SEFI

News Wire

Newsletter of the Science Education Foundation of Indiana

Every Flower Needs a STEM

Dr. Peter T. Kissinger

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It doesn't take a very elegant sensor to detect the current general malaise. Those of us who are old enough to have suffered a half dozen such cycles know that we've come out of them by focusing on and delivering on innovation. Today we have been closing R/D centers and creating unproductive heat by assessing blame. The challenges of delivering airplanes on time, drugs that are perfectly safe and investment banks that can be trusted have become entertainment. It's hard to find serious problem solvers among our politicians or journalists. It's hard to find people who will sit down and consider alternatives without being personally offended, shouting or even walking away. As I've commented before, hype in life science businesses and academia has accelerated to the point that most pronouncements engender cynicism.

There is one demographic that has largely escaped this phenomenon and they are under ten years old. They are intensely curious. They think what might be done before they consider why it won't work. They are the future. They are worth fighting for and they are too important to leave to the devices of public education alone. Teachers should not be blamed or assessed on what society has not supported. Over the last decade there has been more attention paid to Science/Technology/Engineering/Math (STEM) education, its role in global competitiveness and why we have fallen behind. The challenges are very complex, but readers of DDN and their firms are very much needed to participate as parents, neighbors and supporters of schools. Does your company support a science fair prize? Does your company allow for field trips organized by schools, scout troops, 4H chapters or Junior Achievement? Does your management allow release time for your scientists and engineers to speak about your science to a classroom to back up teachers with show and tell? Are you willing to help a teacher buy materials for an inquiry based project? Do you know what it does for a kid to simply see a mass spectrometer or a fully automated chromatograph, an injection molding machine or rapid prototyping tool making a 3D

(**Cont'd Flower needs a Stem**)

A Science Summit with Purpose

The age-old issue about how to teach science in Indiana was featured at the Science Summit 2010 held recently in the Lilly Corporate headquarters. An exciting new agenda was revealed that will produce stronger, more competitive graduates with better understandings of science. The session was sponsored by the I-STEM Resource Network, The Eli Lilly and Company, BioCrossroads, the Indiana Department of Education, the National Sciences Resource Center and the Office of the Governor. The strength of the leadership and the program were impressive.

The program recommended the use of "guided inquiry instruction" for teaching science in all the K-12 grades. Also the professional development for preparing teachers to to use inquiry was addressed. The concept uses kits that come with the supplies needed in designed classroom experiments. The exercises are practical applications of science topics that encourage questions, discussions and journaling. The speakers also reviewed program's in the U.S. where guided inquiry has significantly elevated the science literacy of students.

The new plan is being managed within the ISTEM regional organizations with teachers, administrators and volunteers working together to place guided inquiry into Indiana schools. The regional schools will be assisted for adopting kit instruction into their curricula. All schools in the state can now be served by the regional ISTEM committees.

Many publications report that America is falling behind in STEM education and that today's graduates are less competitive in the marketplace. The new regional ISTEM groups that were positioned during the Summit will be a way to reverse this trend in Indiana.

The Editor

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Things to consider when making a display for science fair competition.

Font Selection /size

Be sure to use a font that is easily read. Never use a special font with odd spacing or letter styles. Generally speaking, the smallest text on your display should be easily read from 5-6 foot away.

Use of color

Use color sparingly and never print your text in colors or use pictures in the background of a text box. It may look good on your computer screen but by the time you get your display to the exhibit hall the words may not be clearly visible.

Data Tables/Graphs

Be sure that every data table and graph has a few words next to it describing what the graph/data table represents. Also be sure that every data table has clearly identified the units represented by the columns. On a graph you need to have a graph title as well as clearly labeled axes with appropriate units.

White Space

Make sure that there is ample white space around your text boxes. Too little white space makes it difficult to follow and makes your display look cluttered.

Photographs

Never use photographs of people or animals without first considering if the photograph adds value to the exhibit. *Pictures of animals undergoing tests are never allowed.* Also, you will need a caption on every photo explaining what the picture represents and who took the photo.

Abstract

DO NOT JUST COPY AND PASTE FROM SECTIONS OF YOUR PAPER. The abstract is very important since it introduces your project in a 250 word statement. It should include your research question, hypothesis, experimental method as well as your results. Be sure that what you say reads well enough that it can explain your project to assist the reader in understanding the work.

Making a Display Board for Science Fair Competition.

1. Collect all materials in a room with good lighting and a large flat surface.
2. Lay the display board fully open on a floor or table and begin by laying out the components of your display where they will logically go. Don't worry about orientation at this point just get them physically arranged. (See opposite page for example)
3. Once you have decided on the layout, trim the pages down to within 1/2 inch of the text. (be careful to keep the pages square).
4. Place the trimmed page on a sheet of construction paper that is 1 inch larger in both directions than the trimmed copy. This will give each page a border of 1/2 inch. Attach to the construction paper with double sided tape and set aside. Repeat the process until all of your pages are mounted this way.
5. Again lay out all of the sections on the board where you believe that they should go. Move them around until you like the location of everything.
6. Measure the width of your question and place a small pencil mark at the center on the construction paper border at the top and the bottom.
7. Measure the width of the left panel on your display board and divide the number in half. Put a small pencil mark at the center where the top of the question will go.
8. Lay the question on the left panel and line up the pencil mark on the question and the display board. With your ruler make sure the distance to the center at the bottom is the same as it was at the top.
9. Holding down the question put a light pencil mark on the display board around the top left and bottom right of the question.
10. Remove the question and place double sided tape on the back of the question. Carefully place it back on the display starting first at the top left corner and then aligning the bottom right corner to match the pencil marks.
11. With an eraser carefully erase any visible pencil marks.
12. Repeat the process until all sections are mounted on the board.

PROJECT TITLE

Try to keep your title to 10 words or less. Make sure it reflects your pro-

Question/Problem Statement

A clear concise question

Introduction/ Background Research

A short paragraph describing the source of your project idea. Try to limit to relevant background and supporting scientific prin-

Hypothesis

A intelligently worded statement.

Null Hypothesis

Your Hypothesis stated in the negative form.

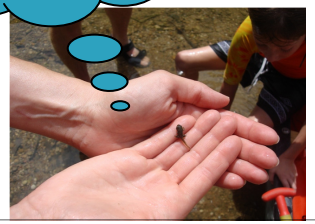
Experimental Design

Description of the experiment that you performed. (RESEARCH PLAN) Remember, you designed an experiment to test a hypothesis. Be sure that your design shows how you intended to measure the effect. Include identification of control and experimental groups as well as describing scientific

Experimental Procedure

This section is a description of the steps to conduct experimental data collection. Do not be too brief or too wordy in this section. You should give enough information that

Only use Photos that relate to your project.



All Photos must have a caption as well as identifying who took the picture or the source if it is from the internet.

Don't be afraid to leave some white space around your text. A board that is too full is confusing and difficult to follow. Don't use too many colors and never put pictures as back-

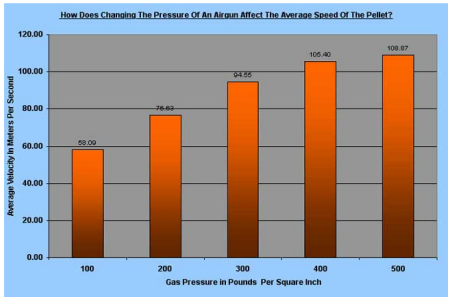
DATA

This section is for the data that was collected in the experiment. **NOT RESULTS THAT YOU CALCULATED.**
USE MS EXCEL to make data tables. All numerical data must have appropriate units identified. Also use gridlines.
Each data table should clearly identify control and

USE AT LEAST 16 POINT FONTS FOR PARAGRAPH TEXT.
USE 24 POINT FOR SECTION TITLES.
MAKE SURE THAT YOUR TEXT CAN BE READ FROM 6 FT AWAY.
NEVER HANDWRITE ON YOUR DIS-

Graphs

In this section, you should have relevant graphical presentation of your data. All graphs must have titles and axes with labels and units. You only need to show one or two relevant graphs here.



Results

Here you show the results of your experiment. These should be based on calculations and statistical analysis. Do not explain your errors here.

Conclusion /Analysis

Based upon your experimental results and the statistical analysis, this most important part of your project. Here you say what your data shows and infer what the results imply. Did your results support the Null Hypothesis? If yes then you cannot reject the null which means that your first hypothesis cannot be supported. If no, you can reject the Null and the experiment may show that your hypothesis can be supported.
AVOID SAYING

Abstract

A one paragraph essay describing your project. Include question, hypothesis, experiment and results. The science fair abstract, in clear language, outlines the entire project. The abstract has a limit of

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About SEFI

SEFI is a not-for-profit 501(c)3 organization whose purpose is to encourage and assist young people to become scientists and engineers and to practice their professions in Indiana. The membership of the Board of Directors is composed of volunteers from industry, the not for profit sector, and academia who are committed to enhancing science education in Indiana. Our mission statement is embedded in deliverable outcomes.

Website—www.sefi.org. **Requests to gcook@sefi.org.**

Flower needs a Stem(Cont'd)

object? Do you think students see these things in an underfunded K-12 school? Do you think that many teachers have seen science as it is practiced? Like me, you became a scientist or engineer because you were curious. You wanted to know how and why things worked. You were not motivated by boring textbooks 500 pages long. You were not motivated by filling in worksheets by recipe because you were not allowed to experience chemicals, animals or electricity because you might poke your eye out. You were not challenged by teachers who said "this will be on the test" imposed on you and your teacher by a committee setting mediocre standards. You liked experimentation because it was fun, it saved lives, it enabled going to the moon, and you could see many flowers at the end of the STEM. Even more exciting are those you could not see such as molecular imaging for cancer or robots roaming on the surface of Mars. Improving STEM education is giving kids a chance to experience discovery themselves, explore further using online resources and move well beyond textbook-centric education which features a rather unfavorable cost/benefit.

A couple of interesting web sites include www.stemedcoalition.org which demonstrates the wide support for improvement, www7.nationalacademies.org/cfe/ and www.donorschoose.org where you can make a donation right now to specific projects proposed by talented teachers. This is not expensive, given that $50 makes a big difference. Check in with your local school district, your state department of education and the teacher that lives on your street. Make a difference. To steal a phrase from William Safire, ignore the nattering nabobs of negativism. They are everywhere.

(Reprinted from Drug Discovery News, March 2010)

Dr. Kissinger is a member of the SEFI Board of Directors .

SEFI Collaborates to develop Celebrate Science in Indiana...

We are working with the leadership from the Hoosier Association of Science Teachers in Indiana (HASTI), The Indiana Academy of Science (IAS), The Children's Museum of Indianapolis, Dow AgroSciences and the Indiana State Museum to develop an annual event where students, teachers, families and the general public can gather to experience the excitement of science.

This one day event is being planned for late fall 2010 and hopefully will include some of the state's most advanced science based companies along with our top universities. The objective is to show the participants how science is done, how it impacts their daily lives and how it provides opportunities for their education and employment in the state.

The day's activities will have participants asking questions and using experiments to develop the answers. We believe that by modeling scientific inquiry and giving the opportunity to practice in a fun environment, the participants will develop a positive appreciation of science.

2010 Hoosier Science and Engineering Fair to be held March 27 on the Campus of IUPUI

More than 120 of the best science fair projects from the 12 regions around the state will meet to compete for honors at the 22nd annual HSEF. From among these winners, 26 of our top High School projects will advance to compete in the Intel International Science and Engineering Fair in San Jose, California in May.

Eli Lilly, Dow AgroSciences, Cook Medical Group and AIT Laboratories are members of a consortium that is financially supporting SEFI in its efforts to sustain science fairs in Indiana. With their continued support, the annual event will be able to continue growing so that more students can have a great experience.