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**Putting Control In
The Students'
Hands**

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Putting Control in the Students' Hands

Several years ago I decided to integrate my interest in art and science to create a new elementary modality for teaching science. The initial approach I designed was a developmental teaching strategy. I would do science demonstrations while the children passively observed, using detailed lab report sheets I designed.

After a year of doing lessons in this manner, I felt that the children were being denied an active role in their science education. I began to re-examine our state and city curricular guides and painstakingly adapted them so that students could participate in hands-on activities that would teach them science concepts and values enjoyably.

My first step was to teach them how to observe and predict accurately. Using a photocopy of a dollar bill, something the children were more than casually familiar with, as a cut up jigsaw puzzle, I showed them that although they had seen a dollar bill, they had rarely looked at it. They had not really observed it; therefore, they knew very little about its characteristics.

Observing through olfactory, tactile, and auditory senses were things children did every day, but they never really processed the information and channeled it into a reservoir for information retention.

Their ideas on observing the world around them dealt solely with visual stimuli, and even this process was purely surface scanning rather than focused and detailed observation.

After a semester of using "sense boxes" in which they isolated one sense to identify and observe objects, the children realized the true meaning of the word observe, and began to heighten their sensory skills to aid them in all phases of learning.

Now that my students were trained observers, I designed a series of experiments on comparing and identifying fingerprints.

Having demonstrated the uniqueness of individual fingerprints, we had a lively discussion on the topics of voice prints, DNA tracing, blood typing, etc., which law enforcement agencies and the courts use in criminal cases.

Providing Self-Motivation

Since most of my experiments are designed to be self-motivating, I capitalize on topics and ideas in which the children show an interest and will want to investigate.

For example, one unit I designed for sixth grade teaches the children how to distinguish one white substance from another similar substance. While the students are playing observation detectives, they are also learning the fundamentals of qualitative analysis.

Predicting is another essential part of the scientific process. After a problematic question has arisen, a guess as to how to solve the problem is a vital first step. One of the ways I teach predicting or the formulation of a hypothesis is to have them guess about a missing frame from one of their favorite comic strips.

By examining that which preceded and that which followed the missing frame in a given comic strip, children can then make educated guesses based on information they have gathered from the other components of the comic strip.

I have found that this method makes predicting enjoyable for them while encouraging them to read newspapers at the same time.

Also, since the materials used are easily available to the students and they are familiar with them, it aids in making them understand that without the other frames, a hypothesis would have been impossible.

"It is also fertile ground for me to develop a spin-off curriculum which I see has piqued the curiosity of students, or that which has raised new questions and needs further clarification."

Children Providing Direction

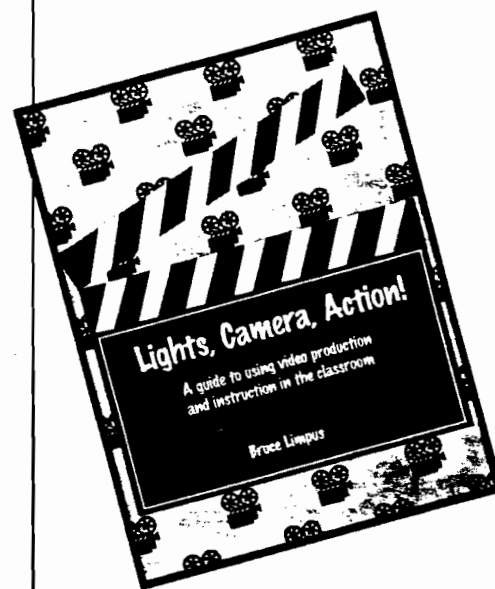
I like to call my students young scientists. Sometimes we talk about how some inventions and discoveries have come about by accident. We discuss how a written account of what we do is vital. As a team we put together a journal of our experiments using the scientific method. Of course our new discoveries also bring with them new vocabulary word entries. Books are periodically checked for new ideas and concepts that develop as a result of classroom experimentation. It is also fertile ground for me to develop a spin-off curriculum which I see has piqued the curiosity of students, or that which has raised new questions and needs further clarification. In this way the children's observation logs become a resource for new lesson plans that they have an interest in learning.

A hands-on science lesson has an exact format of rules and regulations. If children are to work on projects they must be safety conscious at all times. Ways of handling instruments, glass apparatuses, and chemicals become as important as how to record accurately with a pen or how to write concisely in their log. Materials must be distributed and transported safely to the work stations, and the lesson must be safely orchestrated to reduce movement within the classroom. I prefer to have the

students working in small groups of five or six as opposed to individual set-ups, because I do not want them working in isolation. I feel this routine promotes the concepts of working together and sharing in the brainstorming methods I use to elicit creative thinking among the teams. To others, this may seem too noisy but it is a constructive verbal thought process. Movement within the room may also appear erratic, but it is really directed movement whose true direction is toward knowledge. The children readily accept the class rules as a necessity for the greater freedoms hands-on science affords them, and I allow for some flexibility by permitting the students a voice in setting them up.

While the children are working on their experiments, I have the time to circulate about the work stations observing, asking questions, and answering questions. These observations enable me to evaluate areas of difficulties which may arise and build on the strengths exhibited by students. I have also set up buddy systems to help students with difficulties they may encounter learning a particular concept. Since children work at different paces, I group students by attempting to balance each team. As for the student whose work is completed quickly, I find that making extra-credit projects based on related subject areas readily available to the class helpful in dispelling boredom. ☺

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