

## **Learning About Mapping from Lewis and Clark**

Lesson materials for elementary level created/developed by MOREnet/eMINTS instructional staff in support of the Lewis and Clark Historic Landscape Project conducted at the Geographic Resources Center (GRC), Department of Geography, University of Missouri, in partnership with the Missouri State Archives, Office of the Missouri Secretary of State.

The Missouri Research and Education Network (MOREnet) provides Internet connectivity, access to Internet2, technical support, videoconferencing services and training to Missouri's K-12 schools, colleges and universities, public libraries, health care, state government and other affiliates.

The eMINTS (enhancing Missouri's Instructional Networked Teaching Strategies) program is an integral part of a statewide effort to move Missouri's classrooms into the 21<sup>st</sup> century by combining cutting-edge technology with first-class teaching. MOREnet administers eMINTS under contract from the Missouri Department of Elementary and Secondary Education (DESE).

### **Contents**

Show-Me Standards

Lesson 1: Hook and Graphic Organizer

Lesson 2: Using the Lewis and Clark Interactive Map Server

Lesson 3: Map Making

Lesson 4: Off on an Adventure

Lesson 5: Bringing It All Together

Rubrics

Collaborative Work Skills Rubric

Map Drawing Rubric

Map Following Rubric

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**Title: Learning About Mapping from Lewis and Clark**

Subject Area: Social Studies-Geography

Grade Level: 4

Show-Me Standards:

**Social Studies**

- Continuity and change in the history of Missouri.
- The use of tools of social science inquiry (such as surveys, statistics, maps, documents).

**Mathematics**

- Geometric and spatial sense involving measurement (including length, area, volume), trigonometry and similarity and transformations of shapes.

**Annotated Frameworks:** (optional)

- Knowledge of how to read and construct maps attending to such features as the map's title, key and compass rose.
- Knowledge of the geography of Missouri – locations of the Mississippi and Missouri Rivers and major cities.
- Ability to communicate the location of a place by using an absolute description (latitude and longitude) or a relative description (its relation to another place).

Time Allowance:

This is planned as a 5-lesson unit. Each lesson could be completed in a 45-minute period on consecutive days or over a longer period of time.

Materials Needed:

- At least one Internet-connected computer that can be displayed to the whole class. A computer lab setting would be preferable.
- Clipboards, pencils, paper, yardsticks
- Compasses (at least one for each group of 3-4 students)

Description:

See following pages.

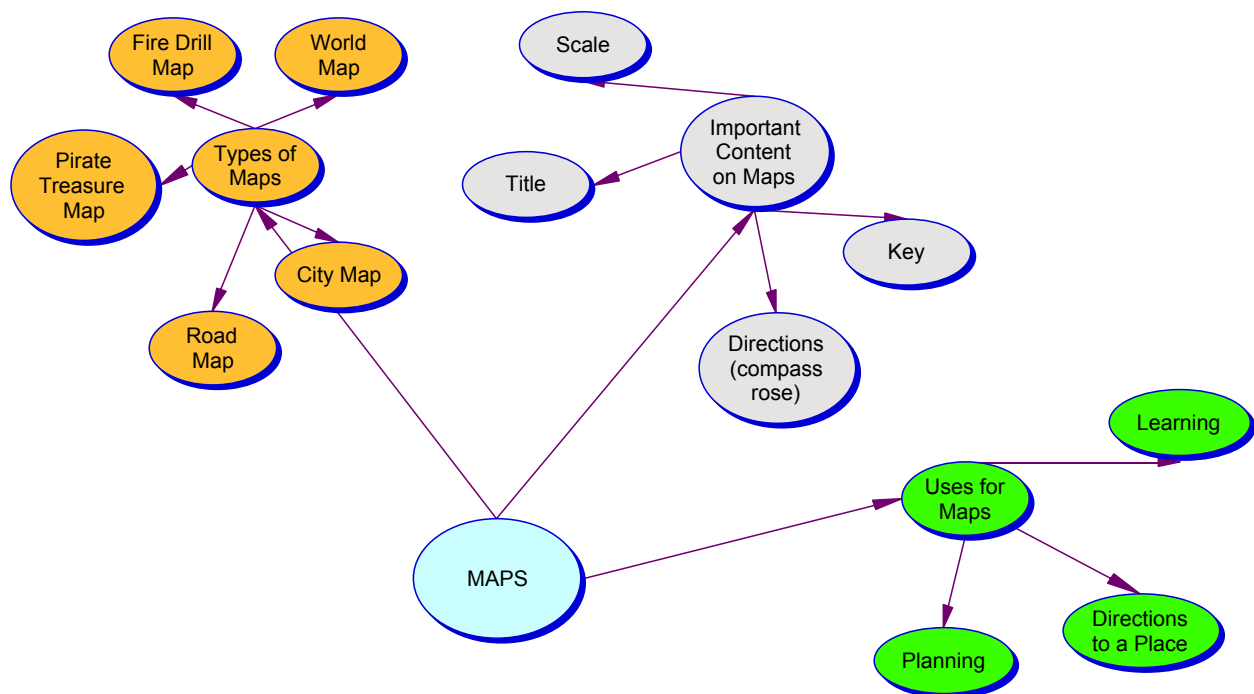
## Lesson One

### Hook and Graphic Organizer

The teacher should hide something (or even several different things) of value to the students in different places in the classroom. The teacher should make a map and pass it out to guide students to find the item(s), but the map should be missing the main pieces of a map (title, key to the symbols used, scale, orientation-compass rose). Students should be given a short time to find the items then brought together to discuss the experience.

Students should be able to express some frustration over the difficulty of following the map. Use Inspiration software on a computer that can be projected and seen by the whole class or a graphic organizer drawn on the chalkboard to collect and organize student observations about the map and maps in general.

Sample graphic organizer.



As students finish making the graphic organizer, remind them of Lewis and Clark's expedition. Tell them they will be looking at maps of the Lewis and Clark expedition in Missouri and also making maps of their own.

Assessment: Quiz (one of many assessments used in this unit)

1. If you wanted to find a relative's house in another town you might use:
  - a. a treasure map
  - b. a street map
  - c. a map showing flora and fauna
  - d. a world map

ANSWER: b

2. A legend or key on a map
  - a. is put there to look nice
  - b. always shows where rivers are
  - c. helps the user make sense of the map
  - d. is not necessary

ANSWER: c

3. Circle the cardinal directions
  - a. left
  - b. south
  - c. east
  - d. right
  - e. west
  - f. down
  - g. north
  - h. all of the above

ANSWER: b, c, e and g

4. A diagram that shows which way to find north
  - a. can be found on a compass and on maps
  - b. is extra
  - c. is optional on a map
  - d. is called a compass diagram

ANSWER: a

5. A map without a \_\_\_\_\_ is useless
  - a. description
  - b. book
  - c. title
  - d. arrow

ANSWER: c

6. Maps indicate scale to show
  - a. how many inches it is across the map
  - b. where things are
  - c. the comparison between parts of the map
  - d. the size of the map compared to the real world

ANSWER: d

7. Which direction is usually at the top of a map?

- a. south
- b. east
- c. west
- d. north

ANSWER: d

8. An important skill when making a map is

- a. ability to run fast
- b. good observation
- c. musical ability
- d. typing fast

ANSWER: b

Write one sentence telling something you learned or knew about maps.

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ANSWER: will vary

Name some maps you or your family have used.

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ANSWER: will vary

## Lesson Two

### Using the Lewis and Clark Interactive Map Server

This lesson is best done in a classroom or lab where each student can work at an Internet-connected computer with a partner. It can be done as a whole class with the teacher guiding the exploration and students observing a projected image, but much is lost when the students are not hands-on and engaged in the process.

The teacher should spend some time trying out the Web site before using this lesson with the class. The maps can be confusing and it will be better for the teacher to encounter some of this confusion and deal with it first.

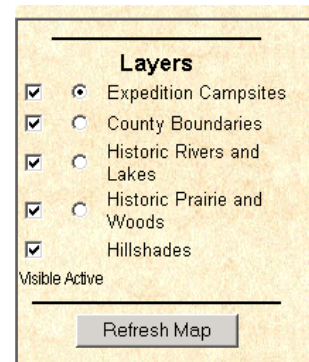
**Note:** If students will be accessing the Web site have it bookmarked so all they have to do is open Internet Explorer or Netscape and choose the Favorites or Bookmarks to go to it. The teacher may instead have a class Web site and create a link to it from this page or possibly the media center or school could add it to a list of resources from the school site.

1. Have all students go to <http://lewisclark.geog.missouri.edu/index.shtml>, the Lewis and Clark Across Missouri Web site. This lesson will guide students into an exploration of part of the Web site.
2. Explain to the students the four choices on the left side of the screen: The Campsites, Virtual Landmarks, Virtual River Travel Day and Interactive Map Server. Tell them they will be spending some time together learning about the Interactive Map Server. The other three choices also are interesting to look at; for the next 15 minutes give the students a chance to try them out. (If the class is looking at this information together on one computer, the teacher will have to demonstrate the three choices. Choose students to come up and guide the class with their choices.) The purpose of this activity is to show students there is more to the site than the map they will be using.
3. When the students have had enough time exploring the first three choices tell them that it is time to look at the **Interactive Map Server**. There are seven different maps to choose among and each one is full of information. For a fourth grade group it will be important to limit the activity to one of the maps so the information is not overwhelming. This lesson focuses on the first map of Lewis and Clark's Expedition. The activity is an interactive question and sharing session. If this activity is done in a lab setting with students using hands-on computers it will be important to have them all come to attention and possibly turn off monitors when there is group discussion time. If it is done as a whole class activity, with a teacher guiding the activity, it will be important not to give answers, but to allow students to take turns being in control of the map with time for observation between collecting responses to questions.

4. Have the students pull down the menu and choose the first map: **“The Journey Begins 1803-1804.”**

5. Begin by making observations as a group about what the students notice about the map. See a list of ideas that should be brought up by the students below. They may come up with other important things, but if they do not mention one of these items the teacher may need to ask more pointed questions.

- The title - Important because it tells the reader what is important about this map - Lewis and Clark’s Journey and the years they traveled.
- The directions - Each of the sides shows North, South, East or West and there is a compass rose in the bottom left corner (vocabulary they will need to learn).
- Layers - Have students take all the checkmarks out of the visible boxes and press the Refresh Map button. Talk about what happens. Have them put in one checkmark at a time and tell what they see. Ask the question, “So far we have only talked about the ‘Visible’ checkbox, but what about the ‘Active’ checkbox?”
- Tell students there will be different information available depending on the active layer. To get this information they will have to use the tools in the toolbar at the left.



## Map Tools

Each of the tools lets you do different things to the map. Have students try all the tools to find out what they do. Each of the tools is explained below. Not all the tools will be useful for a fourth grade activity. The most important tools are highlighted. Students will learn much more from trying out the tools than they will from a step-by-step explanation of each one. When they have questions, refer to this chart for more information.



Legend/Layer List - This tool switches the map between showing the legend and showing the layers.



Overview Map - This tool makes the overview map appear and disappear.



Zoom in and Zoom out - This map does some very magical things when you use the Zoom in and Zoom out tools.



Zoom to full extent and Zoom to active layer.



Return to last map size.



Pan - This hand can grab the map and drag it so you can view a different part.



Identify - This tool lets you find out information about the active layer.



Query - This map is made from a database with large amounts of information. The Query tool lets you form a question for the database to solve. To do this you must know the rules of forming a database query.



Find - This tool lets you type in a keyword about something you want to see on the map. When the Find window is open it is indicated on the toolbar. If it disappears (hidden behind the map window) click on Find on the toolbar.





Measure - This tool lets you measure distances on the map.



Clear Selection - This tool clears anything you have marked with the measuring tool so you can start over.



Print - This tool prints the map you are looking at.



Help - Click this tool for instructions on using the map.

After you talk about how the map looks when you first get there have the students use the **Zoom in and Zoom out tools** and make some observations. These tools interact with the layers in a very important way. When the map is zoomed out all the way and shows the whole state only five layers show. As the map is zoomed in layers are added. When you open the map for the first time the Zoom in tool is chosen.

- Every time you click the mouse on the map it zooms in to the point you clicked on.
- Each time you zoom in several things change:
  - i. More layers are added and new features show up on the map.
  - ii. The scale changes.
  - iii. The Overview shows where the piece you are looking at fits into the whole state.

**The Journey Begins (1803 - 1804)**

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Dept. of Geography, Stewart Hall, Columbia MO 65211  
 URL: <http://www.geog.missouri.edu>  
 Last Update: 09/11/2002 07:23:54



The Identify tool gives information about wherever you click on the active layer of the map. It is important to be aware of which layer is active. The active layer is chosen in the layer box by clicking in one of the circles.

Have everyone try this tool out together first:

1. Start by having students Zoom out until they can see the whole state and the line of red stars indicating the camping places.
2. Have them click on the Identify tool then click on one of the red stars.
3. First a bar will come up that says Retrieving Information and then a box like the one below will appear.

Rec	TYPE	DATE	DESCRIP	NAME
1	camp	04/07/01	lower point of one of large islands (Isles des Parques&apos;	Field Islands &apos;Isles des Parques&apos; pr

Explain to students that this box tells them about the campsite they clicked on. The description is longer than the window so they will have to scroll right to read all the information. Have students try it out then share information they discover. This exercise is a chance to talk about the meaning of flora (plants) and fauna (animals).

Get the Graphic organizer the class put together during the first lesson. Have students find things they talked about in general on this map in particular. How does this map show the things that Lewis and Clark saw along the way (like animals or plants)? Why is scale important? What was the purpose for Lewis and Clark's map?

Play a game to see who can find the information first and how they find it. When someone finds the information they can come up and show the class how they got it. If they are all stuck the teacher can walk them through the steps below each question.

Use the map and tools to find answers to these questions.

1. What date did Lewis and Clark's Expedition camp near Jefferson City?  
(Hint: Zoom in on the map until you see a layer called Present Town/City Names. Make it the active layer. Click on the binoculars (Find) and type in Jefferson City.)  
ANSWER: 04/06/03 (explain to the students that this map uses a different way of writing the date Year/Month/Day)

2. Name a town or city that Lewis and Clark did NOT go to.

ANSWER: Will vary - they just have to name one of the cities not on their route.

3. What animals did Lewis and Clark see in Missouri?

(Hint: Choose the layer Expedition Campsites as the active layer. Click on the binoculars (Find and type in the name of an animal they might have seen.)

ANSWER: deer, bear, raccoon, elk, buffalo, parakeets, horse

4. How many times did Lewis and Clark find raspberries in Missouri? Name one of the dates they found them.

(Hint: Choose Expedition Campsites as the main layer and zoom out all the way to see the whole state. Click on Find, the binoculars and type in raspberries.)

ANSWER: Three dates will come up - 04/06/19, 04/06/30 and 04/07/10

5. Name something else that Lewis and Clark found on 04/07/10.

ANSWER: prairie larboard, grapes, raspberries

6. What information can you find out about 04/06/10?

(Hint: Choose Find, the binoculars, and type in the date. The information from the database containing the Lewis and Clark journal will open. Click on the number at the left to open the map and show where they were on that date.)

ANSWER:

with great quantities of plum (plumb) bushes	deer and bear	open	Drewyer killed 2 bears, other hunters killed 2 deer
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7. Describe where the campsite on 04/06/10 is located:

(Note: You may want to pick a site close to where you live. If you use this date all you need to do is use the information from the last question and click on the number at the right. It will open a map showing the location of their camp that day.)

ANSWER: If the students just look at the map as it is they may say near Gilliam and Slater. This site may not be very meaningful, so you can help them look at the inset and see where it is in relationship to something meaningful to the students. This particular date is not far from Columbia, near the middle of the state.

## Conclusion

Tell students:

“This amazing map is only possible because of the careful observations of Lewis and Clark as they made their expedition. Tomorrow (or whenever the next lesson takes place) you will be doing some observations and making your own map. I hope it will be useful to the people you give it to.”

## Assessment

Teacher observation notes. As students are trying out the interactive map the teacher should make note of students who are asking questions beyond those they were guided to work on. Note should also be made of those students who need extra assistance to follow directions. It might be helpful to have a class list with the names in a table where you can make notes.

## Lesson Three

### Map Making

1. Divide the class into groups of three or four students each. Use observations from Lesson 2 to make sure each group has someone who has a solid understanding of how maps are used. Give each person in the group roles:
  - Expedition leader - The one who has a solid understanding, he or she guides the group and makes sure everything is included in the map.
  - Observation expert - This person should have a yardstick and a clipboard to write on. The person with this role takes notes about what is seen along the way and makes measurements from landmarks to put into the map. If groups are larger than three assign more than one observation expert.
  - Draftsman - This person actually draws the map.
2. After the groups are divided distribute the rubric and go over each of the items their maps should include.
3. Each group should have access to a digital camera. It is ideal to have one camera per group, but if not possible the teacher can supply one for students to borrow when they are ready to take their final picture.
4. Each group needs a compass to note the directions they travel on their map.
5. Explain that each group is going to make an expedition and create a map showing its trip. At the end of the expedition they should take a picture of a landmark — an object or scene they see that will remain the same over time so it will still be there when another group follows their map.
6. After the class arrives at the park or playground take each group to a beginning spot. From this spot they plan their own expedition. They should start by drawing a sketch of the area. Give them a specific amount of time to plan their expedition and take their final picture with the digital camera. The class can return to the classroom to spend time actually drawing the map.
7. Back in the classroom each group will take the notes they made and construct an expedition map with a title, key or legend and compass rose. The teacher should number each map. The teacher will take each of the pictures the groups took and put them into a PowerPoint® to show to the whole class.

### **Assessment** Self Evaluation

Have students rate themselves on a scale of 1-10 on the following statements. Ask them to add all the numbers to come up with a total for their own self evaluation.

1. I listened to instructions.
2. I was helpful to others in my group.
3. I completed what was expected for my role.
4. I did not take over someone else's job except when asked for help.
5. I am proud of the work I did today.

## **Lesson Four**

### Off on an Adventure

Lesson 4 completes the unit. Students have the opportunity to follow a map someone else made and have an adventure finding something.

1. Place students in their pre-assigned groups. Allow each group to draw a number randomly. The number corresponds to one of the maps made by another group in Lesson 3.
2. The class returns to the original location used in the development of their maps where each group will try to follow the map they have been given. When students reach the end of the map they should decide what the landmark is and use the digital camera to take a picture of the landmark.
3. Upon return the teacher adds new pictures to the PowerPoint, pairing them by numbers so the photos can be compared to see if groups found the same landmark.
4. Each map also can be scanned so it can be viewed with the landmarks.
5. Gather the class with rubrics in hand. Begin with a discussion about what was easy and what was difficult about the activity. Was anything missing from the maps they had to follow? When they were following someone else's map did it remind them of things they should have included on theirs?
6. Show the PowerPoint and ask students to give each map three "stars" (good points) and a "wish" (I wish the map had ...) so there is more praise than criticism for each map

### **Assessment**

Use the rubrics (attached) to assess student performance.

- Collaborative Work Skills Rubric
- Map Drawing Rubric
- Map Following Rubric

## Lesson Five

### Bringing It All Together

This lesson brings together all the concepts students have been working on. It should take place in the lab or classroom where they first worked on the Lewis and Clark Maps.

Have students sit with their groups from the map drawing and following activities. They should go to <http://lewisclark.geog.missouri.edu/index.shtml>. Have the students return to the map they viewed before: "The Journey Begins 1803-1804."

Say the following: "Today we are going to talk about two main questions: Why did Lewis and Clark collect such specific information? What good is that information for us today? To make the observations needed to answer these questions, you will have to zoom in on the map."

Have students click in a similar location (campsite in the center of the map). Ask them to stop each time they zoom in and make some observations about how the map changes. Remind them about how new layers are added each time. Ask them to notice which layers get added each time. Have them click on the Legend/Layer tool to see what the new symbols that appear on the map mean. You will notice pink squares that represent historic land grants, commons and public fields.



On the fifth click you will notice there are two rivers. Have students click on the Legend/Layer tool to see what the two different rivers mean. The map adds present day as well as historical marks. Make sure students understand the light colored river is the Missouri River now and the dark colored river is the historical river. Have them make observations about the two rivers (the old river is wider and splits many times).

Explain to students the many reasons the river has changed over the years, but the careful observations made by Lewis and Clark's Expedition help show what the river used to be like. Give students time to zoom in and explore this map more and if they seem to understand the maps well let them switch to other maps using the drop down menu on the right side. Show them how they can use the hand tool to drag the map and follow the river.



Have students take out paper and pencil and list what they observe about how things have changed over the years. As they are looking at maps and making notes, circulate and bring out good observations to the class to guide others. Help students come to the observation that changing the river has also had an impact on the wildlife in the area.

Tell the students they have used good observation skills while using the maps. End the lesson by doing a Venn diagram to compare the maps they drew with the Lewis and Clark Map. They should have a copy of their map to look at while they are looking at the map online to help them understand things that are different and alike on the two maps.

**Assessment:** Each individual turns in a diagram that can be used to see how much was understood about maps from this unit. The Venn diagram definitely should show overlap on title, key or legend, scale and compass rose. Student should have made other notes to show differences between their map and the online map.

## Collaborative Work Skills: Learning about Maps with Lewis and Clark

Teacher's Name:

Student's Name:

CATEGORY	4	3	2	1
Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard.	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Quality of Work	Provides work of the highest quality.	Provides high quality work.	Provides work that occasionally needs to be checked/redone by other group members to ensure quality.	Provides work that usually needs to be checked/redone by others to ensure quality.
Time Management	Routinely uses time well throughout the project to ensure things get done on time. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Usually uses time well throughout the project, but may have procrastinated on one thing. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Tends to procrastinate, but always gets things done by the deadlines. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Rarely gets things done by the deadlines AND group has to adjust deadlines or work responsibilities because of this person's inadequate time management.
Pride	Work reflects this student's best efforts.	Work reflects a strong effort from this student.	Work reflects some effort from this student.	Work reflects very little effort on the part of this student.

Working with Others	Almost always listens to, shares with and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with and supports the efforts of others. Often is not a good team player.
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### Map Drawing Rubric

	Exemplary	Competent	Basic	Emerging
Labels	At least 90% of items labeled and located correctly.	80% of items labeled and located correctly.	70% of items labeled and located correctly.	Fewer than 70% labeled and located correctly.
Spelling/Capitalization	At least 90% of spelling and capitalization correct.	At least 80% of spelling and capitalization correct.	At least 70% of spelling and capitalization correct.	Less than 70% of spelling and capitalization correct.
Neatness	All labels/features can be read easily.	Most labels/features can be read easily.	Some labels/features can be read easily.	Few labels/features can be read easily.
Title/Purpose	Title clearly reflects purpose of map.	Title generally reflects purpose of map.	Title somewhat reflects purpose of map.	Title does not reflect purpose of map.
Key/Legend	Has a key/legend that is readable and useful.	Has a key/legend and most symbols are useful.	Has a key/legend that is difficult to understand.	No key or legend that uses non-standard symbols.
Directions	Map includes a compass rose and it is clear how to orient the map so north is at the top.	Compass Rose or cardinal directions are marked on the map, but not both.	An attempt to place some cardinal directions on the map has been made, but it is not totally correct.	No cardinal directions are included on the map.
Scale	Map includes an indication of scale.	Map scale is included, but not used throughout the whole map.	Map scale is too messy to read or is not accurate at all.	There is no map scale included.



## Map Following Rubric

The maps the group follows may have flaws that should be taken into account when using this rubric. It is provided as a guide for students as they use each other's maps.

	Exemplary	Competent	Basic	Emerging
Success Finding the Goal and Following Directions	After carefully following the map the item identified by the map maker was correctly identified and a picture taken.	After carefully following the map something near the item, but not quite the one identified by the mapmaker was found and a picture was taken.	The item identified by the mapmaker was found with help from others in the class.	The map was followed incorrectly and therefore the item identified by the mapmaker was not found.
Consideration and Helpfulness	All suggestions made to others were considerate and helpful.	Most of the suggestions made to others were considerate and helpful.	Suggestions made to others need improvement to be more helpful.	No suggestions were made to others or only negative comments were made.
Use of Compass	Used the compass correctly to follow the directions on the map.	At times used the compass to follow map directions.	Used the compass with significant help.	Did not try to use the compass and often went the wrong way.
Group Work	All of the members of the group cooperated and helped each other succeed.	Most members of the group cooperated and helped each other succeed	Not all group members participated and helped positively in the activity.	Group members worked individually without concern for each other.

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