**Title: We Measure Weather When We’re Together!**

**Collaborators:** Kelsey Harpman, Jessica Marks, Maggie Stephenson, Gord Wilson

**Grade Level:**10

**Recommended Time Frame:** 1 month (4 weeks)

**Content Areas:** Science, Math, English, Technology

**Summarize the theme for this project. Why do this project?**

The theme of our project is weather, students will explore how the weather affects something that interests them. This project will be included as part of the grade ten science program and will allow students to think critically about the effects of weather on the greater system and will foster independent lifelong learning.

**Identify the content standards that students will learn as a result of this project:**

|  |  |  |
| --- | --- | --- |
| Science 10 | Math 9 | English 10 |
| 212-1: Identify questions to investigate that arise from practical problems and issues  213-2: Carry out procedures controlling variables and adapting or extending procedures where required  213-3: Use instruments accurately and effectively for collecting data  331-5: Analyze meteorological data for a given time span and predict future weather conditions, using appropriate methodologies and technologies (Prior Knowledge) | SP4: Develop and implement a project plan for the collection, display and analysis of data by: formulating a question for investigation; choosing a data collection method that includes social considerations; selecting a population or a sample; collecting the data; displaying the collected data in an appropriate manner drawing conclusions to answer the question. | GCO 1: Students will speak and listen to explore, extend, clarify and reflect on their thoughts, ideas, feelings, and experiences  GCO 2: Students will be able to communicate information and ideas effectively and clearly, and to respond personally and critically  GCO 3: Students will be able to interact with sensitivity and respect, considering the situation, audience and purpose |

**Identify key skills students will learn in this project (Assessment):**

- weekly self assessments (reflection on the learning process)

- working project template/timeline (formative - 4pt scale)

- final presentation and report

- midterm evaluation (talking circle)- formative

**Identify the habits of mind that students will practice in this project:**

- time management and organization

- personal onus

- thinking interdependently

- learning continuously

- questioning and posing problems

**Craft the Driving Question:**

What are the effects of the weather on something that you are passionate about?

Some examples to get you started:

- musical instruments

- animals (hibernation, migration)

- outdoor concerts

- plants (annuals vs. perennials, dormancy)

- buildings

- art/artifacts

- flight (planes)

- cooking

- health

- agriculture

- sports

- vehicle maintenance

**Plan the Assessment:**

**Early in the project:** project template - what is your driving question, what direction will your project take, what steps do you need to follow to realize your outcomes, what are some goals that you have for yourself (see attached)

**Throughout project:** Weekly group and self-assessments (see attached)

**Mid-project formative assessment:** Talking circle - presenting your project idea to your classmates, offering others ideas and receiving peer feedback

**End of project:** Final presentation & Information Pamphlet; Project Debriefing

**Define the products for this project:**

There are two culminating products for this project. The first is an oral presentation of the information and data collected throughout the project. Students will be responsible for communicating a full understanding of their chosen subject area to their peers. The presentation should include a visual representation of data collected that summarizes the project’s results. The second product for this project is an informational pamphlet that students will produce to summarize their research findings. This pamphlet will offer practical suggestions based on the research conducted in their given subject (ex. conditions for proper storage of a violin).

**State the criteria for the project products**

See attached presentation and informational pamphlet rubrics.

**Map the Project (What do students need to know to be successful in their projects)?:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Knowledge and Skills** | **Already Have Learned** | **Taught Before the Project** | **Taught During the Project** |
| Data collection and analysis (manipulating variables) | X |  |  |
| Oral Presentation Skills |  |  | X |
| Written Communication Skills |  |  | X |
| Ability to organize and present information digitally | X |  |  |
| Meteorological background knowledge |  | X | X |
| Ability to collaborate effectively with others | X |  |  |
| Ecosystems and their relationship with surrounding environments | X |  |  |

**Student Timeline:5 weeks (for additional details, see calendar attached)**

**Week 1:** Background Content Knowledge (Finish with Brainstorming Session)

331-5: Analyze meteorological data for a given time span and predict future weather conditions, using appropriate methodologies and technologies

318-4: Explain why different ecosystems respond differently to short-term stresses and long-term changes (Unit 1)

**Week 2:** Project Launching (Goal Setting, Teambuilding, Preliminary Research)

Project Planning Form

**Week 3:** Individual Group Work

Talking Circle (Peer Feedback)

**Week 4:** Finishing Research + Final Presentations and Project Debriefing (next week)

Final Presentations + Debriefing

**Manage the Process:**

The first week of the project will be spent covering related curriculum outcomes from the weather unit of the grade 10 science curriculum. To finish off the week, students will visit UNB Fredericton to hear Dr. P. Jayachandran talk about his research on how weather patterns affect GPS signals. This will provide an authentic context in which to situate the project and will get students thinking about their own project ideas.

At the beginning of the following week, the official launching of the project will occur, where students will be presented with the project’s driving question and will participate in a whole class brainstorming session to generate project ideas. At the end of this class, students will write down three project ideas that are of interest to them, and the names of two people that they would like to work with. After the groups of three have been established, each group will receive a project planning form (see attached) to be completed and passed in by the end of the week. This will ensure that students have begun planning their project ideas and will provide the teacher with a sense of which groups will need assistance.

In the third week of the this unit, the students will have a talking circle to discuss their progress on their projects. This is a tool for students to get feedback and suggestions from their peers as well as a method of doing a formative assessment on their project development. The structure of this activity is up to the teacher, but a suggestion is to allow a group a set amount of time to present their material then a few minutes for discussion before the next group is addressed.

On the following week, students will begin to prepare their final presentation and pamphlet. Presentations will occur on Friday afternoon of the final week. Community members, guest speakers, parents, administration and teachers will be welcome to attend. Copies of the pamphlets will be on display in the classroom and made available to the audience.

The week following the presentations there will be a debriefing session for the students. The purpose of this session is to provide students the opportunity to discuss the strengths and weaknesses of their projects. This will also give the teacher opportunity to edit the project for future classes. Students will fill out a survey (see attached) that will help them with the process of evaluation.

Additional measures that have been taken to manage the group process are the implementation of weekly group and self-assessments, as well as the integration of two guest speakers throughout the project process. Self and group assessments will allow both teachers and students to track project progress and will hold students accountable for their work. It will also allow for preventative measures or intervention to be put in place if needed to ensure the project’s success. Guest speakers will include representatives of the GAIA project, a local sustainability initiative, as well as a local pilot who will discuss the effects of weather on flight. These activities will help maintain the authenticity throughout the project process.

**List of Accompanying Resources:**

|  |  |
| --- | --- |
| **Attachments** | **Appendix** |
| Project Calendar | 1 |
| Project Planning Form | 2 |
| Group Assessment Form (weekly) | 3 |
| Self Assessment Form (weekly) | 4 |
| Students Final Presentation Rubric | 5 |
| Student Pamphlet Rubric | 6 |
| Project Debriefing Survey | 7 |

**Resources:**

"Project Based Learning ." *Online Resource for PBL*. Buck Institute for Education, George Lucas Foundation, Department of Educational Technology at Boise State University. Web. 14 Jun 2013. <<http://pbl-online.org/default.htm>>.

"Weather ." *Environment Canada*. Government of Canada, 6 6 2013. Web. 14 Jun 2013. <<http://ec.gc.ca/meteo-weather/default.asp?lang=En&n=FDF98F96-1>>.

NB Curriculum Documents (Grade 10 science, English, and Math 9)

Dr. P. Jayachandran Research Website <http://radio.physics.unb.ca/jayachandran/>

The GAIA Project Online Resources [www.thegaiaproject.ca](http://www.thegaiaproject.ca/)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PROJECT CALENDAR** | | | | | |
| **Project:** | | | **Start Date:** | | |
| MONDAY | TUESDAY | WEDNESDAY | | THURSDAY | FRIDAY |
| **PROJECT WEEK 1 – Background Content** | | | | | |
| Start Weather Unit  Recap of Water Cycle | Heat Transfer within the Water Cycle  **SCO 331-1** | Water Currents and Heat Sinks in the Hydrosphere and Atmosphere  **SCO 331-2, 331-3** | | Development, Severity, and Movement of Weather Systems  **SCO 331-4** | **Project Hook Activity**  **Field Trip to UNB**  **(Dr. P. Jayachandran)**  **SCO 331-5** |
| **PROJECT WEEK 2 – Project Launching** | | | | | |
| **Project Launching**  Whole Class Brainstorming Session  Generating Project Ideas |  | **Guest Speaker –**  **Brian McCain**  **(Environmental Engineer)**  **Executive Director**  **GAIA Project** | |  | **Pass in Project Planning Form**  **Submit Group and Self Evaluation Form** |
| **PROJECT WEEK 3 – Individual Group Work** | | | | | |
|  |  | **Guest Speaker-**  **Local Pilot**  **Martin Tubbesing**  **The Effects of Weather on Flying** | |  | **Interim Project Presentations**  **Talking Circle**  **Submit Group and Self Evaluation Form** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PROJECT CALENDAR** | | | | | |
| **Project:** | | | **Start Date:** | | |
| MONDAY | TUESDAY | WEDNESDAY | | THURSDAY | FRIDAY |
| **PROJECT WEEK 4 – Project Wrap-Up** | | | | | |
|  |  |  | |  | **Final Presentations**  **(Afternoon Event)**  **Parents and Community Members Welcome** |
| **PROJECT WEEK 5** | | | | | |
| Project Debriefing | Start Next Unit |  | |  |  |

Project Planning Form  
Group Names:Date:

**Remember, this sheet is intended as a guide. Nothing you put on here is written in stone – your plans will likely change as you develop your project.**

In 3-4 sentences, describe the topic of your project.

Why did you choose this topic?

State the driving question that will help you stay on track with this topic.

What do you want to learn over the course of this project? What do you want your audience to learn?

What information and data will you need to complete your project? How will you get it?  
   
What skills will you need to practice/develop throughout project?

List the steps you will need to achieve your learning goals. Where possible, indicate their order by numbering them.

How will you present your information to your audience?

How will you ensure that work is divided evenly?

What will you do to make sure that your group stays on task and works throughout duration of the project?

TEAM CONTRIBUTIONS

Use this sheet to evaluate your team member’s contribution to your team. Provide a written justification of this mark.

Your Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Team member: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Member evaluation: \_\_\_\_\_\_\_/10

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Team member: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Member evaluation: \_\_\_\_\_\_\_/10

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Team member: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Member evaluation: \_\_\_\_\_\_\_/10

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**WEEKLY SELF EVALUATION RUBRIC**

**PROJECT TITLE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**YOUR NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Please rate your contribution to the group on a scale from 1 – 4 with 4 being the highest.

\_\_\_\_1. Following teacher’s instructions

\_\_\_\_2. Asking meaningful questions

\_\_\_\_3. Contributing ideas and information

\_\_\_\_4. Helping the group stay on task

\_\_\_\_5. Contributing materials

\_\_\_\_6. Asking for help when needed

\_\_\_\_7. Sharing responsibilities

\_\_\_\_8. Respecting others

\_\_\_\_9. Explaining things to others

\_\_\_\_10. Doing things on time

I could improve on\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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I rank my contributions to the group as\_\_\_\_\_\_\_\_\_\_because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Student Final Presentation Rubric**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category** | **4** | **3** | **2** | **1** |
| **Preparedness** | Presenter is completely prepared and has obviously rehearsed | Presenter seems quite prepared but might have needed a bit more rehearsal | Presenter is somewhat prepared but it is clear that rehearsal was lacking | Presenter does not  seem at all prepared to present |
| **Content 1** | Presenter shows full understanding of their chosen topic | Presenter shows a good understanding of their chosen topic | Presenter shows a good understanding of parts of their chosen topic | Presenter does not seem to understand their chosen topic at all |
| **Content 2** | Presenter facilitates and answers questions with confidence | Presenter facilitates and answers questions with moderate confidence | Presenter is hesitant to take and answer questions | Presenter avoids answering questions |
| **Posture and Eye Contact** | Presenter stands up straight, looks relaxed and confident, and establishes eye contact with everyone in the room during the presentation. | Presenter stands up straight and establishes eye contact with everyone in the room during the presentation. | Presenter sometimes stands up straight and establishes eye contact. | Presenter slouches or leans against desk and/or does not look at people during the presentation. |
| **Collaboration with Peers** | Presenter almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together. | Presenter usually listens to, shares with, and supports the efforts of others in the group. Does not cause "waves" in the group. | Presenter often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member. | Presenter rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member. |
| **Volume** | Presenter’s speaking volume is loud enough to be heard by all audience members throughout the presentation. | Presenter’s speaking volume is loud enough to be heard by all audience members at least 90% of the time. | Presenter’s speaking volume is loud enough to be heard by all audience members at least 80% of the time. | Presenter’s speaking volume often too soft to be heard by all audience members. |
| **Stays on Topic** | Presenter stays on topic all (100%) of the time. | Presenter stays on topic most (99-90%) of the time. | Presenter stays on topic some (89%- 75%) of the time. | Presenter was often “off topic” during presentation. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***1-Beginning*** | ***2-Developing*** | ***3-Accomplished*** | ***4-Exemplary*** | ***Score*** |
| ***Content*** | There is substantial content missing from the pamphlet. Pamphlet shows little evidence of the research conducted and the results obtained in the project. | Some content is missing from the pamphlet. Limited details are provided in the required sections. | Pamphlet includes sufficient details on project process, driving question, and results. There is evidence of reflection on the learning process. | Pamphlet goes above and beyond the expected content. There is strong evidence of reflection on the PBL process and student learning is made clear. |  |
| ***Organization*** | Pamphlet is difficult to follow. Writing lacks structure and organization. There are no headings to guide the reader through the pamphlet. | Information is presented in an unusual order. The use of headings is inconsistent throughout the work. This results in an overall lack of clarity. | Information is presented in a logical order that is easy to follow. Headings are used to guide the reader through each section of the pamphlet. | The pamphlet is highly organized and easy to navigate. The use of transitions, and headings ensure that ideas are presented in a logical manner. |  |
| ***Presentation*** | Work is unorganized and messy. Significant parts of the pamphlet have been left out. There are numerous spelling and grammatical errors. | Formatting is inconsistent and untidy. Some parts of the pamphlet are missing. There are several spelling and grammatical errors. | Ideas are communicated clearly and succinctly. The pamphlet is neat, organized, and contains few spelling or grammatical errors. | Pamphlet shows excellent attention to detail, presentation is professional, and there is evidence of revision and refinement. No spelling errors. |  |
| ***Illustrations*** | Illustrations are missing or inaccurate representations of student work. These materials do not help the reader understand the data collected. | Illustrations, tables, diagrams, and graphs provide minimal support to the work. Not all visuals are properly labeled. | Illustrations, tables, diagrams and graphs are original, properly labeled and captioned, present relevant data effectively, and complement written work. | Illustrations, tables, diagrams, and graphs are highly original and demonstrate exceptional data analysis skills. |  |

**PBL Information Pamphlet – Content Rubric**

**Project Debriefing – Student Survey**

Please complete the following survey to provide feedback on your overall PBL experience. The survey is completely anonymous and will not in any way influence your mark in this course, so please answer the questions honestly. The feedback that you provide will contribute to the success of this project or similar projects in the future.

1. Was this your first PBL experience? (If no, please describe past PBL experiences below)

Yes No

Project Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Subject Area(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Grade Level: \_\_\_\_\_\_\_\_\_\_\_\_

Project Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Subject Area(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Subject Area(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Grade Level: \_\_\_\_\_\_\_\_\_\_\_\_

**For each of the following statements, state whether you agree, disagree, strongly agree, or strongly disagree by shading in the appropriate bubble.**

1. My PBL experience in this course was a positive one.

Agree Strongly Agree Disagree Strongly Disagree

1. My PBL experience in this course compares well to other learning experiences at this school.

Agree Strongly Agree Disagree Strongly Disagree

1. I would recommend the project based learning experience to others.

Agree Strongly Agree Disagree Strongly Disagree

1. I prefer project based learning to traditional instructional methods (lectures, labs, tests).

Agree Strongly Agree Disagree Strongly Disagree

1. The project process was well organized.

Agree Strongly Agree Disagree Strongly Disagree

1. Assessments evaluated both progress and products throughout the project.

Agree Strongly Agree Disagree Strongly Disagree

1. Assessments techniques used throughout the project were well aligned with the project’s outcomes.

Agree Strongly Agree Disagree Strongly Disagree

1. Project rubrics helped guide me in my work.

Agree Strongly Agree Disagree Strongly Disagree

1. The project was broken down into manageable tasks that I was able to accomplish.

Agree Strongly Agree Disagree Strongly Disagree

1. Project activities were well planned and relevant to the project process.

Agree Strongly Agree Disagree Strongly Disagree

1. Sufficient class time and resources were provided for me to successfully complete the project.

Agree Strongly Agree Disagree Strongly Disagree

1. I received feedback throughout the project process, not just at the end.

Agree Strongly Agree Disagree Strongly Disagree

1. Feedback was constructive and helped me to understand how I could improve my work.

Agree Strongly Agree Disagree Strongly Disagree

1. This project allowed me to pursue my own interests in a way that was fun and engaging.

Agree Strongly Agree Disagree Strongly Disagree

1. I felt that my input was welcomed and respected throughout the project process.

Agree Strongly Agree Disagree Strongly Disagree

1. The purpose and context of the project were made clear to me by the teacher.

Agree Strongly Agree Disagree Strongly Disagree

1. The teacher kept track of each group’s progress throughout the project.

Agree Strongly Agree Disagree Strongly Disagree

1. The teacher provided assistance when necessary but did not tell us exactly what to do.

Agree Strongly Agree Disagree Strongly Disagree

1. Completing this project has allowed me to develop the necessary skills for life in the 21st century (ex. use of technology, communication, collaboration, etc.).

Agree Strongly Agree Disagree Strongly Disagree

1. The project’s driving question helped bring a focus to my work.

Agree Strongly Agree Disagree Strongly Disagree

1. The theme of the project addressed real-world problems.

Agree Strongly Agree Disagree Strongly Disagree

1. This project challenged me to think critically.

Agree Strongly Agree Disagree Strongly Disagree

1. I found completing weekly self-assessments useful.

Agree Strongly Agree Disagree Strongly Disagree

1. I was given the opportunity to reflect on my learning throughout the project process.

Agree Strongly Agree Disagree Strongly Disagree

**Answer the following questions in the spaces provided:**

1. The thing I liked most about this project was...
2. Something that I learned during this project is...
3. One challenge that I was able to overcome by completing this project is...
4. One adjustment that would improve this project for future students is...
5. If I could give one piece of advice to students completing this project in the future, it would be...

Additional Comments:

***Thank you for taking the time to complete this survey! Your input is valuable to us!***