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door air quality is more than a health and safety issue

Why Johnny can't concentrate

By Mike Coughlan
HALIFAX CITY LOCAL

Sit around any staff room for awhile and you'll soon hear similar comments.

"The kids are wired today."

"I can't get 'Johnny' to sit still for two seconds. He's all over my room."

"Some days 'Sally' seems so out of it, nothing seems to sink in. Then on other days she just seems to breeze right through her work. I don't understand."

"Just look at this notebook. It's a mess. Why can't he keep his notes organized?"

Anyone in the teaching profession can recognize some of the everyday frustrations of teaching today's children in these comments. Although there are a great many well organized, focused, motivated children within our schools today, a large amount of teachers' time and energy often goes into those students who are not. Many of our senior teaching colleagues suggest that the number of disorganized, unfocused and easily distracted young people is growing; that "kids are different today". Volumes of educational journals are occupied with studies on motivation, learning disabilities, students "at-risk", attention deficit disorders, violence in the schools and so on. Many theories are advanced and various aspects of our culture today are blamed. Evidence is mounting that one important contributing factor to this wide range of problems in our classrooms today may in fact be the physical environment in which we are working.

The increasingly pervasive use of scented products may be part of the problem. In an article published in *Progress in Neurobiology*, (Vol. 33, 1989) Tyler Lorig reported on the use of double-blind testing procedures to measure changes in human EEG patterns while subjects were exposed to a synthetic compound commonly found in many scented commercial products. Despite exposure levels too low for the students to smell during the tests, Lorig reported, "these experiments demonstrate that undetected odors may produce a variety of central nervous system and behavioural effects such as increasing arousal and producing distraction." (Lorig, 1989) According to the US FDA, fragrances cause 30 per cent of all allergic reactions, and when exposed to perfumes, more than 70 per cent of asthmatics will develop respiratory symptoms. (*The Healthy School Handbook*, 1995, p. 70).

Recent studies seem to indicate that exposure to even relatively low concentrations of certain indoor air pollutants, referred to as volatile organic compounds (VOCs), can result in an alteration of brain function. In an article entitled, "Alterations in Cognitive and Psychological Functioning after Organic Solvent Exposure" (Iris Bell, *Biological Psychiatry*, 1992), a team of doctors at the Department of Psychiatry, University of Pittsburgh School of Medicine reported significant impairment could be demonstrated on tests measuring learning and memory, visual spatial, attention, and mental flexibility and psychomotor speed to subjects exposed to even low levels of VOCs. The chemical compounds in this case were those commonly found in paints, varnishes, glues, dyes and cleaning agents used in the manufacture of plastics and textiles. This study also indicated a connection between exposure to these compounds and "clinically significant levels of depression, anxiety, somatic concerns (headaches) and disturbances in thinking."

Other research produced similar findings (Bell, et al., 1992). Exposures to low levels of chemicals and moulds affect people's ability to reason, organize and concentrate. There is a growing body of evidence that many common "household" chemicals and scented products affect the limbic structures of the brain. Bell and others suggest that, "extremely low levels of environmental chemicals below conscious awareness may have a significant impact on the behaviour of normal humans, especially on arousal levels and attention." Bell further suggests, "The occurrence of attentional deficits in chemically sensitive patients is consistent with the known neuroanatomical links between the olfactory system and frontal cortex." Other areas of the brain involved with memory may also be affected.

Although many of the studies quoted focused on patients diagnosed with multiple chemical sensitivity or industrial workers exposed to higher doses of chemicals, there are indications that the problem of chemical sensitivity affects us all. American Environmental Protection Agency surveys of office workers found that approximately one-third considered themselves "especially sensitive" to indoor air pollutants. In a study of more than 640 college students, two-thirds reported feeling ill whenever they smell one or more such common chemical pollutants as car exhaust, pesticide, new carpet, paint and perfume. (Bell et al 1992). Over one-quarter of these students rated at least three of these as causing illness.

In a recent lecture in Halifax, Dr. Gerald Ross, of the Environmental Health Centre in Dallas, Texas, stated that upwards of one-third of the US population reports a heightened response to some chemicals. He also referred to a recent study of office workers in a so-called "sick building" in the US. Cognitive function and memory testing done on the building occupants revealed that most of those workers who reported symptoms associated with "sick building syndrome" demonstrated some degree of mental impairment on the tests. Most chilling, however, was the finding that approximately one-third of those building occupants who reported no ill affects from working in the building also demonstrated some degree of mental impairment on the tests. They were affected, but did not know it.

It is sobering to realize that these difficulties may be more widespread and prevalent in our school populations than one might think. "Safe exposure levels" established as guidelines for the safe use of many industrial cleaning products or as measures of acceptable indoor air quality assume healthy adult, male subjects. We do not know what long-term low level exposures to these substances are doing to our children.

Over the past 50 years, more and more chemicals have found their way into our classrooms. Students and teachers seem to be increasingly coated with a wide array of scented gels, sprays, colognes and deodorants. Our clothes are laundered in perfumed detergents and dried with scented anti-static sheets. The use of scented hand creams to counteract the effects of hot, dry classroom air is commonplace. So is the practice of frequent cleaning of student desktops with strong disinfectant sprays while school is in session.

Where once teachers and students worked with graphite pencils, pens and chalk, now we see perfumed crayons and erasers, markers of various hues and aromas, and bottles of

"white out". The increased need for technology, unimagined when many of our schools were built, has also created potentially unsafe situations from an environmental health perspective. School offices are now crammed with copy machines, laminators and computer equipment that are known to give off toxic substances while in use, but for which no venting is provided.

In an effort to increase the appearance of cleanliness in our schools and improve the lot of the custodians, mop oils, spray buffers and other strong cleaning products are used, often while school is still in session. The floors in many classrooms and libraries are covered with sturdy synthetic carpets able to withstand years of hard use. These materials gas off a wide range of harmful chemicals such as formaldehyde when new, and act as effective dirt sumps harbouring years of accumulated grime and mould when old.

In many schools, increasing student numbers have pushed financially strapped school boards to install classrooms, music rooms, computer labs, resource and guidance offices and teacher work spaces in areas of school buildings never intended for such uses. Poorly ventilated basements and even closets are often utilized for such purposes. School staff and students work in newly carpeted and renovated areas, or near storage areas for cleaning products where little provision has been made for fresh air. In far too many cases these renovations and repairs, often involving the application of paint and the use of strong adhesives or caulking compounds, are carried out during school hours or too close to the commencement of school sessions to allow sufficient time for the harmful chemical emissions from such work to dissipate.

Savings made on school board budgets by carving away maintenance expenditures may merely result in costly increases in medical expenses. Unhealthy work environments lead to absenteeism, loss of productivity and escalating costs for substitute teachers. A significant number of teaching professionals and maintenance staff are seeking the services of the Environmental Health Clinic. Indeed, teachers follow closely behind nurses in the ranks of Environmental Health Clinic patients. The accumulated effects of mouldy, leaky buildings, strong and potentially harmful industrial-strength cleaning products, and unsafe maintenance practices seem to have taken their toll on teaching professionals in this province.

As educators we also need to be concerned about the potentially harmful effects of indoor air contaminants and their possible impact upon learning. Studies demonstrating impairment of problem-solving ability, concentration and memory as a result of exposure to low levels of substances commonly found in indoor air may provide another perspective on some of the challenges facing teachers in our classrooms today.

Short attention span and an inability to concentrate are serious problems. The numbers of our students who are diagnosed with ADD and ADD with H seem to be growing. Volumes of educational journals are occupied with studies on motivation, learning disabilities, students "at-risk", and attention deficit disorders. A great deal of our human and monetary resources are expended in the form of resource programs, speech and language therapists, special education instructors and consultants upon those students who do not readily learn academic skills or content because they are confused, distracted or overly active. There are few classrooms which do not contain potentially disruptive students. Violence in our school yards has become a major concern. A great deal of time and energy is expended by classroom teachers and school administrators attempting to deal with disruptive behaviour in our schools. The studies cited and many others seem to indicate that the areas of the human brain responsible for learning and emotional response are targeted by chemicals commonly found in cleaning agents and scented products. Perhaps the fog produced by the chemical soup in which we are requiring them to learn has a part to play in amplifying these students' difficulties.

The explanation of chemical sensitivity should not be considered some "silver-bullet" for exorcising the demon of violence in our schools or solving learning difficulties connected to hyperactivity or ADD. However, this broader perspective on the factors impacting upon the learner really is in keeping with the philosophy of our education system which strives to meet the needs of the whole child. The learner's environment should be part of the total vision encompassing efforts to educate our children. As such, we need to pay close attention to the issue of indoor air quality in our schools. It is not only an issue of job safety for those working in our schools, or a health concern for our children. It is a piece of the puzzle which has gone largely ignored in the struggle to solve some of the more pressing problems facing our schools today.

Citizens for A Safe Learning Environment
287 Lacewood Drive, Unit 103, Suite 178
Halifax, Nova Scotia
B3M 3Y7
457-3002, 443-8237