Learning and Link to IAQ
Background

- IAQ in schools is poor:
  - Ventilation inadequate
  - Temperatures elevated
- Poor IAQ in schools may affect students’ performance (possibly teachers’ too)
- School funding is minimal
IAQ/Asthma Environmental Control Strategies

- **SOURCE MANAGEMENT**
  - Removal/substitution
  - Exposure control

- **Ventilation**
  - Dilution
  - Exhaust

- **Air Cleaning**

- **Education & Communication**
  - Provide information to occupants on sources & controls
Ventilation decrease/Chemical increase
Doors & Windows Open

Open windows allow unplanned/unconditioned airflow into School; HVAC unable to control for comfort.
Fig. 1. Prevalence of weekly complaints in Finnish schools.

Kurnitski and Palonen, HB'06, 2006
Figure 1b. Measured ventilation rates per student (l/s) in 108 classrooms. Palonen et al. 2009

- Ventilation measurements performed in 60 schools in Southern Finland
- Median value was 4 l/s per student
- Ventilation is insufficient in a large number of classrooms
Education for Schools
(In the USA have TFS kits)

School Administrators need definitive outcomes to divert funds to undertaking significant improvements to IAQ

Indoor Air Quality

Tools For Schools
Why Ventilation?
Body Odor
Ventilation and reduced risk of airborne transmission of disease.
TB Sanatorium, early 1900’s

Isolation, Ventilation, Sunshine
November 4, 2008

Breathing Dirty Air May Lower Kids' IQ

http://www.reuters.com/article/healthNews/idUSKUA57144920080215
by Anne Harding
Association between Sub-Standard Classroom Ventilation Rates and Students’ Academic Achievement in the US
(Haverinen-Shaughnessy et al. Journal Indoor Air 2011)

- Results reveal linear association between ventilation rate and students’ AP (independent of socioeconomic factors)
Parallel Studies

- Reducing moderately elevated classroom temperatures & increasing outdoor air supply rate improved the performance of schoolwork.
- Speed at which the tasks were performed was improved; effect on errors more confounded.

Wargocki and Lyons (2008)