STUDENT ENGAGEMENT THROUGH DATA MAPPING IN AN UNDERGRADUATE ENVIRONMENTAL CHEMISTRY LABORATORY

Shane Wilkinson[a], Elizabeth J. New[b], Gregory G. Warr[b], Adam J. Bridgeman[c]

Presenting Author: Shane Wilkinson (Shane.Wilkinson@sydney.edu.au)
[a] Chemistry Education and Communication Research Theme, School of Chemistry, The University of Sydney, Sydney NSW 2006, Australia
[b] School of Chemistry, The University of Sydney, Sydney NSW 2006, Australia
[c] Educational Innovation Team, Office of the Deputy Vice-Chancellor (Education), The University of Sydney, Sydney NSW 2006, Australia

KEYWORDS: map visualisation, environmental chemistry, context-based learning, engagement

We are all too familiar with the map visualisations in media depicting the spread and severity of COVID-19 across the world. The representation of statistical data on a map is a powerful tool that can effectively convey factors such as magnitude, density and spatial variations. Analysing data in this format can help identify trends (eg “hotspots”, “patient zero”) from large datasets. Whilst students outside the discipline of geosciences may be familiar with analysing a data map; constructing one would be a rare experience.

In our undergraduate environmental chemistry laboratory, students analyse the metal ion content and hardness of water samples collected on campus. We have used Google Maps Application Programming Interface (API)[1] to allow students to geotag their results on a Google Map. The resulting bubble map is live and continually updated as students complete the lab and submit their results.[2] This map is shared with the cohort so students can view the evolution of data, their contribution to the “project” and generate their own hypotheses as to why certain concentrations may be linked to certain locales (eg. age of building). This approach offers rich context-based learning that could be modified to address other datasets/contexts, locations, and disciplines.

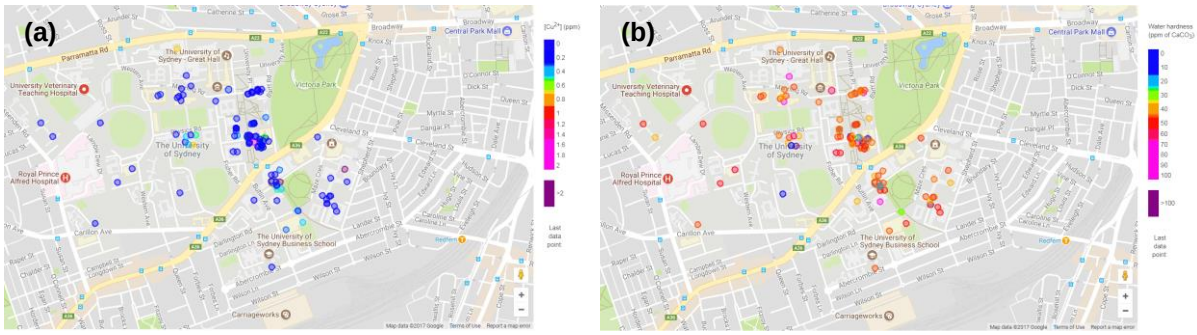

Figure 1. Screenshot of bubble plot of (a) Cu^{2+} concentrations, and (b) water hardness (from Mg^{2+} and Ca^{2+} concentrations) both determined by Inductively-Coupled Plasma – Optical Emissions Spectrophotometry using 2017 class data overlaid on The University of Sydney campus map (Google maps).

1. Google Maps Platform. Guide to implementing Google Maps Javascript API. https://developers.google.com/maps/documentation/javascript/tutorial (accessed 21/06/2020).
2. Current live data can be viewed at: https://scilearn.sydney.edu.au/secondyear/chem2522/results_map.cfm

Proceedings of the Australian Conference on Science and Mathematics Education, 30 September - 2 October 2020, page 87, ISBN Number 978-0-9871834-9-1.