Design for Public Health

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As much as the health care debate has captured the attention of America, interior designers play a pivotal role in providing design solutions for healthy environments. Molecular toxicity, daylighting and ventilation are key areas for interior designers to understand and implement. The EPA is studying the linkages between chemical emissions and human health issues. ASHRAE has revised their ventilation standards and some states have adopted daylighting standards with the intent to promote human health, comfort and performance. [1]

How is health defined? According to the World Health Organization the definition of health is:

> Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[2]

According to Merriam-Webster's dictionary, health is defined as:

> **health**
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> **1 a :** the condition of being sound in body, mind, or spirit; *especially*: freedom from physical disease or pain **b :** the general condition of the body <in poor health> <enjoys good health>

Being healthy is more than not being sick. This presents a much more holistic view of health that includes happiness and well-being as well as being free from pain and sickness.

We spend about 90% of time indoors and generally the indoor air is two to five times more polluted than outside air. There are many contributors to poor indoor air quality: chemicals, mold, particulates, and poor ventilation to name a few. All products are made with chemicals, some which are known to be potentially hazardous to human health. The chemicals are emitted into the air as Volatile Organic Compounds (VOC), which we breathe into our bodies. These VOCs can cause human health issues such as cancer or asthma. Poor ventilation can lead to sick building syndrome or building related illnesses such as legionnaire's disease. When mold is found it a space it may be spread throughout the building via the mechanical ventilation system. Water penetration and moisture problems contribute to mold growth, which can lead to respitory illness.

[1] Wisconsin Department of Administration
[2] Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

So why would interior designers and architects continue to specify materials and products that will make people sick? Why are product manufacturers producing products that make building occupants and possibly their own employees sick?

Interior designers, architects and engineers have the opportunity to design spaces and buildings that would make people healthy (instead of sick).

It is imperative that we specify non-toxic materials and seek out information about the toxic chemicals used to manufacturer products installed in our projects. As interior designers we should familiarize ourselves with the chemicals that are on the carcinogen list provided in the Basis of OSHA Carcinogen Listing for Individual Chemicals. The Green Products Innovation Institute has launched in California as an agency that will review and certify products that meet the California Green Chemistry Initiative requirements. Qualified products will receive a Cradle to Cradle certification. Certifications like Cradle to Cradle and Greenguard are excellent resources for gaining knowledge about the toxic emissions of interior products.

An indoor air quality plan should be developed prior to construction start and implemented throughout construction. The indoor air quality plans in the LEED guidelines require adherence to the SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) 2007 Standards. The SMACNA guidelines require ductwork to be sealed during construction, the jobsite to be swept and kept clean, low-VOC materials to be used, barrier separation between occupied spaces and the construction site and non-toxic housekeeping products.[3] There is also a recommended sequence for installation of materials. All wet materials should be installed prior to non-wet materials. When wet materials are installed after all other materials, we are emitting toxins into the air that will be absorbed by the materials with high sink capacity (i.e. carpet, ceiling tile, textiles).

We must coordinate our effort with the mechanical ventilation system design and operation. It is recommended that a space or building be tested for indoor air quality prior to occupancy. There are two methods recommended by the US Green Building Council. The first option is building flush out. The second option is an indoor air quality test. The building must remain unoccupied during the flush out period and all construction should be complete, including furniture installation, prior to the start of the flush out or the indoor air quality test. These are the best methods to ensure that the space is healthy for the occupants before they move in. Commissioning the

[3] U.S. Green Building Council LEED v.2009

systems is the means for monitoring that systems have been installed correctly and are operating as expected. Ongoing monitoring of the HVAC systems is an important indoor air quality activity.

Designing indoor environments that improve human health, that make people happy and more productive is more than just eliminating toxic materials and ventilation. Human beings need a connection to the outside environment. We need access to daylight and we need to see nature outside. When people are asked to imagine their favorite places, nine times out of ten they will describe a place outside: by a lake or in the woods or in their backyard. Integrating daylight and views into an interior environment is a means of improving occupant health and productivity as well as decrease energy costs because there is less reliance on electric lights.

Thermal comfort is the number one complaint in an office environment. Everyone is either too hot or too cold. Providing access to personal temperature controls is a means of allowing occupants to have responsibility for their own comfort. There is also an opportunity for education. Our buildings are generally kept within a constant temperature range and it is common toe see people wearing sweaters inside buildings in the summer and plugging in space heaters in the winter. We need to reassess appropriate indoor temperatures for the weather outside. People should wear sweaters in the winter and short sleeves in summer and building should accommodate. The re-introduction of operable windows is another opportunity for people to control their environment as well as introduce fresh air. Operable windows can be balanced with a mechanically ventilated system successfully. Having the option to open a window is a healthy opportunity.

Greenguard states that a typical classroom may have anywhere from 50-500 different VOCs in the air.[4] Symptoms from VOC exposure may cause headaches, flu-like illness and potentially cancer. Formaldehyde may be found in furniture, ceiling tile, and cabinetry. Toluene may be found in cleaners and construction materials. Acetaldehydes may be found in plastics and paints. These are just a few of the chemicals emit VOCs and it is recommended to either eliminate them or at the very least limit their use.

The National Research Council has researched the impact of indoor air quality on the performance of children at school and found that there was a 15% increase in math scores and a 14% increase in reading levels with improved ventilation.[5] Increased ventilation combined with non-toxic building materials and access to daylight and views is an ideal design solution.

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[4] Greenguard “Children Health Statistics”
[5] Greenguard “Children Health Statistics”

Take time to ask manufacturing representatives about their manufacturing process and ask them if they have Cradle to Cradle or Greenguard types of certifications. Ask them to identify whether they use known toxic chemicals in the manufacturing of their products. Talk to clients about the benefits of requiring a clean jobsite during construction and the benefits of either testing the indoor air quality or flushing out the space with ventilation. The interior design community must take a leadership position on providing improved indoor air quality.