April 26, 2021

St Raphael - Air Quality Study Update

OVERVIEW

- Sensors for CO2, Temperature, and Humidity
- Installed in sample classrooms and admin areas
- Sensors installed on doors and windows
- 3 schools in original study
  - Mother Cabrini
  - St Jane Francies
  - St Raphael
- Initial study – Nov 12 to Dec 12
- Follow up study – Feb 26 to March 26

CO2 BENCHMARKS – 1200 PPM AND 800 PPM – WHY?

- Carbon dioxide (CO2) is an **indicator** of rate of **air changes** in occupied buildings.
- 1200 parts per million (ppm) flagged as base ventilation rate **for comfort**
- Normal outdoor CO2 400 ppm
- **Not a safety standard**

Increased ventilation recommended for COVID

Harvard T.H. Chan School of Public Health

ACH = **air changes** per hour

~800 ppm CO2 = 4 ACH in 850 sf Class with 20 students and two adult staff

RECOMMENDATIONS FOR ST RAPHAEL

- Implement systematic window operation
  - Continue monitoring, compare to first report

Other Measures:

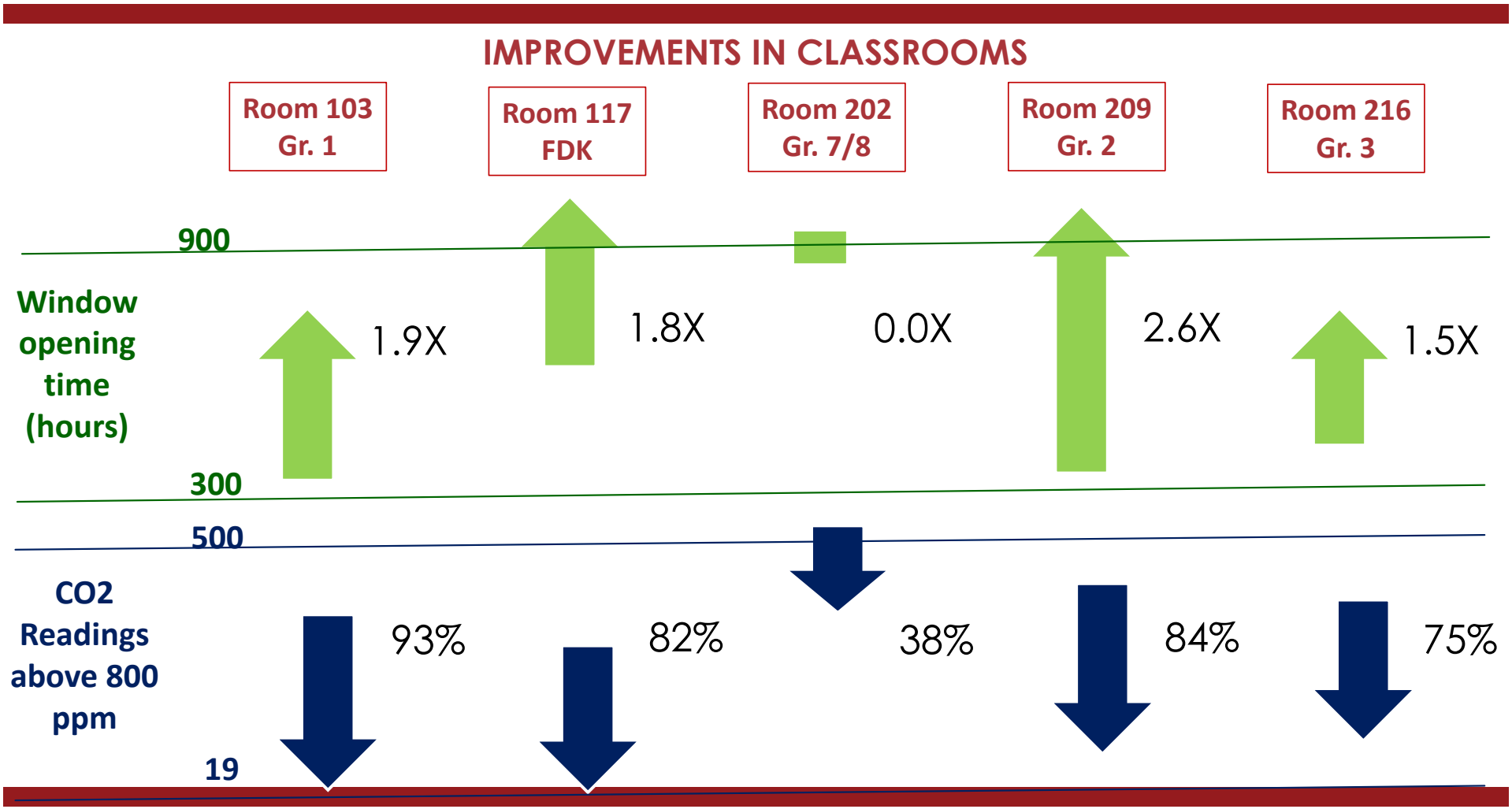
- Portable HEPA air filters – since October 2020
- Portable HEPA filters operated 24 hours
- Exhaust fans and vents serviced

FOLLOW-UP STUDY AT ST. RAPHAEL

- Windows kept open from the end of the school day until 11:00 p.m.
- Data collected from February 26 to March 26 and analyzed

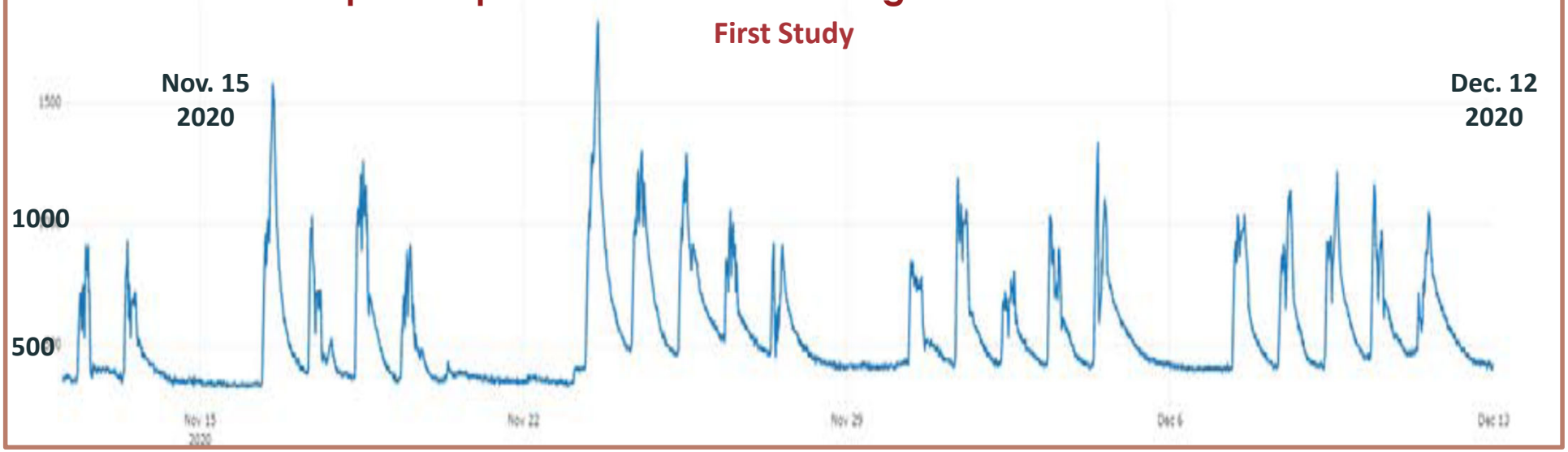
Findings

- Significantly increased window opening time
- Significantly improved ventilation rates:
  - Readings over 1200 ppm only in Room 202 in the second test period with 59% decrease
  - Frequency of readings over 800 ppm decreased in all rooms

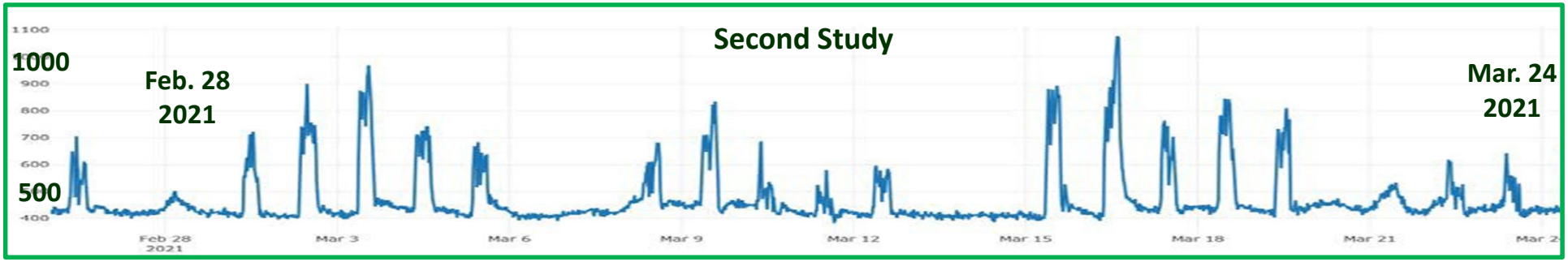

IMPROVEMENTS IN CLASSROOMS
Room 103
Gr. 1
Room 117
FDK
Room 202
Gr. 7/8
Room 209
Gr. 2
Room 216
Gr. 3
900
Window opening time (hours)
300
500
CO2 Readings above 800 ppm
19
1.9X
1.8X
0.0X
2.6X
1.5X
93%
82%
38%
84%
75%

Sample Graph of CO2 Level Readings - Room 209 – Grade 2

First Study



Second Study



(CO2 readings every 15 minutes)

WHAT HAVE WE LEARNED?

- Opening windows effective in non-ventilated schools
  - Systematic & for extended periods
- Exhaust fans are helpful
  - Service regularly
- Portable HEPA filters effectively supplement natural ventilation
  - Operate on high setting
- Get outside as much as possible
  - Enhance outdoor facilities

NEXT STEPS?

COVID-19 RESILIENCE INFRASTRUCTURE STREAM FUNDING (CVRIS)

- Cooling Centre - $133,000
- Outdoor Classroom - $35,000

- Investigate window fans
  - Pilot senior grades
  - Continue monitoring

- Outdoor Shelter/Shade Structure?

Questions

Toronto Catholic District School Board