

Air Quality Educational Initiative – Final Report

In November 2017, TELUS World of Science – Edmonton (TWOSE) put forth a proposal to lead an Alberta-wide education and awareness initiative to communicate the importance of air quality. The deliverables for this project were three-fold:

1. Create and deliver a professional development program on air quality to Alberta science teachers.
2. Create an exhibit on air quality in the town of Hinton, Alberta
3. Create an exhibit on air quality at TELUS World of Science – Edmonton

The following report will detail the overall results of each of those deliverables, including both our successes and limitations throughout this project.

Invisible Waste: A Unit on Air Quality

Throughout the course of this project, TWOSE educators created a series of lesson plans for Alberta teachers focused on the importance of air quality in our province. These lessons were geared for students in grades 4, ,7, 9 and Science 30 and were aligned with the following Alberta curriculum topics:

- Grade 4: Waste and our World
- Grade 7: Planet Earth
- Grade 9: Environmental Chemistry
- Science 30: Chemistry and the Environment

Along with the lesson plans, the TWOSE team created a Professional Development program that would help teachers learn the science content required to teach these lessons. This free PD opportunity included all the resources needed as well as a free Pocket Lab Air device, which was used for air quality testing. We focused our efforts on teachers in rural areas as most often these teachers have fewer opportunities to learn how to teach certain aspects of the science curriculum with confidence.

This PD opportunity was successfully delivered in person to 124 teachers until the COVID-19 pandemic hit in March 2020. After the subsequent lock-down of schools all over the province, we were forced to cancel any sessions that had been planned and quickly pivoted the program to an online format. In May and June 2020, we provided the virtual PD program to 33 teachers. In the fall of 2020, as restrictions to visitors in schools were put in place, we provided 5 more virtual PD sessions through October and November. This garnered participation from 41 additional teachers, which brought our total teachers reached to 206. This included 7 teachers from our target area of Hinton.

We have another PD session planned for December 9, 2020 which we are hopeful will bring our total teachers reached closer to our goal of 245.

Professional Development sessions began in the winter of 2019. The following table is a listing of all Professional Development sessions that have been delivered to date.

Date	Community/PD session	Number of Teacher Participant	Approximate Number of Students reached
February 21, 2019	Palliser District Teachers Convention	11	330
February 28, 2019	Edmonton	10	300
February 22, 2019	South Western Alberta Teachers' Convention Association	19	570
March 8, 2019	Central Eastern Alberta Teachers' Convention Association	23	690
May 2, 2019	Brooks	5	150
June 19, 2019	Chestermere	10	300
February 6, 2020	Edmonton	16	480
February 12, 2020	Fort McMurray	3	90
February 20, 2020	Red Deer	21	630
February 21, 2020	South Eastern Alberta Teachers' Convention Association	7	210
March 5, 2020	Mighty Peace Teachers' Convention	8	240
May 21, 2020	Online Session – Teachers from Grande Prairie, Cold Lake, Bonnyville, Fort McMurray	19	570
June 5, 2020	Online Session – Teachers from Grande Prairie, Mayerthorpe, Donnelly, Ardmore, Sexsmith	14	420
October 23, 2020	Online Session – Teachers from Heinsberg, Sexsmith, Wabasca	5	180
October 26, 2020	Online Session – Teachers from Maskwacis	4	120
November 6, 2020	Online Session – Teachers from Bonnyville, Charbonneau, Fort McMurray	7	210
November 9, 2020	Online Session – Teachers from Grande Prairie, Cold Lake, Paddle Prairie, Maskwacis	6	180

November 20, 2020	Online session – Teachers from Grande Prairie, Fort McMurray, Hinton, Bonnyville	6	180
November 27, 2020	Online session – Teachers from Hinton, Wood Buffalo	11	330
December 9, 2020	Online session – Teachers from Edmonton (registration is open)	1	30
Total		206	6210

The COVID-19 pandemic has created many challenges in reaching teachers for this kind of PD. Although a virtual session provided convenience to our staff as well as participating teachers in that they needn't travel, we found contacting teachers to be quite challenging. Despite our many efforts to hold several different sessions, investment in extra advertising, as well as direct calling schools, we were unable to get participation from our goal number of 245 teachers. For this reason, we have contacted the North Central Teachers' Convention Association and have submitted a proposal for a live speaker session during the teacher's convention that takes place in February 2021. During this session, teachers who register will receive the remaining Pocket Lab Air devices and will participate in the PD session. We are confident that this will be a well-attended session and will further our ability to reach the remaining teachers with this project.

After each PD session, we ask participants to fill out a survey to evaluate both the content of the PD session as well as their confidence in using the lesson plans and Pocket Lab Air device. The results of the post-session survey can be seen here: [Cumulative Post-session Survey Results](#)

In addition to the post-session survey, we also asked past participants to provide feedback on their use of the lesson plans in the time since they completed the PD session. Those surveys were sent out in June 2020 and garnered the results found here: [Year End Survey Results](#)

More than 80% of teachers responded that they were either “somewhat confident”, “Very confident” or “Extremely confident” in teaching about air quality in the year-end survey. Additionally, more than 86% of teachers reported that they intend to use the resources provided in their classroom in future years as well as share the resources with other teachers in their school. This is very encouraging that teaching this content will continue beyond the term of this project. Some positive comments received were:

- “Thanks for the easy to follow lesson plans. I look forward to using them in the future.”
- “Thank you for affording this opportunity to tinker with technology that normally we would not have the chance to see or use.”
- “The resources have been extremely valuable. I have a strong background in science but have struggled with connecting this content to real-world applications! I am so grateful for the resources!!!”
- “We have ordered a class set of 12 Pocket Lab Airs and will continue to build engaging lessons for our school. We use/plan to use in grades 4/5, 9 and our outdoor/environmental option classes.”

During the spring of 2020, an interesting opportunity arose when Myriad Sensors approached us to take part in their citizen science project entitled the Blue Sky Zero. This project aimed to make use of data collected through Pocket Lab Air units already in the hands of the teachers who had our taken our PD and were using their devices in their classes. The goal of this research was to measure the change in air quality while people all over North America and beyond were traveling less due to being in lockdown. This research and testing began in March 2020 and continued until September 2020. We included this in our virtual PD sessions as an extra activity for the participants. The data collected during this project can be seen here: [Blue Sky Zero](#)

Air Quality Exhibit – Hinton, Alberta

Working with the Hinton Municipal Library, we were able to install an air quality exhibit for the town of Hinton in December 2019. Shortly after the installation, the COVID-19 pandemic forced the library’s closure and as a result, fewer members of the public than expected were able to engage with the exhibit. The library re-opened in late October 2020, and they have once again made the air quality exhibit available to their patrons. The Pocket Lab, because it is a hand-held device, has been excluded from the exhibit for the time being. The staff at the library are hopeful that it will be placed back in use very soon. One of the librarians took part in one of the PD sessions held in November, so they are well prepared to use the Pocket Lab Air once it can be made available to patrons again.

Air Quality Exhibit – TELUS World of Science – Edmonton

The final part of the air quality project is the Edmonton Air Quality exhibit to be installed at TELUS World of Science – Edmonton. Originally, this exhibit was set to be placed in the Environment Gallery, however, over the course of renovations at the science centre, that gallery has since been removed. As was noted in our last report, this exhibit will now be housed in our new Health Zone exhibition in the Allard Family Gallery. The final

exhibit will be installed in the *Environment* section of the new gallery which will be filled with hands-on exhibits focused on how the environment in which we live can influence our health. This exhibit will consist of an interactive touch screen where visitors will be able to explore how air pollution affects Edmonton and other parts of the province in real time using data provided by the Alberta Environment and Parks and Airshed monitoring stations. Visitors will be able to look at the air quality “today” as well as the air quality during 6 different historical events so that they can compare air quality experiences. When visitors choose the “today” option from the menu screen, they will see live data which is pulled twice daily from the Government of Alberta’s Air Quality Health Index (AQHI). Visitors will be able to zoom and pan to different areas of the map and explore the current air quality conditions. The map will show the AQHI using the same number range (1-10+) and colours used by the Government of Alberta to denote the different levels of AQHI.

When a visitor selects an historic air quality event, they will be able to see the AQHI on a looping GIF of the map of Alberta during that particular period. For example, if a visitor selects the Fort McMurray fires in May – July 2016, they will see a dark red colour appear in the affected areas that denotes an AQHI of 10+. The map will also show how the AQHI changed over the course of the historical event.

Detailed design drawings of the exhibit screens and drawings showing the placement of the final exhibit piece within the gallery can be found in the attached files.

This exhibit is currently in the fabrication stage, with all equipment and materials purchased. As has been the case with other parts of the air quality project in 2020, there have been significant delays in getting to the completion stage with this exhibit piece due to COVID-19. In April 2020, the design firm, GSM, that is working on the health exhibition of which the air quality exhibit is a part, was forced to close their doors due to the lockdown in Montreal. The closure lasted until July 2020 when TWOSE finally formally requested reactivation of the project team at GSM, which was subsequently approved by their leadership team. This 3-month delay to the project pushed the fabrication stage significantly and thus caused a delay in prototyping and testing interactives, which includes the air quality exhibit. TWOSE however, has pushed the fabrication of the air quality exhibit up in priority and a version of the final exhibit will be completed and available to our visitors by the end of 2020. This exhibit piece will remain on the gallery floor available to visitors until the Health Zone exhibition opens to the public in June 2021.

Despite the recent challenges to this project in 2020 due to COVID-19, the project has been a success. We are continually thanked by the many teachers who have been able



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to take part in the Professional Development sessions, especially those teachers from remote areas. The participants appreciated the PD workshop and remarked how the technology greatly enhanced their lessons. We have heard from teachers who have formed a small group to take the PD session so that they can receive enough Pocket Labs to create a “class set” to share among all the science classes in the school. This puts the devices and the learning not only in the hands of teachers, but in the hands of students who are the ultimate changemakers in their households and subsequently, their communities. The project team at TWOSE has discussed the continuation of this program beyond the term of this funding as we have seen its impact and recognize the value of the information contained therein. Regardless of the continuation of the educational programming, the air quality exhibits in both Hinton and TELUS World of Science – Edmonton will continue to educate Albertans for many years to come.

LAT 53° 33' 40"N LON 113° 33' 50"W