Ms. Garby and I found her presentation interesting. It got me into birds and now I’m reading about birds in Montana.” Another student was inspired to go to the lake and wrote, “these presentations make me want to go outside and explore nature.” Another student wrote, “I gained another perspective about nature and its deeper meaning, and it made me want to learn more about how the world works.”

The results of these two survey questions showed that 46% of students felt neutral or disagreed that they felt motivated to learn more. These students reported that they grew tired of the lectures each day and would have liked more videos and hands-on activities to break up the time spent taking notes. One student wrote, “I feel like the activities could be a little bit more engaging because some of them didn't really fit with the most important stuff that they told us.” Several students felt there needed to be more time to discuss the activities, and one wrote, “I think some of the activities were hard to follow on their own since we were rushed for time so completing them took lots of help.”

At the end of the seven-week treatment, students were asked to present their research and project to parents, staff, and the same guest speakers that presented to them earlier. Students were given a Final Presentation survey regarding their perceptions of motivation and learning based on knowing they were presenting to an authentic audience, not just classmates and the teacher. The Likert survey included questions about how they felt before and after the presentations, as

well as feelings of motivation to do well in front of parents, staff, and guests. Only 75 students participated in the final presentations and the survey, and 30 students reported they had a family member attend the presentations.

Table 12: Final Presentation Effects on Student Motivation (N=75)

Student Answer	Frequency	Percentage
Strongly Disagree	1	1%
Disagree	5	7%
Neutral	15	20%
Agree	37	49%
Strongly Agree	17	23%

Table 12 shows that 72% of students reported feeling more motivated to do well during the final presentation compared to traditional presentations to classmates. One student wrote, “this way of presenting was way better than presenting to classmates. I was more confident and it was a fun way to share my knowledge.” Other students wrote that it was better to present multiple times to small groups that “actually cared about what you had to say and wanted to listen” instead of “the whole class looking at you.” Most of the negative comments from the 28% who did not enjoy the presentation centered on disliking all presentations, regardless of the audience.

Additional questions in the survey showed 78% of students felt the presentations were a positive experience after they were done, compared to only 47% feeling positive before the presentations. A student responded “I felt really good after presenting. I was nervous at first, but it ended up being fun, and people really liked my work and asked questions.” Another student wrote “I felt really good after presenting because I got lots of compliments and people asked questions, which made me enjoy teaching others about what I learned.” After the student

presentations, several staff, parents, and community guests made positive comments about the event. One parent commented that “[child’s name] really surprised me today. They presented to me at home and they were very nervous for today. I’m impressed with how confident they were in front of all these adults.”

Finally, student motivation was assessed during interviews conducted at the end of Week 5, at the conclusion of the research and project phase. Students were asked to volunteer for a short interview to share their thoughts about the impact of student-centered learning on their motivation and learning. Several students were willing to participate, and five students were randomly selected from the list of volunteers in each of the three class periods, for a total of 15 students. After a short conversation about their specific progress and project goals, each student was asked about their feelings regarding the student-centered activities and the effect those activities had on their work completion. At the conclusion of the interview, students typed a final statement into Google Forms to summarize their feelings. Misspelled words and minor mistakes were corrected by the researcher.

Table 13: Interview Responses (N=15)

Theme	Student Quotes
Motivation	“When we get to choose the project, it makes us want to work harder and do well, because you are interested in what you are learning and actually care about it.”
	“The project was more engaging than normal classwork and I enjoy learning more because it was hands-on and different from just doing worksheets.”
	“This project made learning more enjoyable and made me want to keep working on it because I liked what I was doing and wanted it to turn out good.”
Student Agency	“It was fun and interesting, and I felt more motivated because I was working on something I chose and could be creative with.”
	“I liked working with a partner and discussing what we were going to do. It helped us share ideas and make the project better.”

	"I liked that we could choose our project, partners, and how we wanted to present it, which made it feel more personal."
	"Having lots of choices made the project more fun and allowed me to be creative and design something my own way. I think I actually work better at home and I liked that."
	"Being able to plan my own work and make my own decisions helped me feel more independent and take ownership of my project."
Student-Centered	"I loved being able to choose my own topic and what my project looked like instead of being told exactly what to do."
	"Working on my own makes me learn more because I have to think and figure things out instead of just following directions."
	"This was more engaging than worksheets because we were active, creative, and involved in what we were learning."
	"It was better than sitting and listening to a teacher all day because we actually got to do something and be involved in our learning."
Teacher-Centered	"Sometimes it is difficult not having clear instructions and I didn't always know what to do, which made it harder to stay on track."
	"I would rather be told exactly what to research than have to figure everything out myself because it can get confusing."
	"I like freedom, but sometimes I want you to explain things more clearly or give more directions. It is a lot more work and its easier having the teacher do things instead of us for everything"

Table 13 shows that 80% of the students interviewed had positive feedback about the student-centered learning environment. The 12 positive responses were coded for themes related to motivation to complete work, student agency, and preference for student-centered learning. The three students who were critical of the project were coded as "teacher-centered" and commented on wanting more direction and instruction from the teacher. The positive feedback from these interviews, combined with the two surveys, reinforces the positive impact of the treatment on student motivation and learning.

CHAPTER FIVE

VALUE: REASONING AND REFLECTION

Claims From the Study

The literature reviewed for this action research project supports the claim that Project Based Learning has a positive impact on student engagement when they participate in authentic, student-centered experiences. Themes from the research highlight that students are more engaged in their learning and develop stronger interest in the content when the teacher allows them to be in charge of their own learning. When students take ownership of their learning and become primary decision-makers, they connect with each other, the content, and the community. Similarly, this study claims that PBL had a positive impact on seventh-grade students' agency, science comprehension, and motivation because of the treatment focused on the Flathead River Watershed. Data collected using surveys, tests, student reflections, and interviews were analyzed as evidence of this claim.

Regarding Focus Question #1, data collected in both Active Learner surveys and Weekly Student Reflections support the claim that the implementation of PBL positively affects student agency in middle school science. Comparison of the pre- and post-surveys shows that students increased student agency in relation to voice, choice, ownership, reflection, and collaboration skills. While there was only a 12.3% increase in the average overall score out of 100, the analysis of the raw data from a paired t-test confirms that increase is statistically significant and reliable. Data collected in 696 separate statements from Weekly Student Reflections confirms that students were aware of their developing skills in student agency. The thematic analysis of the reflections indicates they are conscious of student agency during the treatment, while the surveys

confirm an increase in the five categories of student agency after the treatment. The combination of statistically significant survey gains and consistent reflection themes supports the reasoning that the treatment in this study positively impacted the development of student agency in middle school science.

Regarding Focus Question #2, data collected from two Ecology tests and the proficiency scores of three assignments support the claim that PBL positively impacts students' ability to learn and comprehend Montana Science Standard MS-LS2. While the average pretest score of 18/100 increased to an average score of 55/100 on the posttest, the gains were less than expected. The overall distribution of posttest scores shows that the treatment was moderately effective for students learning science content since only nine students scored higher than the expected score of 80/100. Data collected from cumulative proficiency scores during the treatment also support the claim that PBL positively impacts students' ability to learn science content. Analysis shows 53 out of 79 (67%) of the students were proficient or advanced when the scores for their research notes, project, and poster/slides were averaged. The combination of the modest gains from the tests and significant gains in proficiency scores supports the reasoning that the treatment in this study positively impacted student learning.

Regarding Focus Question #3, data collected in surveys and interviews support the claim that the implementation of PBL positively impacts student motivation and learning. The Guest Presentation Survey showed 78% of students felt the guest presentations had a strong effect on their learning about the local ecosystem. While only 54% felt the guests motivated them to learn more, many students acknowledged at least one guest that generated interest in something new. The Final Presentation survey showed that 72% of students felt intrinsically motivated to

complete work and perform well for the authentic audience of parents, staff, and community members, including some of the guest speakers. Finally, the student interviews conducted during the treatment show that 80% of students felt the student-centered learning environment motivated them to learn and independently complete work compared to traditional teacher-directed learning. The combination of the results of the surveys and interviews regarding student motivation supports the reasoning that the treatment had a significant impact on student engagement and performance.

This study shows that Project Based Learning strategies have a significant impact on student agency and motivation, and moderate impact on knowledge and comprehension of science content. The feedback collected with surveys and interviews shows that authentic student-centered learning creates an environment where students feel ownership and responsibility for their learning. The findings add to existing research indicating that curriculum connected to real-world topics is meaningful to students and leads to increased interest, confidence, and engagement.

Value of the Study and Considerations of Future Research

This study shows the value of PBL as a highly effective teaching strategy that empowers students to make meaningful connections to the curriculum and their local community. Project Based Learning strategies were used throughout the study to provide a framework for student-centered learning. In addition to emphasizing the value of PBL as a powerful teaching strategy, this study provides other science teachers with a model for PBL implementation, provides students with valuable metacognition skills, and shows the importance of involving the local community in education.

Teachers in Kalispell School District #5 are integrating PCBE strategies into their classrooms, and this study provides a model for them to use PBL to achieve this. The study began with students learning about the local environment from community members with careers in the outdoors. The students then researched a topic of interest and created a project to teach others in an authentic way. The study culminated in capstone presentations to show their findings and highlight their learning process. The progression in this study aligns PBL with the principles of PCBE by encouraging individualized learning, career readiness, and flexible learning environments to promote student agency (Marzano et al., 2017, pp. 1–3).

Another value of this study centers on students developing self-awareness and metacognitive skill development. This began with understanding their own learning styles and continued with setting goals and self-reflection during the treatment. Steering away from teacher-directed classrooms gave students opportunities to choose their learning path and feel accountability for their mistakes and successes. By shifting to student-centered learning, “we are supporting the development of expert learners as well as critical social-emotional learning skills, including self-awareness, empathy, perspective-taking, and responsible decision-making” (Tucker & Novak, 2022, p. 53). The metacognitive skills learned during this study will hopefully serve students now and into the future across all subjects and grade levels.

Finally, this study provided valuable insight into the power of involving the community in public education. The first community involved in this study was the ecological community of the Flathead River Watershed. Students learned about the local environment and organisms, including the value of conserving local resources where they and their families recreate. The second community of staff, parents, and community members outside the classroom had an

influence on the education of the students as well. Students learned directly from career professionals, presented their project to their family, and gave final presentations to an authentic audience. Student surveys showed that students put high value on this part of the study, and it influenced their motivation and work ethic.

Considerations for future research include integrating student proficiency scales, providing more scaffolding activities for students, and clearly defining student agency skills. First, an important part of PBL and PCBE is teaching students to self-assess using proficiency scales. This study lacked fully formed scales for student use, and steps will need to be taken to incorporate this into the design of the unit. Second, it will be important to prepare mini-lessons and individualized instruction to help scaffold students who need extra support. According to the interviews and surveys in this study, there were about 25% of students who struggled with being self-directed, and they needed more support from the teacher at some point during the treatment. Finally, future considerations for improvement include more time dedicated to teaching the principles of student agency. Formal lessons that clearly define voice, choice, ownership, reflection, and collaboration will help students gauge their abilities and progress during the PBL unit.

Impacts of Action Research

Over the years, I have tried many strategies to engage my students. The advancement of technology has made it easy to gamify content, provide entertaining videos, and create formative assessments. Combined with this, I continued to provide hands on activities to promote learning content and occasionally invited career professionals to guest speak to share their expertise. As an alternative to final tests at the end of a unit, I started to incorporate projects where students

summarized all they had learned plus researched something of interest within the unit topic. After finishing their research, students had a “menu” of choices to complete a project to show what they had learned. While students reported they enjoyed the summative projects, I felt it lacked academic rigor and realized that it was still very much teacher directed.

I began researching ways to implement specific PBL strategies to improve summative projects. I used online resources and ordered *Hacking Project Based Learning* to better understand the nuances of PBL. Due to my visual and kinesthetic learning styles, I needed to see PBL in a classroom setting to better understand the complexities of incorporating it into my classroom. I found that many teachers used projects in their classrooms, but found they used pieces of PBL without fully utilizing essential PBL strategies for authentic, student-centered learning.

Throughout my experience in the MSSE program, I have sought out classes that provided opportunities for PBL-inspired inquiry to move toward implementation in my classroom. Several classes inspired me to pursue this study to implement PBL into my classroom. The action research has changed the way I view the abilities of my students and the impact of allowing them to direct their own learning. Traditional classrooms allow them to learn, but don’t allow them to participate in their own learning. All these years I realized that students want to feel included in decision making and empowered to teach themselves, but do not have these opportunities in a typical classroom.

Several of my current students have expressed their dissatisfaction with traditional learning environments, and unfortunately, they will continue to experience teacher-centered classrooms throughout their schooling. My hope is that this study will help inform other teachers

in my school, district, and surrounding communities about the benefits of Project Based Learning. For my future students, they will continue to be exposed to student-centered learning environments as I work to transition my current units of study to PBL units. This process will take several years as I incorporate PCBE strategies as well. My hope is that students, staff, and the community continue to benefit from the authentic experiences in my classroom and the classrooms of my colleagues.

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APPENDICES

APPENDIX A: IRB Exemption

Hello Eash, Carter,

Your protocol was reviewed by the IRB and has been approved.

PI: Eash, Carter

Approval Date: 1/15/2026

Title: PROJECT-BASED LEARNING AND THE IMPACTS ON STUDENT AGENCY

Protocol #: 2026-2377-EXEMPT

Review Type: Exemption

Expiration Date: 1/15/2031

Work described under this protocol may now commence. The PI is responsible for ensuring that the protocol accurately describes research practices being conducted.

- > Review Category designation determined by the IRB can be found in the final section of your protocol.
- > Any changes must be submitted via Amendment prior to implementation.
- > Per the Common Rule, research only requires Interim (annual) Review by the IRB if 1) it was reviewed via Full Committee or 2) is regulated by the FDA.
- > All research is subject to post approval monitoring.
- > All protocol types must be renewed 5 years after approval.
- > Inform the IRB once your research is complete so that the protocol may be inactivated.

Please contact your IRB Program Manager with any questions or if you are in need of assistance. Thank you for your diligence in the care of human subjects research participants.

Institutional Review Board for the Protection of Human Subjects | Office of Research Compliance | Montana State University

APPENDIX B: ACTIVE LEARNER PRE AND POST SURVEY

Active Learner Pre and Post Survey

Your Voice as a Learner
>

Sharing our ideas, giving feedback, and asking questions

V1. I am comfortable speaking my ideas to the whole class. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🟡 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

V2. I am comfortable giving feedback and sharing opinions with classmates. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🟡 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

V3. I am comfortable asking any classmate questions and help improving my work. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🟡 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

V4. I am comfortable asking the teacher questions and help improving my work. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🟡 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

V5. I feel like I am listened to and my voice has a positive impact in class. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🟡 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

Your Choice as a Learner



Choosing how you learn, what you learn, and how you present it.

Ch1. I have opportunities to choose the topics I research instead of the teachers choosing for me. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Ch2. I have opportunities to choose how I learn (videos, textbook, etc) instead of the teachers choosing for me. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Ch3. I'm able to choose projects to complete instead of the teachers choosing for me. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Ch4. I'm able to choose how I use my work time instead of the teachers choosing for me. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Ch5. I'm able to choose daily and weekly work plans for myself instead of the teachers choosing for me. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Your Ownership of Learning
Feeling in charge of your learning

O1. I set learning goals for myself in addition to the learning goals from the teacher. *

0 Strongly Disagree
1 Disagree
2 Sometimes
3 Agree
4 Strongly Agree

0
1
2
3
4

O2. I complete work for the sake of learning, not for the teacher and grades. *

0 Strongly Disagree
1 Disagree
2 Sometimes
3 Agree
4 Strongly Agree

0
1
2
3
4

O3. I understand the value of what I am learning. *

0 Strongly Disagree
1 Disagree
2 Sometimes
3 Agree
4 Strongly Agree

0
1
2
3
4

O4. I am able stay on task even when the school work is challenging or difficult. *

0 Strongly Disagree
1 Disagree
2 Sometimes
3 Agree
4 Strongly Agree

0
1
2
3
4

O5. I feel ownership of my learning and responsible for my progress. *

0 Strongly Disagree
1 Disagree
2 Sometimes
3 Agree
4 Strongly Agree

0
1
2
3
4

Reflection as a Learner



Improving your work from feedback and self-reflection

R1. I ask questions or do more research to help understand what I am learning. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

R2. I think about what I learned and accomplished yesterday to help improve the quality of my work. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

R3. I pay attention to the rubric directions of an assignment and reread the directions several times if needed. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

R4. I use feedback from the teacher and classmates to improve my work. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

R5. I make a plan each day and work to accomplish the tasks. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Collaboration

Giving and Receiving as a team

Co1. I am a reliable part of a group because I value the ideas and feedback of others. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🔴 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Co2. I am a reliable part of a group because I avoid distractions and use my work time to be productively. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🔴 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Co3. I am a reliable part of a group because I help my group focus on the rubric directions. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🔴 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Co4. I am a reliable part of a group because I help my group stay focused and respectful. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🔴 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

Co5. I am a reliable part of a group because I have a growth mindset. *

0 🟡 Strongly Disagree 1 🟡 Disagree 2 🟡 Sometimes 3 🟡 Agree 4 🔴 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

APPENDIX C: ECOLOGY PRE AND POST TEST

Ecology Posttest

Name: _____

Answer the questions below to the best of your ability.

Concepts in Ecology (2 points each)

1. Define Organism: _____
2. Define Population: _____
3. Define Community: _____
4. Define Ecosystem: _____
5. Define Biotic: _____
6. Give several examples of Biotic Factors affecting populations: _____

7. Define Abiotic: _____
8. Give several examples of Abiotic Factors affecting populations: _____

9. Define Biodiversity: _____
10. Define Watershed: _____

Local Ecology (6 points each)

11. What watershed do we live in? _____
12. What river system does our watershed belong to? _____
13. What is the ecosystem we live in? _____
14. Draw a labeled food web including native species for our local ecosystem.

15. Name and describe some careers and agencies involved in conserving local ecosystems. _____

Environmental Science (10 points each)

16. How does the availability of resources affect the size of a population in an ecosystem?

MS-LS2-1

17. Explain how interactions between organisms might be different in our local ecosystem and a different ecosystem. _____

MS-LS2-2

18. Describe how energy and matter move through an ecosystem. _____

MS-LS2-3

19. Name and describe specific environmental issues affecting the biotic and abiotic factors in our local ecosystem. _____

MS-LS2-4

20. Describe possible solutions humans could use to protect biodiversity and explain why it might work. _____

MS-LS2-5

APPENDIX D: GUEST SPEAKER SURVEY

Guest Speaker Survey

Guest Speaker Presentations
Student perceptions of the Guest Speakers

G1. Guest speakers in the classroom helped me understand the agency they work for better than regular lessons. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

G2. Guest speakers in the classroom helped me learn about careers in science better than regular lessons. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

G3. Guest speakers in the classroom helped me learn about native species better than regular lessons. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

G4. Guest speakers in the classroom helped me learn about environmental problems better than regular lessons. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

G5. I feel motivated to learn more about careers in the outdoors because of the guest speakers. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😊 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

G6. I feel motivated to learn more about our local environment because of the guest speakers. *

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0	1	2	3	4
☐	☐	☐	☐	☐

G6. Please explain some positives of the Slideshows given by the eight guest speakers. *

Long answer text
.....

G7. Please explain some positives of the activities given by the eight guest speakers. *

Long answer text
.....

G8. Please explain some improvements for the Slideshows given by the eight guest speakers. *

Long answer text
.....

G9. Please explain some improvements of the activities given by the eight guest speakers. *

Long answer text
.....

G10. Share your thoughts on specific presenters, activities, or things that had an impact on your learning. *

Long answer text
.....

APPENDIX E: FLATHEAD WATERSHED PROJECT OVERVIEW



Welcome Scientists!

In 1968, President Lyndon B. Johnson signed the Wild and Scenic Rivers Act into law to protect America's rivers and watersheds. The law declared that rivers should stay free-flowing without dams for the benefit of the wildlife, people, and future generations. The Three Forks of the Flathead were some of the first rivers in America to be protected, and this is why our local ecosystem is still so healthy.

Over the next several weeks, you are going to research your chosen topic in order to contribute to the Comprehensive River Management Plan (CRMP) for the Flathead River. The CRMP is a plan for how the Flathead River and all the surrounding areas should be managed by local agencies to protect the Outstanding Remarkable Values (ORV) of our ecosystem. The Crown of the Continent Ecosystem is all the organisms in the living Community surrounded by the abiotic environment.

Answer These Two Essential Questions

- 1. Why does protecting or eliminating this part of the environment matter for the Flathead River Watershed?**
- 2. How does this abiotic part of the ecosystem positively or negatively impact the Outstanding Remarkable Values of the habitat?**

Phase 1: Guest Speakers

Learn about the biotic and abiotic factors in the Flathead River Watershed from local experts who work with local agencies. The authentic experience of meeting and learning from these outdoor professionals sets the stage for your research.

Phase 2: Research your Topic

Use the Watershed Resource page to take notes on pages 10-14 in your minibook to collect information on the topic you have chosen. Use this Research Choice Board to organize your research to help you answer both Essential Questions. **Choose 3 research items or 4 to be advanced!**

Abiotic--Use this choice board if your topic is NOT capable of life!	
Draw a map that includes the location and surrounding habitat of this abiotic factor in the ecosystem.	Describe 3 ways this abiotic factor benefits or harms humans.
Describe how 3 populations of organisms benefit or harm from this abiotic factor.	Explain 3 environmental concerns pertaining to this abiotic factor
Explain the history and origin story of this part of the environment.	Explain how your abiotic factor affects overall biodiversity and possible solutions to protect or eliminate it.
Your Choice! If you find something Interesting to research, get Teacher approval!	

Biotic--Use this choice board if your topic IS capable of life!	
Create a detailed food web including your organism and 9 other organisms.	Identify and explain 3 limiting factors that affect your organism in the watershed.
Describe 3 beneficial or harmful interactions with other species in the community	Explain 3 ways humans positively and negatively impact this organism
Describe 3 adaptations of this organism that helps it survive in here	Explain how your organism affects overall biodiversity and possible solutions to protect or eliminate the organism
Your Choice! If you find something Interesting to research, get Teacher approval!	

Phase 3: Create a Project

Design a way to share your answers for the two Essential Questions with family or others to educate them on the CRMP. You will get feedback from the people you present to collect data on the impact of your project to educate them on the Flathead River Watershed and its Outstanding Remarkable Values. **This is not a poster or slideshow!**

Art Installation	Public Information Materials	Podcast or Audio Story
Documentary Movie	3D Model	Children's Book
Social Media Campaign	Letter to the Editor	Host an Informational Meeting
Interview an Expert	Site Visit Photo Display	Board Game or Group
Be Creative and create a project that gets teacher approval. This is an appropriate time to use AI to generate a list of project ideas!		

Phase 4: Create a Poster

Create a poster or slideshow to display your project. You will get feedback from the teacher and your classmates before creating your final poster. You will use a rubric to include specific information about your Project. You will use the poster to present your project to KMS, parents, and others.

Phase 5: Project Fair

You will present your poster to visitors that could include KMS students, KMS staff, parents, community members, and our guest speakers.

APPENDIX F: FLATHEAD WATERSHED RESOURCE PAGE

Watershed Project Resource Page

Use this resource page organize your research to link to important websites

Date	Organization	Day to Day Science	Native Species in our local Ecosystem Montana Animal Field Guide Montana Plant Field Guide	Problems they investigate in local ecosystem	Online Resources
Wed Feb 4	Flathead Audubon Society	- Field Observations - Banding and Tagging - Radio Telemetry - Satellite Telemetry	Clark's Nutcracker Common Loon Osprey Bald Eagle Golden Eagle	- Habitat Destruction - Poisoning - Lead - Rodent Poison - Pollution	Slideshow Merlin phone app Bird Sounds Wetlands Video
Thurs Feb 5	City of Kalispell	- Test stormwater for sediment, oxygen level, and toxic chemicals like pesticides, lawn fertilizer, metals, and car oil - Educate and enforce	Mountain Whitefish Northern Pike Minnow Two species of Sucker Fish Columbia Slimy Sculpin	- Non-Point pollution from runoff that flows into creeks, rivers, lakes - Lawn Chemicals - Motor Oil and Metals - Animal Waste - Sediment	Slideshow City Stormwater Map Rain garden Video
Fri Feb 6	Fish, Wildlife, and Parks Fisheries	Monitor native species and non-native species and their habitats. - Netting - Electrofishing - Snorkeling - Count redds (nests) - Population estimates using mark-recapture	Bull Trout Westslope Cutthroat Trout Mountain Whitefish Two species of Sucker Fish Columbia Slimy Sculpin	Introduced and Invasive species - Mysis Shrimp - Lake Trout - Predation - Human affecting habitat - Estimating Population size	Slideshow Don't Let it Loose Catch and Release Video

Tues Feb 10	Flathead Lake Biological Station	Limnologists monitor lakes and tributaries • Water Temps • AIS • Water Quality • GIS mapping	Bull Trout Beneficial Non-Native: Kokanee Salmon	• Aquatic Invasive Species (AIS) • Transboundary Mining Pollution • Pesticides • Nutrient Pollution- Nitrogen and Phosphates cause algae growth	• Slideshow • Clean Drain Dry • Water Quality • eDNA • Limnology • Mack Days • Video
Thurs Feb 12	Flathead National Forest Service	Help forests to be resilient and diverse (species, size, density) Manage all the uses of the forest. 1. Social - Hiking and recreation 2. Economic -money made from forests through tourism, logging, etc. 3. Ecological - habitat, shelter, and food for wildlife	Whitebark Pine Ponderosa Pine Lodgepole Pine Douglas Fir Engelmann Spruce	• Mega Drought ◦ Leads to wildfire ◦ Leads to invasive attack • Invasive Species ◦ Whitepine Blister Rust ◦ Spongy Moth ◦ Pine Beetle • Humans ◦ Deforestation ◦ Urbanization- Towns getting bigger	• Slideshow • Wolves in the ecosystem • Whitebark Pine in mutualistic symbiosis with Clark's Nutcracker • Video
Friday Feb 13	Hilary Hutcheson Flyfishing StreamFlow Hydrology	• Measuring streamflow in CFS (cubic feet per second) ◦ Affected by rain, temperature, snowmelt, drought, dam release • Monitor Insects • Tailwater vs. Freestone • High water vs Low Water • Teach client about Ecology of the area	Westslope Cutthroat Trout Bull Trout Mountain Whitefish	• Warming Waters hard for fish and can lead to too much algae • Hybridization of Native species with Non-native species • Low Snowpack leads to low water issues • High water flooding	• Slideshow • River Features • National Water Dashboard • Flathead River • River to Lake Initiative • Video

Tues Feb 17	Flathead River Alliance	Citizen Science collect data to give to Forest Service and Glacier Park • Macroinvertebrate • Water Quality ◦ Water Temp ◦ Clarity ◦ pH (acidity) • Bird species that eat fish • Trash • River users • Wildlife Create CRMP (Comprehensive River Management Plan) to preserve ORVs	Westslope Cutthroat Trout Bull Trout Indicator species of macroinvertebrates • Stonefly indicate healthy waters	• Warming waters ◦ Fish and insects need colder water for oxygen • Climate Change ◦ Low snow and warmer water • Invasive Species ◦ Rainbow trout, mussels, invasive plants • Recreation pressure • Habitat Loss • Pollution	• Slideshow • Weed Rodeo • Wild and Scenic Rivers • Columbia River Basin • American Rivers • Outstanding Remarkable Values (ORV) • Bob Marshall Wilderness • Hungry Horse Dam • Video
Thurs Feb 19	Fish, Wildlife, and Parks Wildlife	Conflict Management • Educate people to be proactive, not reactive ◦ Bear Proof trash and livestock • Meet landowners • Install Electric Fences and Cameras • Capture Bears ◦ Collect data on age, size, health, etc	Black Bear • Ursus americanus • Evolved in Forests to climb trees • ~13,000 in MT Grizzly Bear • Ursus arctos • Evolved in open areas with more aggression and claws to dig • ~2,000 in MT Bears have Cultural value and Ecological Value • Disperse Seeds • Predators • Nutrient Cycling	More People + More Bears + Less Habitat = More Conflict	• Slideshow • Bear Aware • Wildlife Management • Glacier Park Bear Population Count • Video

APPENDIX G: PRESENTATION RUBRIC

Final Presentation Rubric

Poster or Slides Rubric

Name: _____

	0	1	2	3- Proficient	4-Advanced
Title				☐ Include a Title	
Essential Questions				☐ Explain the importance and positive impacts ☐ Explain the Outstanding Remarkable Values	Include evidence and analysis about the importance and positive impacts
Research Summary				☐ Explanation of 3 Research items ☐ #1 _____ ☐ #2 _____ ☐ #3 _____ ☐ Cite at least 2 internet pictures to go with your Research	Very detailed explanation of 3 or more Research items
Project Summary				☐ Explanation of the your Project and the audience you presented to ☐ Include at least 2 pictures of you Presenting your project to family members or others	Very detailed explanation of your Project and feedback and questions from your audience
What overall score do you give yourself for your poster/slides?	0 1 2 3 4				
Why did you earn this score?	1. _____ _____ _____ 2. _____ _____ _____ 3. _____ _____ _____				

Give this page to 3 different classmates to write feedback

**Feedback
from
Classmate
#1**

Name: _____

Provide helpful feedback to help them improve their poster and presentation

Poster:

Presentation:

**Feedback
from
Classmate
#2**

Name: _____

Provide NEW helpful feedback to help them improve their poster and presentation

Poster:

Presentation:

**Feedback
from
Classmate
#3**

Name: _____

Provide NEW helpful feedback to help them improve their poster and presentation

Poster:

Presentation:

APPENDIX H: FINAL PRESENTATION SURVEY

Final Presentation Survey

BEFORE Final Presentations

Description (optional)

PRESENTATIONS Motivated me *

I was more motivated to do well for this presentation compared to normal presentations in front of classmates.

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😞 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

Feeling Positive BEFORE PRESENTATIONS *

BEFORE the presentations yesterday, I felt good (positive) about presenting to parents, staff, and others .

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😞 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

Feeling Prepared BEFORE PRESENTATIONS *

BEFORE the presentations yesterday, I felt my poster or slides were prepared to present to parents, staff, and others .

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😞 Agree 4 😞 Strongly Agree

0 1 2 3 4

☐ ☐ ☐ ☐ ☐

Please write several complete sentences to explain how you felt BEFORE the final presentations.

Long answer text

.....

AFTER PRESENTATIONS



Description (optional)

Did a parent or family member come to the presentations? *

☐ Yes☐ No

AFTER PRESENTATIONS

*

I feel the presentations to parents, staff and others was a positive experience

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0

1

2

3

4



AFTER PRESENTATIONS

*

I feel the presentations to parents, staff and others was BETTER than just presenting to classmates and teachers.

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0

1

2

3

4



AFTER PRESENTATIONS

*

I feel that I was prepared to present and did well.

0 😞 Strongly Disagree 1 😞 Disagree 2 😞 Sometimes 3 😊 Agree 4 😊 Strongly Agree

0

1

2

3

4



Please write several complete sentences to explain how you felt AFTER the final presentations.

*

Long answer text

.....