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learning earth science by doing

FIELD TRIP PLANNING

TEACHER GUIDE

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I hope this guide will inspire teachers to take their students on a field trip at least once every year to have fun learning science in the perfect classroom, the great outdoors.

CONTENTS

INTRODUCTION

"The best geologist is the one who has seen the most rocks."

This quote was made by a British geologist named Herbert H. Read in 1940. It was obvious, even back then, that learning to observe in the natural environment and to "see geologically" was an essential skill. Learning outdoors is the cornerstone to gaining earth science knowledge and skills. It is a proven pedagogical approach for applying the knowledge students learned in the classroom and an opportunity to learn skills in the field. Therefore, it only makes sense that students should learn about earth science in the natural environment by going on a field trip.

A field trip should incorporate the fundamental learning components of any science. These are: scientific method; concepts; and core ideas. The guide introduces a 7-step scientific method for planning an earth science field trip that incorporates three stages; pre-field trip, field trip and post-field trip. The activities involved with this methodology will help students develop the concept of inductive reasoning by learning how to distinguish between what is and what is not important and also to move from evidence (or facts) to claims (or generalizations).

Students will learn the core ideas of an Earth system by analysing data they collect during the field trip using hands-on observations, measurements and other field activities. The data, which provides the facts, is analysed to make generalizations. Integrating these fundamental science components in a field trip is a formula for learning success.

To achieve an effective field trip, there are also important activities that must be done before and after the field trip. All these activities are detailed in the following parts.

Part I - Field Trip Assessment

This first phase is critical for defining the field trip. You will assess your needs and those of your students, including outside resources required for executing the field trip. A site visit will be completed to further assess risks of the field trip location and planned activities

Part II - Field Trip Activities

This guide will help you with navigating your students through a 7-step scientific method. It includes detailed activities for each of the three stages of the field trip; which are, Pre-field Trip (what is done before), Field Trip (during) and Post-field Trip (after the field trip).

Part III - Field Trip Evaluation

The last component of field trip planning will be your evaluation. You will identify what, when and how all the information is captured for each of the three stages of the field trip.

FIELD TRIP ASSESSMENT

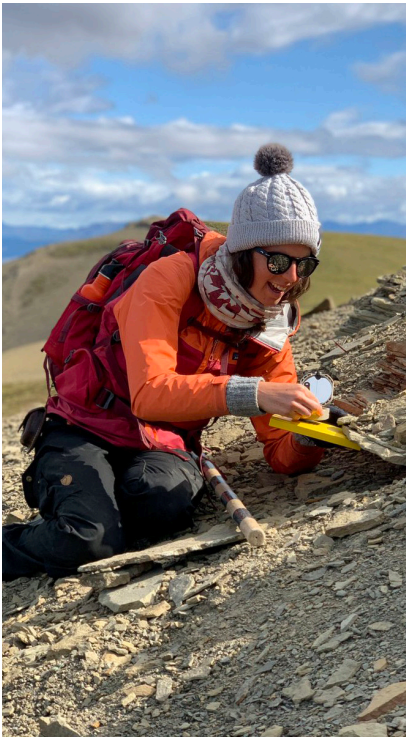
A field trip experience creates new knowledge and seeing things in new ways.

A field trip that is well planned and thought out will be a unique and memorable experience for everyone involved. The outdoor environment is an opportunity to create new knowledge by reshaping what is seen and or what grabs our attention. An effective field trip experience should focus on both the cognitive and emotional concepts of learning. How we think about the outdoor environment and what we feel is just as important as the knowledge learned during the field trip. It will be important to keep these elements in mind when completing this field trip assessment.

An easy and practical approach to any plan is by using the 6Ws, starting with the broader questions to ask. The first question should be, "Why will I conduct the field trip?" and then work through the remaining Ws in the order shown here.

1. **WHY WILL I CONDUCT IT?**
2. **WHO ARE THE INDIVDUALS?**
3. **WHERE WILL I CONDUCT IT?**
4. **WHEN WILL I CONDUCT IT?**
5. **WHAT DO I NEED TO CONSIDER?**
6. **HOW WILL I CONDUCT IT?**

For each of the 6Ws, there will be more detailed questions that need to be considered. The number of questions will depend on the type and complexity of the field trip you are planning. The assessment is completed for each stage of the field trip and for the different participants. Therefore, the 6Ws take into account what you need to consider for each of the stages (pre-field trip, field trip and post-field trip); as well as examine the perspectives of yourself, your students, and anyone else outside of these participants. An example of some common questions are provided in the table on the next page.



6Ws OF FIELD TRIP ASSESSMENT

1. WHY WILL I CONDUCT IT?

Do I have strategic goals I want to achieve?

Are there specific curriculum outcomes and can I link them to skills students will learn?

Are there associated dispositions?

2. WHO ARE THE INDIVIDUALS?

Who are my students?

Who are the different Subject Matter Experts (SMEs) that can assist?

Who are the chaperones?

Are there special considerations or accommodations for anyone in these groups?

3. WHERE WILL I CONDUCT IT?

Where will I go for the field trip?

How many and where will the stations be located?

4. WHEN WILL I CONDUCT IT?

When is the best time for the field trip, taking into consideration weather and preparation time that's needed?

When will I do my site visit to assess suitability and potential risks at the location?

5. WHAT DO I NEED TO CONSIDER?

a. Teachers

What are the field trip activities and tools needed to do them?

What are the associated risks and safety concerns of field trip activities?

What professional development, training and practice do I need?

When and where will these things be done?

Who will provide them?

b. Students

What will be learned at the stations?

What are the specific learning goals?

What activities will be done?

What resources are needed?

What outcomes will be achieved?

c. Subject Matter Experts (SME) and Chaperones

Who are potential contacts?

What role/responsibility will each have?

When and where will they be required?

What is their contact information?

6. HOW WILL I CONDUCT IT?

What are the school administration procedures and policies for field trips?

How will the field trip be funded?

How will costs be covered?

How will I plan for logistical requirements?

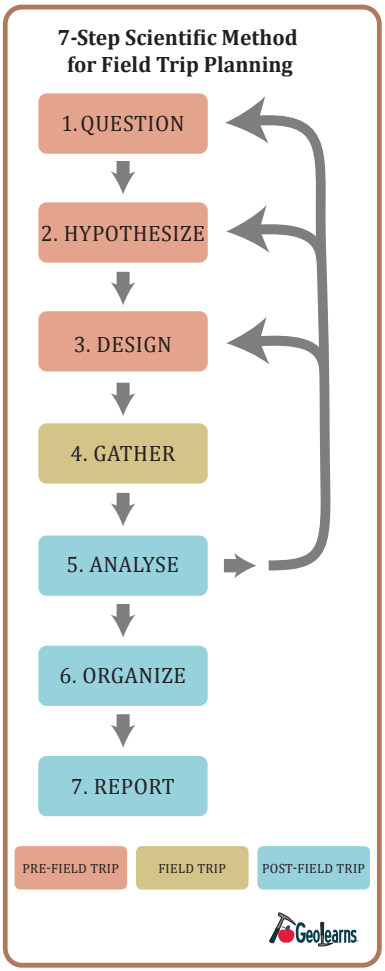
FIELD TRIP ACTIVITIES

Rocks can be both the youngest and oldest things we'll see on Earth.

There is no better place than the outdoors to learn how to observe with your own eyes and to build first-hand knowledge about earth science. Observations collected from the natural environment give real context and help students understand the complexities involved in studying Earth systems. The more opportunities students are provided to observe, the more skilled they will become at distinguishing between what is important (what matters) and unimportant (what doesn't matter). For example, learning to observe characteristics in the rock will be more important than identifying its rock name. The goal is to learn and develop skills by doing.

Conducting a project that will allow the students to plan their field trip will achieve a deeper learning experience. This can be done by following the 7-step scientific method illustrated here. They will design their field investigation, collect data (i.e. rocks), analyse and share their findings. Having steps to follow with detailed instructions and activities will allow students to be more engaged through the entire project. Students will learn invaluable life skills which they can then apply to other science projects and likely to everyday problem solving and planning.

This field trip planning method is an excellent approach, no matter what goals(s) you want to achieve and what subject you are teaching for the field trip. It is applicable in everyday life for planning whatever activity you want to do. To demonstrate what is involved in the field trip stages, the following sections detail an example of going to a beach to collect rocks for rock identification activities.



PRE-FIELD TRIP: STEPS 1, 2 & 3

STEP 1. QUESTION

In their student group, have them think about the question they want to ask about their field trip project.

STEP 2. HYPOTHESIZE

In their student group, have them think about a hypothesis based on the question they asked.

STEP 3. DESIGN

Student

The teacher will help students with the different things they need to think about. Have students review photos and maps to get familiar with the location. Then, get them to create the following:

- **checklist of materials**
- **itinerary**

Teacher

Before the field trip, the teacher must create the following documents:

- **SME & chaperone packages**
- **safety briefing**
- **rules of conduct**

The first two steps provide the students with a reason and purpose for doing the field trip. It is important to emphasize that these are essential elements to the project. They can use the suggested ones shown here or create their own. Let them explore their curiosities.

A possible Question (Step 1) might be:

> **Is our location a good place to find rocks to learn about rock names?**

A possible Hypothesis (Step 2) might be:

> **Yes, there will be lots of different types of rocks at our location.**

The Design (Step 3) will help reduce barriers for students who might be anxious about being outdoors or being somewhere they have never been before. This is when students will make a checklist of materials needed for the field trip and create an itinerary. Have students think about the tools an earth scientist might use and the personal items they need to pack in their backpack. The students might get ideas from comparing how they planned for a family trip or another school field trip.

During this stage, you will also develop packages for the SME and Chaperones to provide them details about the field trip, as well as their roles and responsibilities. In addition, you will create a few critical documents, such as the safety briefing and rules of conduct, for everyone participating in the field trip. These are required documents for any field trip.

During your field trip assessment you will have identified the number of chaperones required for the field trip based on school board policy. For grades 3 to 6 this is usually 1 chaperone to 8 students. At least one month prior to the field trip (or earlier depending on the complexity) you should send out requests for chaperones and SMEs. Once you receive replies from these volunteers and you have confirmed all the details about the field trip they should be sent their packages.

The chaperone and SME packages should include the following documents:

- field trip itinerary
- student list (first names only) in their assigned groups
- site map
- chaperone and SME responsibilities
- safety plan
- evaluation form
- student field guide or similar document that details the student activities

CHAPERONE & SUBJECT MATTER EXPERT (SME) RESPONSIBILITIES

Thank you for helping to make this field trip successful and meaningful for our students

Chaperone responsibilities

- interact with students in your group to encourage their thinking and ask them questions about what they are observing and doing
- be firm and friendly in ensuring students follow rules and practice good citizenship
- know what activities students have to do and keep them focused on their tasks
- stay with your assigned group and keep the group together at all times
- check to make sure you have all students from your group at the beginning and end of each planned activity
- know the schedule and make sure your group gets to a station in time for the activity

SME responsibilities

- interact with all the students to encourage their thinking and ask them questions about what they are observing and doing
- be firm and friendly in ensuring students follow rules and practice good citizenship
- know what activities students have to do and keep them focused on their tasks
- coach students as they work through their tasks and demonstrate the field skills they are learning, as needed
- know the schedule and assist chaperones to make sure groups get to a station in time for the activity

Have a wonderful time learning with our students

THANK YOU!!

FIELD TRIP SAFETY & CONDUCT

Here are examples of safety and conduct information for a field trip to a beach that you can provide in the packages for the SME and Chaperone and to use for your safety briefings.

Protected Sites

In most cases it is okay to collect loose materials from the beach, such as rocks, but it is not permitted to collect fossils. A permit is required to remove material from the cliff face and to collect fossils from the beach. Check with provincial laws, such as the Beaches Act in Nova Scotia.

Safety Issues

Tides: One of the most important safety concerns is being aware of the tides. The rising tide may cut off your beach access and leave you stranded with no route to return back safely. The general rule of thumb is to start your hike when the tide is falling (going out) and return at least two hours before the high tide time.

Make sure that you check the tide schedule for the area you will be visiting as they are different from one place to another.

Dangerous Surfaces: The best places to collect rocks are along the rocky beaches so you will need good, sturdy footwear to walk safely. Avoid slippery rocks covered with seaweed, green algae or mud. Walk carefully on rocks, especially those that have fallen from cliff faces as these usually have very sharp edges. It is best to leave your beach sandals at home!

Cliffs: Do not walk close to the cliff face. Rocks and debris may fall down from the cliff without notice. A safe distance away from the cliff is about 10 metres (length of a school bus).

Safety Kit: The teacher and chaperones should each carry a small safety kit and a whistle with them. The kit should include items to provide first aid for minor cuts or injury and a form for recording information. The whistle can be used to call for help and warn others of dangers.

Weather: Weather can change very quickly if you are not paying attention. You should bring extra clothing for cold and wet weather, and also have a hat and sunscreen for a hot, sunny day

Safety Planning

Take the time to develop a safety plan. Identify all the safety issues that relate to the field trip location and activities, as well as any personal medical issues of the participants. Then determine the plan on how to deal with them if they arise. Provide a copy of the plan to the SME and chaperones.

Rules of Conduct

It's important that all participants acknowledge the code of conduct, to behave respectfully and follow the rules. Students also need to abide by the physical boundaries of where they can and can't go and the timings that they have to be at the different stations.

FIELD TRIP SAFETY PLAN	
Identify safety issues related to:	**Develop plan to address safety issue**
a. Field trip location:	
b. Field trip activities:	
c. Personal medical issues:	

List of Important Phone Numbers

School Office:

School Principal:

Address and Phone Number of nearest emergency facility:

RULES OF CONDUCT DURING THE FIELD TRIP

The rules of conduct while on the field trip are as follows:

- Provincial School Code of Conduct is in effect throughout the field trip
- teacher, SME and chaperones will demonstrate responsible behaviour and promote an attitude of cooperation and safety awareness
- students shall be responsible for demonstrating courtesy, cooperation, and safety awareness
- students must be respectful of others, listen and follow rules
- students must stay with their group and always be within eyesight of the chaperone at all times
- keep all your garbage in your backpack until there is a proper place to dispose of it
- be respectful of living things and do not harm or destroy plants and animals you may encounter
- the teacher and every chaperone must carry a school approved first aid kit
- all should take part in looking for safety hazards and making everyone aware of them as soon as possible. Students will inform either the teacher, chaperone or SME immediately

Have a wonderful time learning, be respectful and stay safe

THANK YOU!!

FIELD TRIP: STEP 4. GATHER

STEP 4. GATHER

Activities done during the field trip.

a. Observing

- first take time to look around and notice different types of rocks

b. Collecting

- choose rocks that represent the three rock types
- select rocks that are large enough to see its characteristics (about fist-size) and not too big that you can't carry it by yourself

c. Measuring

- measure rock dimension
- test for permeability

d. Recording

- fill in the rock identification form
- use the journal for additional notes, observations and measurements
- write about your experience in your journal
- make sure others will be able to read your writing and understand your notes

e. Sketching

- use the space in the form to sketch your rock
- include a title, scale and labels for the features described for each sketch
- use the journal for additional sketches
- make sure that others will understand what you've sketched

f. Taking photos

- write a brief description in the journal for each photo taken on the field trip
- make a list of photos you took

The Gather step includes field activities such as; observing, collecting, measuring, recording, sketching and taking photos. Walk your students through these field trip activities in the order listed here. Review and explain how to fill out the Rock Identification Form and emphasize the importance of including a proper title, scale and labels for each one of their sketches.

Ensure that the students are given a safety briefing and explained the rules of conduct as soon as they arrive at the location and before starting any activities. This briefing should be a repeat of what was given in the classroom near the end of the Design step. The chaperones and SME must also be present for the safety briefing. Informing everyone before starting the field activities will be a good reminder to stay safe and follow the rules.

Instruct students that each one of them has to collect at least three rocks and complete the Rock Identification Form. One form is filled out for each sample. Also encourage them to take photos, if possible. Inform the students that they will be bringing the samples they've collected back to the classroom so that they can finish the rock identification forms. During the field trip, it's important that students take their time selecting samples and making sure their group has enough different types of rocks. The students will have to select one of their rocks to write about in their final report and which they will present to the class.

ROCK IDENTIFICATION FORM

Collector	Date	Sample #

Location Name	Location Description

ROCK OBSERVATIONS (describe the following characteristics)

Colour (give one or more)

Dimensions (shortest & longest lengths)

Shape (choose one of the following)

rounded

angular

Texture (crystals, grains, or too small)

Permeability test
(pour tiny amount of water on the rock)

water is absorbed =	water runs off =
permeable	**not permeable**

subrounded

subangular

Feels (smooth or rough) (light or heavy)

Pattern (no pattern or organized)

Describe your observations (include patterns and other characteristics you can see)

Sketch your rock (include labels such as the rock's dimensions and any special features)

Rock type: (circle one)

Igneous Sedimentary Metamorphic

Rock name:

POST-FIELD TRIP: STEPS 5, 6 & 7

The Post-field Trip steps of the scientific method will test your students' knowledge and challenge their ideas about Earth processes. Encourage them to ask lots of questions and think about what they have learned about the rock names and types.

The **Analyse** (Step 5) begins with asking important questions about each of the three Pre-field Trip steps; the **Question** (Step 1), **Hypothesize** (Step 2) and **Design** (Step 3). Explain to the students that the arrows in the 7-step scientific method (see page 4) is the process of analysing the Pre-field Trip steps. This helps to confirm whether these steps are still valid or if adjustments are needed. This first part of the analysis will help to identify if there were some things that could have been done differently to better prepare for the field trip.

STEP 5. ANALYSE

The students should be guided through the following questions for their analysis.

a. Did I ask the right QUESTION?

- NO, then ask a new question and restart the process from Step 1

OR

- YES, explain and then go to next question

b. Is my HYPOTHESIS correct?

- NO, then create a new hypothesis and restart the process from Step 2

OR

- YES, explain and then go to next question

c. Do I need to change my DESIGN?

- NO, explain and then go to next bullet

OR

- YES, then determine what needs to be added, changed or removed and restart the process from Step 3

d. list all the data that supports your hypothesis

Next is to analyse all the information from the **Gather** (Step 4) of the Field Trip stage. This includes looking at the rocks collected, the information learned about the location and everything that was recorded from the field trip (rock identifications, sketches, journal notes and photos).

Students might be surprised to learn that the data they collected may lead them to new or unexpected information. It is possible that this information could have changed how they would have done one or more things in the first 4 steps. If there is time, allow for a discussion to identify what things they could have added or done differently up to this point.

The **Analyse** (Step 5) is an opportunity for students to reflect on all that's been completed to this point and determine if they have gathered enough data to continue on to the next step. At the very least, the students should try to identify gaps or information that was missed. For example, they could think about how

they would answer questions like, "Is there something important I wanted to do but couldn't?", or "Did I forget to do something I planned?" Answers to these questions should be added to their report.

STEP 6. ORGANIZE

Explain that the data needs to be organized before it can be put into a report and shared with others.

a. **gather your data**
b. **categorize your data**
c. **show your data with graphs, diagrams, and tables**

Once the analysis is completed, each group will start the **Organize** (Step 6) of their data by gathering up all that the group has collected. This includes their Rock Identification Forms, sketches, journal notes and photos. Allow time for the students to learn about what each of the other students in their group has collected. The task for each group will be to decide how they will organize their group's data so they can summarize their findings in a report. Students can create a table or graph to show information about their analysis. An example could be as simple as a graph showing how many rocks the group could and couldn't be named or what was the most common rock name that was collected in the group. You can allow students to come up with their own categories and determine how to show their results.

STEP 7. REPORT

Explain that their report should include the following:

a. **Title**
b. **Project Description**
c. **Findings**
d. **Conclusion**

The **Report** (Step 7) should be a fun activity where each student has an opportunity to participate in presenting findings from their group and individually. No matter whether students prepare a written report, poster, or oral presentation they must use, as a minimum, the headings shown above. Let them use their imagination to come up with a **Title**. Explain that their **Project Description** is the Why, What, Where, When and Who of the field trip project. Their **Findings** will include information and analysis about the rocks that the group collected and investigated. Students can include a table or graph that represents data from all the rocks collected by the group. Their **Conclusion** will state whether their Hypothesis was or was not correct and explain why. Encourage them to add other aspects of the project, such as things they liked learning about, what was difficult, and what they would do differently.

If there is time, have some of the students prepare an individual presentation on one of the rocks they investigated in detail.

FIELD TRIP EVALUATION

Without reflection you'll never know how to repeat your successes or improve upon your failures.

The main purpose for evaluating the field trip is to make improvements for the next one, but it might also lead to new ideas for a different field trip. No matter how detailed your field trip plan is or how well it is executed, there will likely be room for improvements. The important outcomes to focus on are identifying the lessons learned and sharing these with the students and others who will benefit.

Your evaluation should include feedback from as many people as possible and represent everyone involved in all three stages of the field trip process. The method you choose to collect feedback can be with forms, such as those provided in the following pages. You can also add your own observations and conversations you may have had with different people participating in the field trip. Also include answers to questions you received during the field trip from the students, SME and chaperones. Your conversations and questions might also help others think about things they will include when they complete their own evaluation. Add notes to describe the photos you took and those received from others. These can provide valuable context to your evaluation and help emphasize important points.

For any evaluation, it helps to have a journal handy to note observations or thoughts whenever they take place. When you go back to read your comments and after you've had time to reflect, you'll probably find yourself adding more details. When it's all done, make sure to share with others who could benefit from your experience.

TEACHER EVALUATION FORM		
STAGE	**WHAT WENT WELL?**	**WHAT TO IMPROVE?**
Field Trip Assessment		
Pre-Field Trip 1. QUESTION		
2. HYPOTHESIZE		
3. DESIGN		
Field Trip 4. GATHER		
Post-Field Trip 5. ANALYZE		
6. ORGANIZE		
7. REPORT		
General Comments		

STUDENT EVALUATION FORM		
STAGE	**THINGS YOU ENJOY?**	**THINGS TO CHANGE?**
Pre-Field Trip		
Field Trip		
Post-Field Trip		

SME & CHAPERONE EVALUATION FORM		
Name:	**Organization:**	**Contact email/Phone #:**
Which part of the field trip were you involved with? (check all that apply) Pre-Field Trip _____Field Trip _____ Post-Field Trip _____		
Describe your experience, include both favourable and unfavourable events.		
Would you like to volunteer on another field trip? If yes, which part(s) of the field trip would you like to volunteer with and would you like the same or different role.		
Please provide any additional comments.		

The following are some questions that might be useful for summarizing important points from the different sources of information you have collected about the field trip.

TEACHER EVALUATION SUMMARY
List important points to improve the next field trip.
List important points to help design a different field trip.
Identify points I should share with: Students SME Chaperones
Identify points I should communicate to: Other teachers Principal Organizations outside of the school (specify each one)

NOTES

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Field Trip Planning

Teacher Guide

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