

I Could Use the Help

Paul K. Bryant

Do we hafta know this? When am I gonna use this, anyway? This is sooooo BORING!

Sound familiar? If not, close your eyes and take a trip down memory lane...the high school class you thought would never end...a time when summer was all that mattered even if it was an eternity away. Those utterances probably came from your lips all too often, opening shots in the daily skirmish of school. For those of us in the teaching profession, this is a daily battle.

But perhaps I'm writing to the wrong audience. Readers of this article are probably successful professionals. But ask yourself, "Did I make it because of school - or in spite of it?"

Well, a few moments of reflection might be enough to convince you that some things never change. School is taught much as it was when you and I were plowing through the geometry proofs (remember your postulates?).

But if you return from the past and look at the world today you realize many things do change. The kids you see today are not the same as you and I were. Their experiences are different and the fundamental concepts they assimilate are not the same. Their exposure to the world, it seems, is somehow much more intense.

Could it be that schools aren't keeping up? Or is industry leaving schools behind?

Few people today are willing to say schools are doing a great job. Recent national studies paint a grim picture, and indeed the idea of school reform, particularly in the sciences, has come to the political forefront. Witness the self-proclaimed "education-president" concerned about our ability to compete in the world market.

So why am I in this profession? I have a BS in materials science from Rice University, and I withdrew from a PhD program at Cornell to fight what many would call a losing battle. The answer has nothing to do with wishing to help the masses or serving mankind. It's simpler than that. I am in the same position as those kids. It just took me longer to get turned off the system.

Scientific fields have advanced so rapidly that many of us outside them can't keep up. And many of those inside get swept along with the current and don't stop to think about where the river is going.

We have somehow compartmentalized our world so that those "doing science" are

in a separate world from those "learning science." We are used to seeing the end products of research while not understanding the processes used to develop them. In doing so we have turned the learning of science into the learning of science facts. Technology has advanced but left society behind. Many of us have lost the sense of what science is, and researchers have become more and more distant from the society supporting them.

Science is not a set of data, or a list of fundamental laws. Science is a conceptual construction. It is a way of perceiving the world and trying to make sense of it. Kids are one place true science is found. They are always asking "Why?" and "How come?" But we as a society have allowed a rift to develop which puts off that natural curiosity and even turns it into distaste.

So why am I railing about this in the *MRS Bulletin*, you ask. Because I suspect the answer to these problems lies in the hearts of the very ones who have succeeded, despite the odds against them. I also sense from my friends and contacts in research situations that the struggle doesn't end once you're out of school. Have you ever found yourself questioning your choice of career or field of study?

Our schools are set up on the same model as many factory lines. A child's day is broken into set periods of time, and he or she moves from task to task in a set order every day. After a certain amount of material is "covered," it is set aside and the next set of tasks is brought in. But a wealth of research tells us that people don't learn this way. A few important points:

1. People assimilate knowledge into an existing framework of thoughts. New knowledge is only accepted and used when it fits the predefined concepts or when a new strategy of thinking accompanies it. Otherwise, it is disregarded. (Ever throw out a data point which was obviously in error?)

2. Children have different learning styles. Some are auditory learners, some are visual learners, some learn best by physical manipulations, etc. (When someone asks you to spell a word, do you have to grab a pencil so you can see it?)

If you take a minute to think of the implications, some striking facts stand out. First, teaching facts to a child who already

has some preconceptions about a subject does not guarantee those facts will take root. More likely, the outcome will be to avoid the situation which produced the disquieting anomaly in the first place. Do we turn kids off to science by providing data with no reasoning behind it?

Second, the data we do present to kids are given in a lecture format over 90% of the time. Think what that means to the kids who aren't good auditory learners (well over half, by the way). Scary thoughts, no?

So, are there ways to address these concerns? Is there a role for the people in the field to aid the ailing school system? Yes, and the prescription is simple, though the healing process is not. In short we've got to put experiential, student-centered learning back into the classroom. Jane has to see the wonder in a falling leaf before she will perceive the magic of knowing the acceleration due to gravity is 9.8 m/s^2 . Dick should be fascinated by the colors of the rainbow before being burdened with diffraction theory.

So by now you've probably seen the foreboding implication: learning is a labor-intensive, personal process. Grim news for our schools. So how can you help?

My students are fascinated with the issues of the day—nuclear power, medicines, the space shuttle, the latest polymers, pollution, etc. But to many students these issues are set before them by the whim of the gods; the students themselves couldn't possibly have a hand in developing the solutions or guiding the hand of fate. This is where you, the knowledgeable reader, enter the picture. The children are not in the position to change the system. But you are. You can put a face to that word "scientist." How to start? Contact your local high school and get in touch with the chemistry or physics teacher. Arrange tours of your work place or plant. Give a talk on your research. Sponsor a summer intern. Act as a resource person for a class—the kids or the teachers can call you to get an opinion. Let the kids connect generic "scientists" mentioned in their books to real people who are fun and curious. Kids see science professions as inaccessible and boring. Liven it up.

Schools didn't create all their own problems. They won't be able to solve them either. Industry input is a resource too valuable to ignore. Get involved. I, for one, could use the help.

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