

CREATING A HEALTHY LEARNING ENVIRONMENT

An Internet of Things (IoT) case study

DIGITAL
ISLE OF MAN 



01

CONTEXT

We spend up to 90% of our time indoors so we need to ensure that air quality is good. Especially so in a school environment as many studies have shown that high levels of **Carbon Dioxide** (CO₂) in a room, significantly impact our ability to concentrate, problem solve or perform at our best on exams and tests.

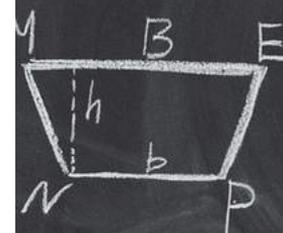
There are other factors like **temperature**, **humidity levels** and **light** in school environments which can also impact a pupils' ability to learn effectively, for academic progress as well as health and well-being.

We want to provide a healthy learning environment for students, in a classroom setting educational leaders and teachers want an optimal environment to maximise learning.

People exhale CO₂ when they breathe out, and if over time there is a build-up in a classroom, this suggests that ventilation needs improving. Although elevated levels are not a direct indicator of Covid-19, they will indicate an increased chance of virus transmission. Humidity levels being too high or low can have several impacts on health, but in low levels cold and flu viruses may spread more rapidly, and people are more prone to sinus infections.

If we aren't measuring then we won't know typical ranges in the rooms we spend several hours in, and if we don't know there is a problem then we can't take action to improve the environment.

swork



02

SOLUTION

To address this lack of data about our school's learning environment we launched a pilot Indoor Air Quality Monitoring Programme in Scoill Phurt le Moirrey (SPLM) in June 2021 with a low cost and easy to deploy solution (device), with the ability to display current results and capture historical data in a dashboard.

The Milesight AM107 device measures several parameters in a room:

- CO2 concentration
- Total volatile organic compounds (TVOC)
- Temperature
- Humidity level
- Light levels
- Barometric pressure
- Activity levels

It has the advantage of an e-ink display so that it is easy for people in a room to see their current status.

The battery powered unit connects wirelessly over a dedicated IoT (Internet of Things) network (LoRaWAN) which has been provided Island-wide by Digital Isle of Man, please get in touch with us on contact-digital@gov.im if you'd like to learn more or check coverage in your location. Measurements are sent as often as you wish, every 10 minutes by default, to a location or service of your choosing. For this trial we partnered with Manx Technology Group who are the resellers for Milesight and have also provided us with a demo web visualisation which collects the data and presents it in easy to digest dashboard views of the trend information for each parameter being measured.



03

RESULTS



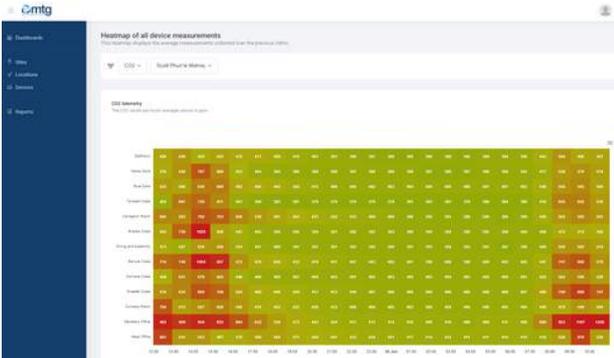
The results from the pilot are really encouraging and we've learned a lot about how to talk to teachers and students about the devices, as well as how to calibrate and most optimally place the units themselves. **We've since worked closely with the Department of Education, Sport and Culture to install them in all of our Island's schools.**

In each room the students are aware of what levels the readings need to be at, the CO2 level in particular, and are able to make decisions about when to open windows or to move to another area for a while until the levels drop back down to a desired level of below 1000ppm (parts per million).

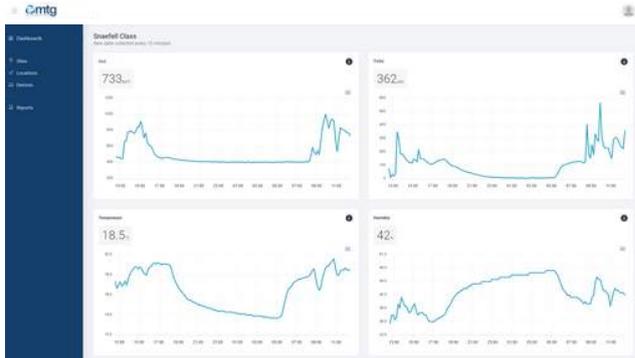
As a next step we want to broaden the metrics we assess to capture noise levels (decibel monitoring) to create a more comprehensive picture of the learning environment. We will work closely with SPLM students and any other interested parties to build upon this knowledge and give them more examples, tools and lessons to aid them in their understanding of how they can influence the environment and world around them.

“The monitors have had a big impact on how we perceive and manage our learning environments and they have also created independence in the children when managing their own classrooms.”
Steve Chapple, Deputy Head at SPLM

Dashboard



CO2 heatmap of all classrooms over a day



Graphical representation of CO2, TVOC, Temperature & Humidity