

Tasting, touching, smelling and discovering

GeethaDurairajan

When I heard that this year's special issue is going to be on chemistry, I first thought to myself: "I am not a science teacher; I even gave up studying physics, chemistry, and biology more than 30 years ago after my pre-university: what do I know of this area?" But then, a couple of images from my own school days flashed across my mind and I thought I would share these reminiscences and reflect on them.

We started chemistry (and physics) practicals in class 9; for the final examination, we would be given this mysterious packet of some powder and be asked to 'carry out a series of tests' to determine what salt it was. In spite of having done these tests every week in class, when it came to the final examination I would always be scared, for very often, I would not be able to identify the salt. It is possible that because of stress, I may not have carried out the tests properly. I know today that if chemical reactions do not always happen the way they are expected to, it has to be because something was either not heated to the right temperature, or added at the correct time. It is also possible that many more tests had to be carried out by me, but I did not because of lack of time, since all practical examinations are timed and the less confident ones do not start their work fast enough.

I remember voicing my fears to my elder sister who had just graduated in pharmacy. Her advice was simple but not available in any chemistry textbook. She said, "Look, anyway, no one will ever give you a salt that contains arsenic or any other such chemical which is lethal. So, when you get the salt, first smell it; then touch it and get used to the texture." Then, she said, (and this is what made a big impression), "Nothing will happen; just touch the salt with the tip

of one finger and taste it; but use only your finger tip, okay". With these 'tests' you will be able to narrow down your salt, or if you are lucky, be able to even 'identify' it. Once you have done all this, carry out a few of the standard tests and confirm your results."

With great trepidation, the next time I was given a 'mysterious packet' (a salt to identify), which was mysterious only to me the student, and not even to the attender who put them into packets, I did what she asked me to, and continued to do so every following week. Of course, I made sure that no one (neither my classmates, nor more importantly, my teacher) saw me doing all this; somewhere I knew that I would be taken to task for such 'unscientific' testing.

Of course, I do not have to tell you that I was very successful in my salt identification and not because I carried out the tests with Bunsen burners, burettes, pipettes, and test tubes. I did do all that, but not before smelling, touching, etc.

The questions that I now ask myself as an adult are: Was my sister wrong? Did she teach me to do 'sly' things in the practical examination? Would this be termed as cheating?

I do not think so. All of us as human beings do science; as children, we taste, smell, touch, feel, see, and hear and that is how we make sense of the world around us. But when it comes to organized, planned, systematic teaching, this natural use of the five senses seems to disappear.

The wonder of discovery gives way to the dreary desert sand of dead habit; we measure chemicals,

heat them, burn them and so on, but do not feel and touch

and smell them to 'discover' their qualities.

There is one more childhood memory that I would like to share and reflect upon even though it is related to physics and is about focal points and lenses. All of us know how those experiments are conducted in practical classes that used to begin only in class 9. Mirrors, light, and lenses - these get manipulated to get the results. After a point, (once I had worked out the system) I did not have to 'find' out the distance between the lamp and the lens and the mirror. I used to get the calculations right, and then, just place everything where it should be, and bingo, my 'successful experiment' got written up! No discovery, only dreary habit.

Much before we did such experiments, in class 5 or 6, one summer, my father brought home a nice big magnifying glass (the glass was bigger than my palm is today) for my mother to use to look at the stitches and designs in embroidery books. I had just finished studying, in science, about how, if sun-light is focused on one point using a convex lens, a fire could be started. Here was a brilliant opportunity. In the middle of many afternoons, when everyone else was taking a nap, I would take the magnifying glass, go out into the sun, focus it on a leaf, and actually wait for it to catch fire. I also learnt to burn the chlorophyll so that only the burnt veins would be seen; next, I began to do designs on the leaf, for I learnt that with care, I could burn the leaf with heat, without actually letting it catch fire.

I am sure you can work out what happened to my 'scientific experimentation!' One fine day I got caught! I focused the glass for too long on one spot and the leaf caught fire. Some adult saw this and came out running. I still remember the scolding I got (in Tamil, of course). "What are you doing? You could have burnt yourself! You could have burnt the house! Come inside at once! Don't ever touch this magnifying glass again..." and so on. I

tried explaining that I had studied about lenses and focal points, and was just finding out all about it, but no one wanted to hear any of that!

My discoveries with science stopped there, until a few years later, my sister taught me to taste and smell salts for chemistry. But I have never been able to see this as genuine 'discovery', for it was only a pragmatic short cut to help me get good marks in the practical examinations in school!

I gave up studying chemistry after my early college days, but even today, see myself as a student of science who likes to poke around in the sand with a small child to discover how something looks like. A 'What is this' or a 'Why' is nearly always answered by me with a 'let us find out'. Babies put anything and everything into their mouths to know their texture. This knowing and discovering seems to disappear by the time they begin studying science; even if it exists in the early years, the serious study of science makes it disappear. A real pity, for that is when it needs to be encouraged so that discoveries and inventions continue to happen. The practice of rigour and system that is taught in a practical laboratory class is also needed, but good habits alone, do not a scientist make!

The author is Professor, Department of Testing and Evaluation, EFL University, Hyderabad. She can be reached at <gdurairajan@gmail.com>.

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