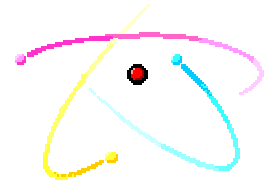# Topic: Science Fair Project

Grade : 3-Adult
An integrated lesson plan covering 5
sessions of approximately 50 minutes each.

Lesson-Planning Approach

Some learners perceive their "world" as a whole, where all things are interconnected and dependent upon each other. These "integrated" students face major challenges in coping with our dominant educational, social, and economic systems, which tend to present information in a linear fashion without the necessity of integration into meaningful context. Integrated students are at-risk of failing as they attempt to grasp information in ways that do not match their experience. Among large populations of at-risk students are many from Native American and similar cultures who do not regard their world as a sum of parts but as a blend of all that they experience.

This lesson plan does include some traditional, linear approaches to delivering information (checklists, rules, analysis, problem solving and organization). In addition to the traditional, linear delivery of information, this lesson plan also includes some of the following strategies, designed to appeal to at-risk students as they learn academic/life skills:

> ➢ Integration of technology
> ➢ Story telling/anecdotal information
> ➢ Non-competitive group and team work
> ➢ Performance-based assessment and rubrics
> ➢ Visual presentations and practice through technology and other means
> ➢ Project-based assignments that integrate family and community
> ➢ Activities appealing to multiple intelligences (Gardner)

Lesson Overview

This lesson is designed to guide students through a science fair project. Once students have chosen a topic, they will research the topic on the Internet. Students will analyze and summarize the research they find. Students will then design and implement an experiment using the scientific method. Students will use Excel to organize and graph their data. The writing components will be written using relevant vocabulary and correct punctuation, sentence, and paragraph structure.

Lesson Project: Science Fair Project

Project Objectives: When students complete this project, they will be able to create a science fair project that follows the scientific method.

Integration of Other Functional/Academic Skills: (Critical thinking is required throughout the lesson.) Students will be able to...

Math:	Apply graphing techniques to data collected during experiment; use mathematical functions to calculate differences in results
Reading:	Read expository research on their chosen topic; identify main ideas and details
Writing:	Summarize, write instruction text
Grammar:	Apply standard punctuation and sentence structure.
Science:	Apply the scientific method to an experiment; explore scientific principles associated with their project
Technology:	Apply basic features of Microsoft Word and search a site on the Internet

State/National Standards

Science Standard 1:
Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Math Standard 2:
Describe the connections among representations of patterns and functions, including words, tables, graphs, and symbols

Reading and Writing Standards:

Standard 1:
Students read and understand a variety of materials.

Standard 3:
Students write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling.

Standard 4:
Students apply thinking skills to their reading, writing, speaking, listening, and viewing.

Standard 5:
Students read to locate, select, and make use of relevant information from a variety of media, reference, and technological sources.

Websites

Science Fairs: http://www.scri.fsu.edu/~dennisl/CMS/sf/sf.html
http://www.ed.gov/pubs/parents/Science/
http://www.ipl.org/youth/projectguide/
http://www.eskimo.com/~billb/
http://www.parkmaitland.org/sciencefair/

Other Ideas: http://www.madsci.org/
http://ericir.syr.edu/Projects/Newton/

Pre-requisites

Students need to be able to read and write on a fourth grade level.

Students need Internet access skills to find research on their topic.

Students should have some knowledge of Excel or have a supervisor who does. Some instructions are included, but assume a basic knowledge of spreadsheets.

Required Materials

➢ Materials for the science fair projects will depend upon the research topics the students choose.

➢ Students will need up to 3 sheets of posterboard per group for their final display.

➢ Access to encyclopedias is suggested; even though the students will be doing research online, additional resources should be available.

Handouts

Scientific Method Template (online and printable versions available)

Required Equipment/Technology

Computers
Microsoft Office, or other word processing and data base programs
Printers

THE LESSON

Note: Students do not learn from what <u>you</u> do but from what you have <u>them</u> do.

Preparation

Activity	Time Estimate	Instructor Notes
Brainstorming science fair projects	20 min.	Create a list of possible projects with the students, To spark the interest of all students, add a story or conversation about different topics.
Model finding Internet sites that support science ideas	20 min.	Use the suggested web sites to show students how to use the Internet as a research tool [SEE LIST OF SITES]

Presentation

Activity		Instructor Notes
Show Powerpoint presentation on the scientific method [POWER POINT PRESENTATION LINK]	30 min.	As you move through the presentation, make sure to explain the different parts of the experiment. Answer any questions that the students may have.
Developing a Hypothesis	20 min.	Have students form small groups. Each of the groups is to formulate a hypothesis to research and test. Use the Powerpoint presentation as a way to give instructions on creating a hypothesis.

Practice and Performance

(Students help you perform the project steps. You help them perform project steps. They perform steps with little or no instructor help.)

Activity		Instructor Notes
Researching the topic	45 min.	Students will use online and additional resources to discover as much as possible about their chosen topic. Have the students use the activity checklist to show that they have researched and found facts relating to their topic. See website list for some suggested sites to visit.
Gathering materials and writing procedures	45 min.	Materials will likely be gathered outside of class. However, materials should be present when the students write the sequential instructions to their experiment (this will help them visualize how the experiment will go). Students write procedure on Scientific Method Form (Handout 1).
Conducting the experiment	Will Vary	Time will depend on the chosen experiment. While the experiment is in progress, students are to record their observations. Students continue using Handout 1 to record observations.
Writing the Results on the Scientific Method Form	30 min.	The results should include: whether the hypothesis was correct, possible explanations for incorrect hypotheses, and other ways to test their hypothesis. If students need to use Excel to show results graphically, see the Excel checklist (under technology checklists) to help guide students to create a graph. Instructions are somewhat specific to bar graphs as that is what is most common with this type of experiment.

Lesson Assessment Strategy (Formative – As the lesson progresses)

Preparation, Presentation and Overall Implementation (Instructor)

- ➢ Did I make enough resources available to the students?
- ➢ Did I model finding Internet sites to the degree that students could do it independently?
- ➢ Have I given my students enough guidance with the freedom of choosing their own topic?

Performance and Practice (Student)

- ➢ Have the students chosen an appropriate topic?
- ➢ Can they apply the steps of the scientific method to their experiment?
- ➢ Are they able to accurately report what happened in the experiment?

Technology

- ➢ Were there enough computers available for the students?
- ➢ Could the students effectively use the Internet and word processing programs?

The Scientific Method

Research *What did you find out about your topic?*

Problem *What question are you trying to answer with your experiment?*

Hypothesis *Based on what you know, what do you think will happen?*

Materials   *What things will you need to complete the experiment?*

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Procedure *Write an instruction text telling how to do the experiment.*

Observations *What did you notice as the experiment was in progress?*

Conclusion *Was your hypothesis correct? If it wasn't, what are some reasons that something could have gone wrong? If it was, what further research could be done on this topic?*

Activity Checklist for Students

Experiment Section	Activity to be completed	Check when finished
Research	1. Found facts relating to topic.	
	2. Found experiments that have already been done on your topic.	
Hypothesis	1. Your hypothesis is posed as a question.	
	2. Your hypothesis is able to be answered by doing an experiment.	
Materials and Procedure	1. You have gathered all materials necessary for your project. Ask your teacher if you need assistance.	
	2. Your procedures explain how to do your experiment. Make sure that the steps are in the order that you are supposed to perform them.	
Conducting the experiment.	1. You performed the steps in the correct order.	
	2. You have written what you saw happen in the observations section of the Scientific Method Recording Sheet. Make sure to write down details about what happened. For example: Did you see a gas released? Did anything change color? Was there heat produced? Record anything that you see, even if you don't think it is important.	
Conclusion	Answer the following in the conclusion section: 1. Was your hypothesis correct? If it was, what other experiments could be done on your topic? 2. If your hypothesis was incorrect, why do you think it was wrong? What didn't happen the way you thought it would? How could you change your experiment to further test your topic?	

Technology Checklists

The following technology is required for this lesson:

	A computer for every small group
	A computer with Powerpoint for the presentation
	Microsoft Word, or other word processing program

Excel Checklist for Creating Graphs

Instructions	Check when Completed
1. Enter data into an Excel spreadsheet. Data should be arranged with the top of the column being the title and the rows being the data points.	
2. Highlight data points	
3. Select the ChartWizard on the toolbar.	
4. Select **Column** as the chart type and click on Next.	
5. Select **Series** if the data points have represent two points in time. If not, click on next and skip to step	
6. Name the series by typing in the white box next to Name and click next. Don't forget to name both series, but if you make a mistake simply click the back button and fix it.	
7. Enter the Chart title, X axis name (horizontal), and Y axis name (vertical) into the appropriate boxes. You can experiment with the other buttons on the box, but this is all you need to complete a simple graph. Click Next when finished.	
8. Choose either to create the graph as a new sheet or as an object in the current sheet. Creating the graph as a new sheet will allow you to print the graph by itself.	

1	2	3	4
Scientific Method not attempted, or completed with major errors.	Scientific Method attempted, but has several errors.	Scientific Method followed with only 1 or 2 minor errors.	Scientific Method followed and recorded correctly.
Writing is hard to understand because of major errors in spelling and/or grammar.	Writing contains many errors that interfere with the reader's understanding.	Writing is done with only a few spelling or grammar errors that don't interfere with understanding.	Written components follow all grammar and spelling rules.
Project is completed more than 3 days late.	Project is completed 2 to 3 days late.	Project is completed 1 day late.	Project is completed at the designated time.