Edinburgh Napier
UNIVERSITY

Natalie Bain-Reguis
n.reguis@napier.ac.uk

Saturday 18th of November 2023 Online 2-4pm

Safe Health Care for All
COVID
ACTION
SCOTLAND
COVID ACTION SCOTLAND

Scottish Regulations in Schools

The Scottish Government **(March 2020):**

1 – **Indoor Temperature:** **17°C min.**

2 – **Ventilation:** **10I/second/person**

→ **below** **800-1500ppm** CO_2 **levels**

(depending on the activity)

CO_2 level in classrooms: usually above 1500ppm

[Uk Gov, Coley and Beisteiner]

CEC 1ˢᵗ study

- 50 classrooms in 9 schools
- From Victorian to 2009
  - 4 primary schools
  - 4 high schools
  - 1 Special school

  - 7 natural ventilation
  - 2 mechanical ventilation

- 1 week November and December 2020
- Temperature and Humidity
- CO_2
- Feedback document to teachers

- 14 classrooms (**28%**) with CO_2 levels **above 1500ppm** threshold,

- 7 classrooms (**14%**) with average indoor temperature **below 17ºC**,

- 16 classrooms (**32%**) with average RH **below 40%RH**.

Impact of
Visual feedback CO$_2$ sensors
on the
Indoor Environment
and on the
Health and Well–being
of
Scottish teachers

Edinburgh Napier
UNIVERSITY

Aim of the study

Edinburgh Napier UNIVERSITY

FACTS:

- March 2021, the Scottish Governments announcement
- Positive outcomes: visual devices for energy consumption
- Teachers: stress, anxiety and depression and increase work-related respiratory problem.

AIM:

Pilot project to explore the effect on:
- **the indoor air**
- **the teachers' comfort and behaviour-change**

when:
- **raising awareness**
- **using visual CO_2 sensors**

in naturally ventilated primary school classrooms

RESEARCH QUESTIONS:

- Can visual CO_2 sensors help the teachers improve the IAQ of their classrooms?
- Can we ask the teachers to be in charge of managing the ventilation of their classrooms?
- Can CO_2 sensors have perceived health benefits for the teachers?

Study Design

89 Primary schools
90% Naturally ventilated

School T with visual sensors + non-visual sensors

School S with non-visual sensors

- From October 2021 to June 2022
- 2 Victorian primary schools
- 20 classrooms
- Naturally ventilated
- 26 teachers (15 and 11)

Make the invisible visible

Edinburgh Napier UNIVERSITY

TAPAS
Tackling air pollution at school

milu
architecture . interior design

ZSL INSTITUTE OF ZOOLOGY

Edinburgh Napier UNIVERSITY

a.r.u.

The **AIR** We Share

Natalie Reguis (Edinburgh Napier University)
Sarah Strachan (Global Sustainability Institute, Anglia Ruskin University (ARU))
Rosie Williams (The Institute of Zoology at the Zoological Society of London)
Michelle Wong (Milu Architecture Ltd)
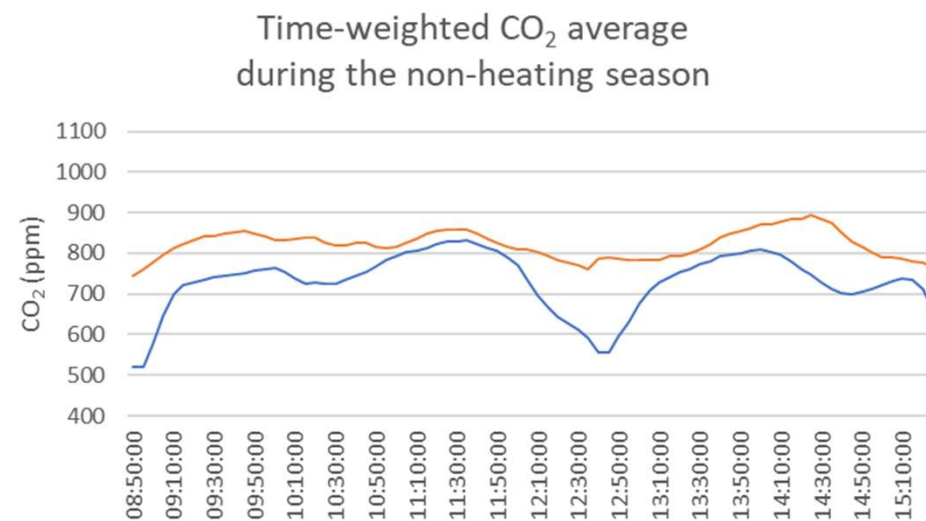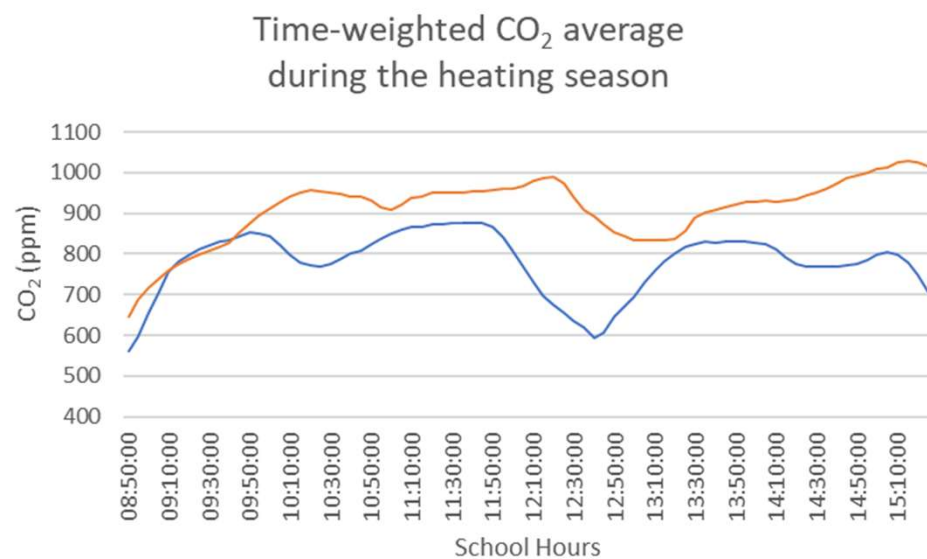
Healthy Indoor Learning Environments

PUBLIC HEALTH and LEARNING

https://youtube.com/watch?v=qozMHsTlIww

Outdoors Fresh air: circ 420ppm

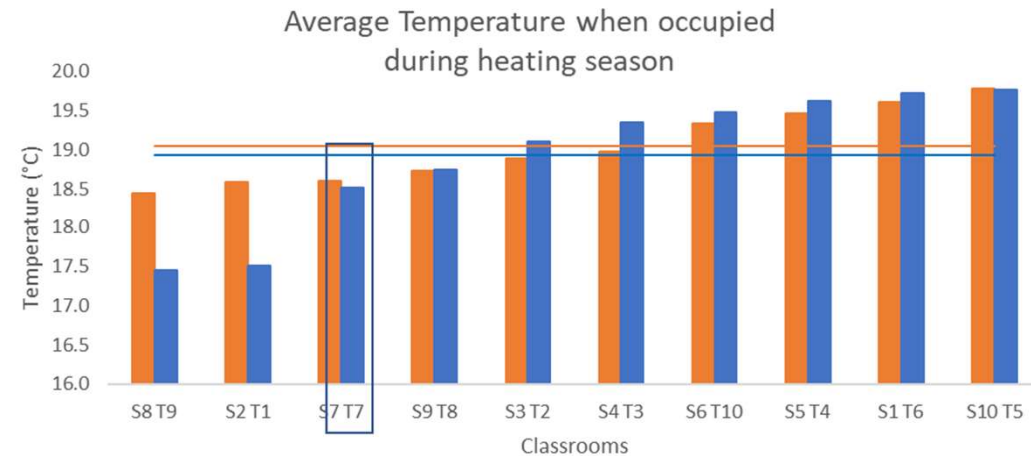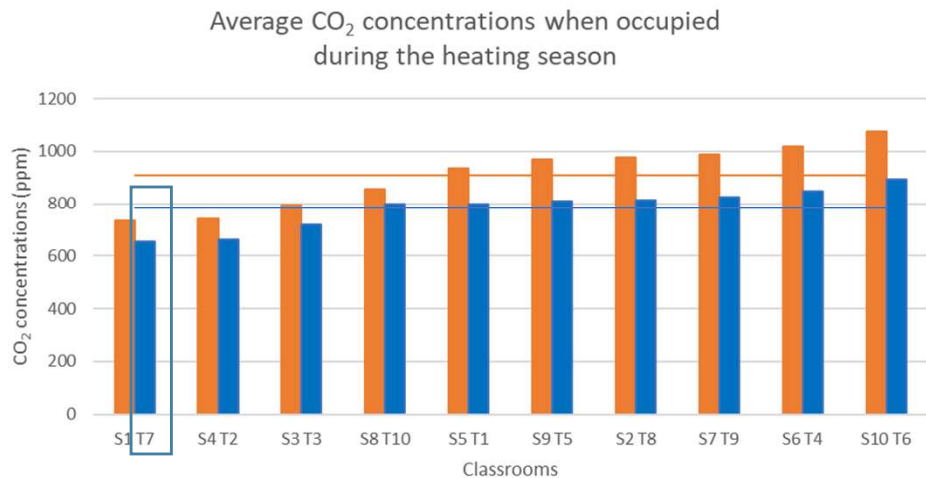| Under 800ppm	**No Action** Needed
800 -1500ppm	Take steps to increase ventilation Work to below 800ppm Eg Open windows, purge break, fans, Reduce occupancy Consider Hepa Filter Units *
Above 1500ppm	Action required **Poor Ventilation** Purge break / Reduce Occupancy Return to use room when air is improved *

Findings

TIME-WEIGHTED CO$_2$

Findings

ENVIRONMENTAL PARAMETERS: INDOOR TEMPERATURE

Average CO_2 concentrations when occupied during the heating season

Average Temperature when occupied during heating season

Classrooms in school S WO visual sensors — Classrooms in school T with visual sensors

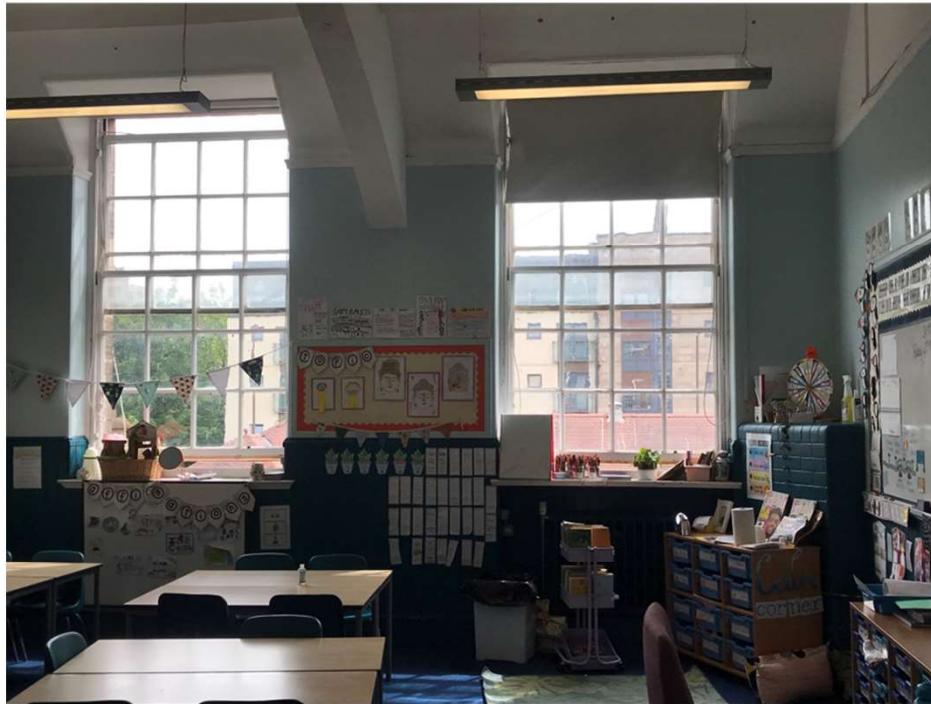Average of all classrooms of school S — Average of all classrooms of school T

Findings

WEEKLY OBSERVATIONS
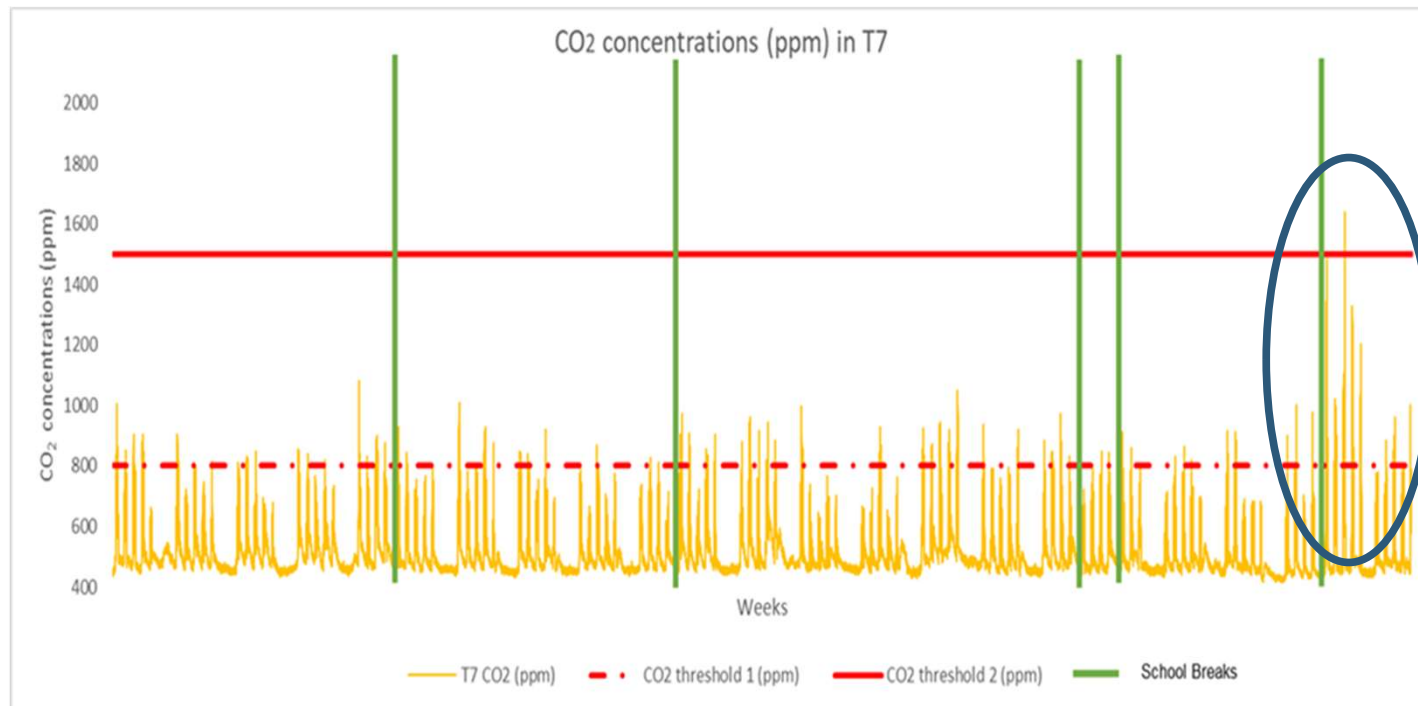
Supply teacher

Observations

WEEKLY OBSERVATIONS

Classroom T7

Classroom T8

Findings

SURVEYS

- **No impact** on perceived health symptoms, overall indoor working environment (both schools)

- **Positive impact** on air freshness, air odour, air cleanliness, ventilation, and overall indoor air satisfaction (both schools)

- **Negative impact** on air movement and draughts (both schools), indoor temperature, added pressure, distraction

Edinburgh Napier
UNIVERSITY

Conclusions

Edinburgh Napier
UNIVERSITY

+ Raising awareness of the teachers about good ventilation practice for their classrooms: Improved the air quality as quantified by reduced CO_2 concentrations

- More ventilation: Reduced the comfort levels of the teachers during the heating season
Less comfortable = colder

Visual CO_2 sensors:
+ Helped the teachers to improve and maintain lower CO_2 concentrations
- Disruptive during class time and added work-related pressure

Thank you!

n.reguis@napier.ac.uk