MARS STUDENT IMAGING PROJECT (MSIP)
Suggested 3-Week Archived Schedule

This schedule is intended to provide a set of activities to be implemented in your classroom as a three-week MSIP archived format. Each session is intended to fit a classroom period of about 45 minutes. This format/schedule can also be used as a 'primer' for your students to put together a formal proposal and project for use of the THEMIS camera. You can implement this format with students in small groups of 3-5 students or with an entire class.

Here is an overview of each meeting/session:

Week 1: Sessions 1 - 5

SESSION 1: Earth / Mars Comparisons and an Introduction to MSIP and THEMIS Images

SESSIONS 2 and 3: Mars Uncovered

SESSION 4: Mars Image Analysis Activity

SESSION 5: Mars Image Analysis Activity (continued) and Question Mars Activity

Week 2: Sessions 6 – 10

SESSION 6: Question Mars Activity (continued)

SESSION 7: Question Mars – Question Selection, Experiment Design & Refining Your Experiment

SESSION 8: Refining Your Experiment and Data Collection Methods

SESSION 9: Data Analysis Practice

SESSION 10: Data Analysis Practice (continued) and MSIP Proposal Overview

Week 3: Sessions 11 - 15

SESSION 11: MSIP Proposal Discussion and Data Gathering

SESSION 12: Data Compilation

SESSION 13: Graphing and Data Analysis

SESSION 14: Drawing Conclusions

SESSION 15: Writing up your Final Conclusions

RESOURCES THAT CORRESPOND TO EACH MEETING ARE AVAILABLE AT :

- http://marsed.asu.edu/upload/MSIP_Archived

This includes the MSIP ARCHIVED STUDENT MANUAL. (This manual is a compilation of all the materials and activities. If possible, it is recommended that each student have their own manual.)

MARS STUDENT IMAGING PROJECT

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SESSION 1: ***EARTH / MARS COMPARISONS AND AN INTRODUCTION TO MSIP AND THEMIS IMAGES***

Minimum materials required:

- *Internet connected computer with speakers: 1 per class*
- *Earth/Mars Comparison Outline sheets: 1 per student*
- ***For Homework Reading:*** *MSIP Resource Manual Chapter 3 (pp 13 – 18): 1 per student*

Having your students become familiar with similarities and differences between geologic features found on both Earth and Mars can allow them to begin thinking about what may be interesting for them to research.

1. Show the MSIP Intro Video: A video link to this presentation is available at :

   - **http://breeze2.is.asu.edu/p93588777/**

2. Have students follow along and take notes using the Earth/Mars Comparison outline. This outline is available at:

   - http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 1 folder)

HOMEWORK RECOMMENDATION:

1. Read Chapter 3 (pp. 13-18) from the ***MSIP Resource Manual.***

Students can read other parts of the *MSIP Resource Manual*, but Chapter 3 is the highly recommended. This chapter will continue to increase student's background knowledge about comparisons between features found on both Earth and Mars. This will allow them to potentially narrow down their interests towards a particular topic. The *MSIP Resource Manual* is available at either of the following links:

- http://msip.asu.edu/pages/pdfs/MSIPResourceManualv200.pdf OR
- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 1 folder)

MARS STUDENT IMAGING PROJECT

ASU MARS EDUCATION PROGRAM

SESSIONS 2 AND 3: ***MARS UNCOVERED: Revealing the Geologic History Through Mapping***

Minimum materials required:

- *Mars Uncovered Student Guide: At least 1 per pair of students*
- *Mapping Materials: At least 1 set per pair of students*
  - *THEMIS Image Mosaic (Chryse Planitia recommended)*
  - *Transparency Sheet*
  - *Set of red, green, blue and black erasable markers*
  - *Two paper clips (to secure map and transparency sheet)*

This activity will guide students through an inquiry-based and critical thinking approach of studying the surface of Mars in a similar way scientists do. This lesson will teach students to create a geologic map of Mars and use relative age dating techniques to analyze the information and interpret the geologic history of that region.

You will find the *Mars Uncovered Teacher Guide*, *Student Guide* and three possible images to map at either of the following links:

- http://marsed.asu.edu/upload/MarsUncovered OR
- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 2 and 3 folder)

Students can simply follow the guide with the teacher leading necessary discussions as recommended in the *Mars Uncovered Teacher Guide*. If students are going to map one image, the Chryse Planitia image is recommended.

HOMEWORK RECOMMENDATION:

Whatever students do not finish in class with the *Mars Uncovered* activity, they should finish for homework.

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SESSION 4: ***MARS IMAGE ANALYSIS ACTVITY***

Minimum materials required:

- *Mars Image Analysis Activity materials: 1 set per team of 3-5 students*
  - *One THEMIS Visible image*
  - *The accompanying context image*
  - *An "11 X 17" MOLA map*
  - *Erasable markers*
- *Set of Feature Identification Charts: 1 per student*
- *Mars Image Analysis Student Worksheets: 1 per team of students*
- ***For Homework Reading:*** *Question Mars Activity page 1 (Objective and Student Introduction background information sheet): 1 per student*

This activity allows students to use a hands-on approach to get familiar with what can be seen/resolved in THEMIS visible images. The lesson asks students to identify features seen in images, make measurements and think about the relative ages of features within the image. (Lendable materials are available for this activity.) This activity is available at the following link:

- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 4 folder).
  Folder includes *Mars Image Analysis Student Worksheets*, *Mars Image Analysis Lesson Plan* (though the formal lesson plan is not followed exactly, the lesson plan can be used to supplement teacher information), *Feature Identification Charts* and a *video clip* of how to incorporate this lesson into your classroom)

The format recommended to facilitate this activity is as follows:

First give students groups 1 set of the *Mars Image Analysis* activity materials and have the do the following:

1. Have students locate the general area of where their THEMIS image is located on the MOLA map.
2. Have students label and identify features on their THEMIS visible image and the context image. They should use the *Feature ID Charts* for assistance in naming the features.
3. Students should think about and label information about the history of the area using the relative age dating techniques they learned in the *Mars Uncovered* activity.
4. Make measurements

You may want to play the video clip to explain each part of the activity with the students.

5. After students have had a chance to label features and make measurements on their initial image, give them the *Mars Image Analysis Student Worksheets*. Have them fill out the information requested for their initial image. The instructions are as follows:

Instructions:

1. Observe the labeled image and materials at your table. Look at the approximate location of where the THEMIS image is located on the MOLA map. Write down information you think is important about the surrounding area (the context) that may play a role in the features you are observing in the THEMIS image.
2. Using the *Feature Identification Charts*, look at the labeled features identified on the THEMIS image. List 2-3 geologic features you find interesting from the image. You can choose to list features that may or may not have been labeled.
3. Sketch and label your favorite geologic feature or combination of features from each THEMIS image.

6. Have student groups rotate from image to image (~5 minutes per rotation). They should continue to fill out their worksheets as they make observations of other images other students have labeled.

Note: There may not be enough time for students to make observations of all images during Session 4. You can continue this during part of Session 5. Even with the additional time provided in Session 5, not all students will get to make observations of every image.

HOMEWORK RECOMMENDATION:

1. Read page 1 of the *Question Mars Students Guide*

Even though students will have not completed the *Mars Image Analysis* activity in this session and will not officially start the *Question Mars* activity until the end of Session 5, assign the background reading (page 1 only) of the *Question Mars* activity as homework. You made decided to give students the entire *Question Mars Student Guide* at this time, but only assign page 1 for reading.

You will find the *Question Mars Teacher Guide*, *Student Guide*, and *Feature Identification Charts* (these are the same ID Charts that were used with the *Mars Image Analysis* activity) that go along with this activity at either of the following links:

- http://marsed.asu.edu/upload/QuestionMars OR
- http://marsed.asu.edu/upload/MSIP_Archived (Look for Sessions 5 and 6 folder)

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SESSION 5: ***MARS IMAGE ANALYSIS ACTIVITY (Cont'd) AND QUESTION MARS ACTIVITY***

Minimum materials required:

- *Mars Image Analysis Activity materials: 1 set per team of 3-5 students*
  - *One THEMIS Visible image*
  - *The accompanying context image*
  - *An "11 X 17" MOLA map*
  - *Erasable markers*
- *Feature Identification Charts: 1 per student(students should already have this handout)*
- *Mars Image Analysis Student Worksheets: 1 per team of students (students should already have this handout)*
- *Question Mars Student Guide: 1 per student (students should already have this handout)*

Mars Image Analysis Activity

Begin this session by providing the first 25 minutes for students to be able to continue with the *Mars Image Analysis* activity. Have students continue making observations of images and logging those observations on the *Mars Image Analysis Student Worksheets*.

Bring the activity to a close by reiterating two important points:

- It is important to look at the context of where an image was taken in order to better understand what features may be in an image
- It is important for students to realize that they may have a general topic of interest they would like to focus their research on (for example: volcanoes). They need to keep in mind that they must focus on specific features (like the ones they identified in the *Mars Image Analysis* activity) that are associated with that topic and that are visible in images they will use as data for their future research project.

Question Mars Activity

You will find the *Question Mars Teacher Guide*, *Student Guide*, and *Feature Identification Charts* (these are the same ID Charts that were used with the *Mars Image Analysis* activity) that go along with this activity at either of the following links:

- http://marsed.asu.edu/upload/QuestionMars OR
- http://marsed.asu.edu/upload/MSIP_Archived (Look for Sessions 5 and 6 folder)

Once closure has been done for the *Mars Image Analysis* activity, briefly discuss what students read in the background information page of the *Question Mars* activity. Perhaps two areas you want to draw students' attention to as a review of what they read are the two sets of bulleted information on the page. The first set of bullets state the following:

- Think about what you are curious about related to Mars and create general questions
- Evaluate your questions making sure you have appropriate tools to answer those questions

- Realize that science is most often conducted in small bits and pieces. It's understandable to have "big picture" questions, but scientists (and you) need a specific focus/question of study. This will contribute to a greater understanding about Mars through detailed research.

It is important for students to know that starting with general questions is good, but that those general questions need to be focused on something very specific (like the geologic features related to general topics they were looking at with the *Mars Image Analysis* activity). The goal of this activity will be to help them focus their questions.

The other set of bulleted information focuses on the THEMIS instrument. Students should realize that the camera can take both visible and infrared images but that the students should focus on the morphology (specific geologic features or landforms) seen with both of those data sets of images.

Once you have discussed the background information (page 1), have the students group themselves in their research teams. As a class, discuss the *Question Mars Student Worksheet 1*, questions 1 and 2. This should take approximately 3-5 minutes. Then within their small research groups, have students debate and decide what topic their group wants to study. Research teams must agree upon 1 topic of study. They do not yet need to focus on what geologic features within that topic they will focus on.

Once the research team has come to a decision, have each member of the group spend approximately 5 minutes individually brainstorming questions they may have about their topic. Some students may not finish creating five complete questions within the time frame provided. They should write down however many complete questions that come to mind in the 5-minutes provided.

HOMEWORK RECOMMENDATION:

1. Have students read pages 3 and 4 (*Student Worksheet 2*) of the *Question Mars Student Guide*. Part 2 of the *Question Mars* activity has students look at THEMIS images related to their topic (available at http://themis.asu.edu/topic) and has them start making observations.

2. Along with the reading, students should log at least 1 observation of an image (on page 5 of the *Question Mars Student Guide*) for homework. (Note: If students do not have a computer at home, you can ask them to either try doing this in the library or media center. Students should be able to make at least 1 observation for homework.)

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SESSION 6: *QUESTION MARS ACTIVITY (continued)*

Minimum materials required:

- *Question Mars Student Guide: 1 per student (students should already have this handout)*
- *Internet connected computer: 1 per pair or per small research group*

Have students get together in their research groups to look at and discuss their first logged observation on the *Question Mars Student Worksheet 2*. Students should make sure that they:

- Named specific geologic features they observed in THEMIS images. A common error is that students write down the title of the image rather than the features they observed.
- Make sure they wrote down the image ID #. Proper image ID numbers begin with a V (for visible images) or an I (for infrared images). If students logged something that does not begin with a *V* or an *I*, they may have written down an image release date number or the title of the image, both of which will be difficult for any one to relocate that image. (Students can still log those images OR they can choose to go to a different image that does have the Image ID # accessible.)
- Sketch: Students should sketch and label a part of the image they observed focusing on the features that interest them.
- Specific observations: Students should have bulleted information (or at least short sentences) of what they observed.

Once students are sure they understand the procedure for observing and logging images, they should continue with Part 2 of the *Question Mars* activity. Students should ideally work in pairs on the computer, although if necessary, each small research group can work from one computer. Students should log at least 4 additional observations of THEMIS images (available at http://themis.asu.edu/topic) per pair or per small research group related to their topic.

Students should now have at least 5 observations (but hopefully more!) of THEMIS images related to their topic of interest.

HOMEWORK RECOMMENDATION:

1. Students should log at least 2 additional observations of 2 images for homework. (Note: If students do not have a computer at home, you can ask them to either try doing this in the library or media center. Students should be able to make at least 2 additional observations for homework.)

2. Have students complete the *Question Mars Student Worksheet 3 – Question Development – Refining Questions* for homework.

(NOTE FOR PAIGE: CREATE THE CRITERIA FOR SELECTING FINAL QUESTION SHEET)

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SESSION 7: ***QUESTION MARS – QUESTION SELECTION, EXPERIMENT DESIGN and REFINING YOUR EXPERIMENT***

Minimum materials required:

- *Question Mars Student Guide: 1 per student (students should already have this handout)*
- *Internet connected computer: 1 per pair or per small research group (students may not end up using the computer during this session)*

Question Selection

Students should come to class having completed the *Question Mars Student Worksheets 3*. They should have identified the 1 question (out of the 3 they individually created) as a potential research questions for the team to focus on. Students should decide which one of their questions is the most interesting and most answerable using THEMIS images.

Experiment Design and Hypothesis Development

The *Question Mars Student Worksheet 4* asks the students to focus on ONLY the one question they feel, as a team, is best answered by using THEMIS visible images. This part of the activity helps students start thinking about how they would go about answering their question - the experiment design.

Question Mars Student Worksheet 4, question #5 is important for students to discuss carefully as it asks them to formulate a hypothesis of what the outcome of their experiment will be. Their hypothesis should be supported by their current observations rather just an unsupported guess. Students need to discuss their observations together in order to come up with a possible outcome (hypothesis) that is based on the current trends they are observing. Even though they will only have made a few observations each, basing a hypothesis on those observations is essential. The data they collect throughout the project will allow them to either support or refute their hypothesis and help them come to a conclusion about their question.

Refining Your Experiment

Once they have answered the questions on the *Question Mars Student Worksheet 4*, have them begin the *Question Mars Student Worksheet 5 – Experiment Design – Refining Your Experiment* together. This worksheet gives them a pre-made starting list of a step-by-step plan (a more flushed out experiment design) of how they will go about gathering data for their research. This will enable them to think about their experiment design in a more detailed fashion.

<u>HOMEWORK RECOMMENDATION:</u>

1. Have students write down additional information on the *Question Mars Student Worksheet 5* to the list of what observations they would need to log from every image in order to make their experiment repeatable and be able to come to a conclusion about their question.

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SESSION 8: ***REFINING YOUR EXPERIMENT and DATA COLLECTION METHODS***

Minimum materials required:

- *Question Mars Student Guide: 1 per student (students should already have this handout)*
- *Internet connected computer: 1 per pair or per small research group (students may not end up using the computer during this session)*
- *Experiment Design (Data Collection Methods) Handout: 1 per student*
- *THEMIS Image Data Gathering table: 1 per student*

Refining Your Experiment

Students should discuss the *Question Mars Student Worksheet 5* that they completed for homework. They should discuss and come to a decision on what data (information) they will collect and log from every image they observe. This will become an important aspect of their step-by-step plan or refined experiment design.

Data Collection Methods

As they discuss and finalize the data they should collect as part of their experiment design, they should fill out the *Experiment Design (Data Collection Methods)* sheet available at:

- http://marsed.asu.edu/upload/MSIP_Archived (Look for Sessions 8 folder)

Filling out this sheet will allow them to see what information they need to collect, where they will find that information and why that information is important for their project. Students should fill out as many pieces of information they feel will help answer their question. There is no minimum or maximum set of data students should collect. That will depend on their research question.

Once students finalize their *Experiment Design (Data Collection Method)* sheets, each student should get a copy of the *THEMIS Image Data Gathering* table. This table is available at:

- http://marsed.asu.edu/upload/MSIP_Archived (Look for Sessions 8 folder)

Based on what data students decided to collect and log from every image, have them fill in that information as the header of each column of the data table. Students should decide the order in which they should fill in the header information as well as divide up column header spaces provided if they need additional columns for the data they plan to collect. Students need to make sure their team data tables are consistent.

HOMEWORK RECOMMENDATION:

1. Have students log information from images they have already made observations of (from *Question Mars Student Worksheet 2*) on the *THEMIS Image Data Gathering* table.

Students should look at their previous observations and ONLY include images that apply to their projects. They may have some observations logged that focus on other aspects of their topic that they decided not to focus on. These observations should NOT be included in their data table.

Additionally, students probably did not record all the information they now realize they want to collect from each and every image, based on decisions they made with their data collection methods. They can relocate any of the previously observed images by going to the http://themis-data.asu.edu website. If they type in the image ID # (the V# or I#), they will be able to look at that image again and log the other observations and data they may need to obtain for their project.

Each individual that makes up a research team should create their own data table. They data they recorded on their *THEMIS Image Data Gathering* tables that will be compiled with other team members data (and repeat information taken out) at a later time in an excel spreadsheet. It is again important to stress that their data tables be filled out consistently.

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SESSION 9: *DATA ANALYSIS PRACTICE*

Minimum materials required:

- *Graphing and Data Analysis Practice Guide: 1 for each pair of students*
- *Computer: 1 for each pair*
  - *Computer needs to have excel*
  - *Provided electronic copy of MOLA map needs to be on each computer*

Once students know what data they need to collect in order to answer their question and support or refute their hypothesis, they need to have an idea as to how they will be able to analyze their data. For this activity, students will need access to a computer that has Microsoft Excel.

Provide students with access to the *Graphing and Data Analysis Practice Guide*. This guide and the MOLA map that goes along with it is available at:

- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 9 folder)

Note: This activity may take more than 1 session to complete. Allow students time during Session 10, if necessary, to complete this activity.

HOMEWORK RECOMMENDATION:

1. Have students continue to log information from images they have already made observations of (from *Question Mars Student Worksheet 2*) on the *THEMIS Image Data Gathering* table.

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SESSION 10: *DATA ANALYSIS (Cont'd) and MSIP PROPOSAL OVERVIEW*

Minimum materials required:

- *Graphing and Data Analysis Practice Guide: 1 for each pair of students (students should already have this handout)*
- *Computer: 1 for each pair*
  - *Computer needs to have excel*
  - *Provided electronic copy of MOLA map needs to be on each computer*
- *MSIP Proposal Outline: 1 per student*

Data Analysis

If students are still working on the *Data Analysis Practice Guide*, provide them time during the beginning of this session to complete the activities.

MSIP Proposal Overview

The proposal outline should be used in order to have students create an outline of their work to see if they are lacking any information for their project.

- This outline is available at http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 10 folder)

Some important aspects of their project that they will most likely need to work on will be:

1. Gathering background information from books and / or websites and other sources about what is known about the feature(s) they are studying.

- This information can include definitions of the features they are studying, specific knowledge and hypotheses other scientists have about these features. Students should write down information and keep track of references in order to cite sources appropriately.

A few suggested resources students can use as they conduct their research are:

- MSIP Resource Manual: This is included in their Student Manual
- Feature ID Charts: This is also included in their Student Manual
- THEMIS website: http://themis.asu.edu
- Other reliable internet sources
- Books, Magazines or Science Journals

2. Gathering specific information from archived THEMIS images (available at http://themis.asu.edu) that relate to their project.

- At this time they should look at their *THEMIS Image Data Gathering* tables and make sure they all agree on the set up of their data table. Research team data tables should be consistent in every way. They should think about how the headers should be labeled and exactly how they are going to log the information they want to collect from every image. They should NOT start filling out their data tables with previously recorded data (from the *Question Mars* activity) until they are finished discussing the entire proposal outline.

3. For the Analysis Plan section, they should show the headings of their data table (without the actual data included) and think about what graphs they will make. Students should use the activities they completed with the *Graphing and Data Analysis Practice Guide* to think about what graphs they may want to create to display their data.

HOMEWORK RECOMMENDATION:

Have students fill out each section of the *MSIP Proposal Outline* starting in class. Anything they don't finish in class, they should work on as homework.

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SESSION 11: ***MSIP PROPOSAL DISCUSSION and DATA GATHERING***

Minimum materials required:

- *MSIP Proposal Outline: 1 per student (students should already have this handout)*
- *THEMIS Image Data Gathering table: 1 per students (students should already have this table)*
- *Internet connected computer: 1 per pair or per small research group (you may not use the computer during this session)*

MSIP Proposal Outline Discussion

Students should discuss each section of the *MSIP Proposal Outline* that they finished for homework to ensure that everyone is on the same page with their project. They should share their ideas for each section and come to a consensus on what information is important to include.

Data Gathering

When they finish discussing their *MSIP Proposal Outline*, they should review each others data tables (*THEMIS Image Data Gathering* tables). Students should make sure the data each student has input on the data table is consistent. Each individual should have their own data table.

Once students finish checking their data tables, they should get back into their groups to continue collecting additional data by going to the appropriate THEMIS website. They should discuss how they should divide up the images available to maximize the number of different data points their team will collect. For example, one group could make observations of the images available on page 1 of the image gallery and another group could look at page 2, and so on. Try to allow students to come up with their own decisions as to how to divide up their efforts.

If students are making measurements, they can make estimated measurements by looking at an image on their computer (knowing the image is 18km across). Another option is to print out images and determine the scale of the image. This would be similar to what they did with the Mars Image Analysis activity. (The printing option depends on your ability to print images.)

HOMEWORK RECOMMENDATION:

Data gathering can be continued for homework as well as throughout the project. The more data students collect, the more confident they will be when formulating conclusions and answering their question.

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SESSIONS 12: *DATA COMPILATION*

Minimum materials required:

- *THEMIS Image Data Gathering table (students should already have this table)*
- *Computer with Excel: 1 per research group*
- *Data Analysis Planning handout: 1 per student*

Students should compile their *THEMIS Image Data Gathering* table information into one team master table in an excel spreadsheet. Students should be sure not to repeat any of the same data and should make sure the data is input consistently.

HOMEWORK RECOMMENDATION:

Have students take home the *Data Analysis Planning* handout and have them list at least 3 possible graphs they could make of their data. They should think about what they included on the *MSIP Proposal Outline* and also what they did in the *Data Analysis and Practice Guide*.

The *Data Analysis Planning* handout is available at:

- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 12 folder)

Teacher "Homework" Recommendation: If possible, print out a copy of the compiled master data table for each member of each team for use the following day.

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SESSION 13: ***GRAPHING AND DATA ANALYSIS***

Minimum materials required:

- *Compiled THEMIS Image Data Gathering table (printed from the excel spreadsheet): 1 per student*
- *Computer with Excel: 1 per pair of students*
- *Data Analysis Planning handout: 1 per student (students should already have this handout)*
- *Data Analysis handout: 1 per student*

Students should discuss their ideas from their homework and *Data Analysis Planning* handout. They should decide what graphs they will in fact want to create for their project. Students should also decide who will be responsible to make what graph. They do not all need to make each graph (unless there is time). Students can make graphs using a computer or "by hand". The most important aspect of the data analysis will be able to make observations and interpretations of their data.

Students should use their compiled master data table to create their graphs. They can refer to the *Graphing and Data Analysis Guide* for assistance in making their graphs if necessary.

Once graphs are made, students should use the *Data Analysis* handouts to write down the observations and interpretations of each graph. The *Data Analysis* handouts are available at the following link:

- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 13 folder)

HOMEWORK RECOMMENDATION:

Provide students with a print out of any or all the graphs they have made and have them complete the *Data Analysis* sheets at home.

SESSION 14: *DRAWING CONCLUSIONS*

Minimum materials required:

- *Data Analysis handout: 1 per student (students should already have this handout)*
- *MSIP Final Report Outline: 1 per student*

As a team, students should discuss the *Data Analysis* handouts they completed for homework. Together, they should discuss their observations and interpretations of each of the graphs. Based on their discussion, they should revise (as necessary) their *Data Analysis* handouts to record the most pertinent information for each graph for their project.

Using the information and data acquired and graphed throughout the project, students should now be able to compile their information into the *MSIP Final Report Outline*.

An outline to use as a guide for the *MSIP Final Report* is available at either of the following links:

- http://marsed.asu.edu/upload/MSIPArchivedFinalReportOutlinev1.doc OR
- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 14 folder)

HOMEWORK RECOMMENDATON:
Students should complete the *MSIP Final Report Outline* for homework.

SESSION 15: *WRITING UP YOUR FINAL CONCLUSIONS*

Minimum materials required:

- *MSIP Final Report Outline: 1 per student (students should already have this handout)*
- *MSIP Archived Team Results Outline (optional): 1 per team*

Students should discuss their completed *MSIP Final Report Outlines* in order to ensure they have included all the information that related to the research they have done. It is also important to ensure their information is consistent among each team member.

OPTIONAL: If students wish to potentially publish their results on the MSIP website, they can do so by filling out the *MSIP Archived Team Results Form*.

This outline is available at either of the following links:

- http://marsed.asu.edu/upload/MSIPArchivedTeamResults_web.doc OR
- http://marsed.asu.edu/upload/MSIP_Archived (Look for Session 15 folder)