Hack the Globe

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Team 17

> Education enables individuals to build more prosperous and successful lives and societies to achieve economic prosperity and social welfare. [1]

Prompt 3: *Increasing access to education in remote and low-resource communities*

A quality, basic education is one of the key factors to improving quality of life and empowering locals to develop solutions to the greatest challenges in their communities. In the world's poorest areas, libraries and print content are scarce. To tackle this, one organization is leveraging digital learning, where an abundance of quality content can be sourced for free from the Internet and provided to the world's most remote, offline, and resource-constrained areas.

GIC Profile – Rumie Initiative

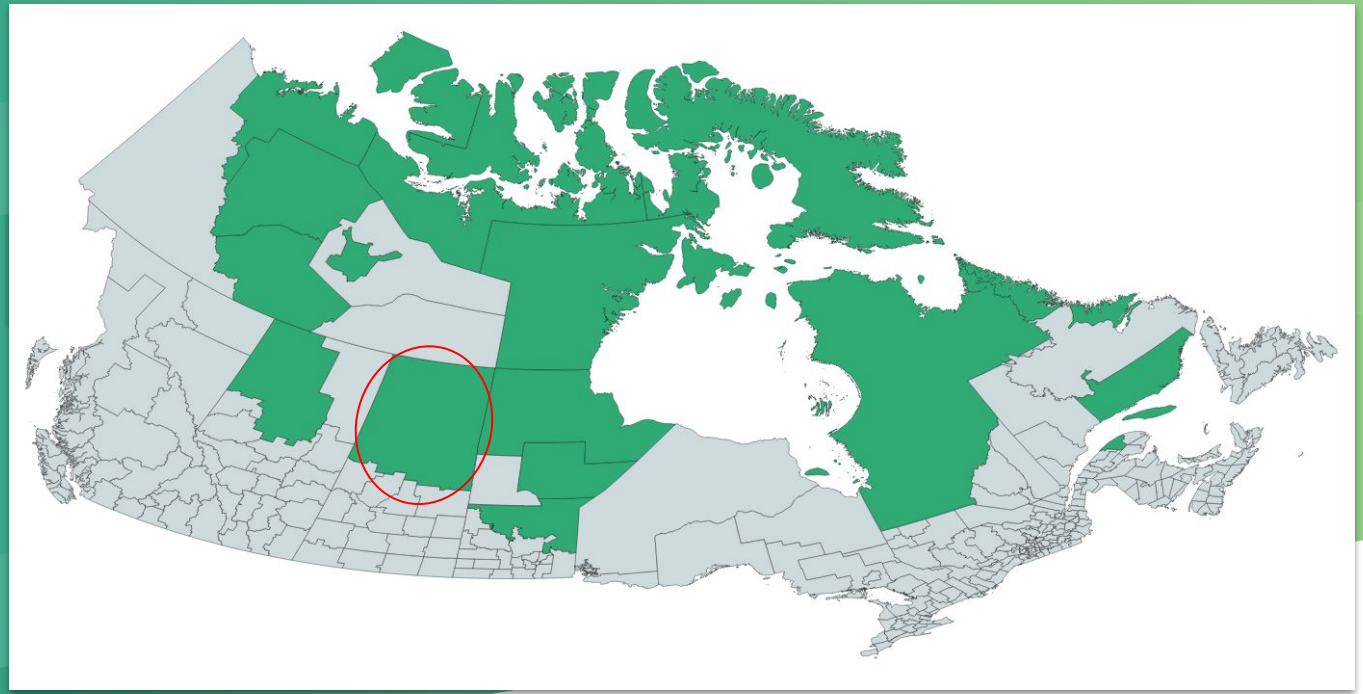
Over 1 billion children lack access to education across the world, causing them to miss out on opportunity and information in an increasingly digital, knowledge-based economy.

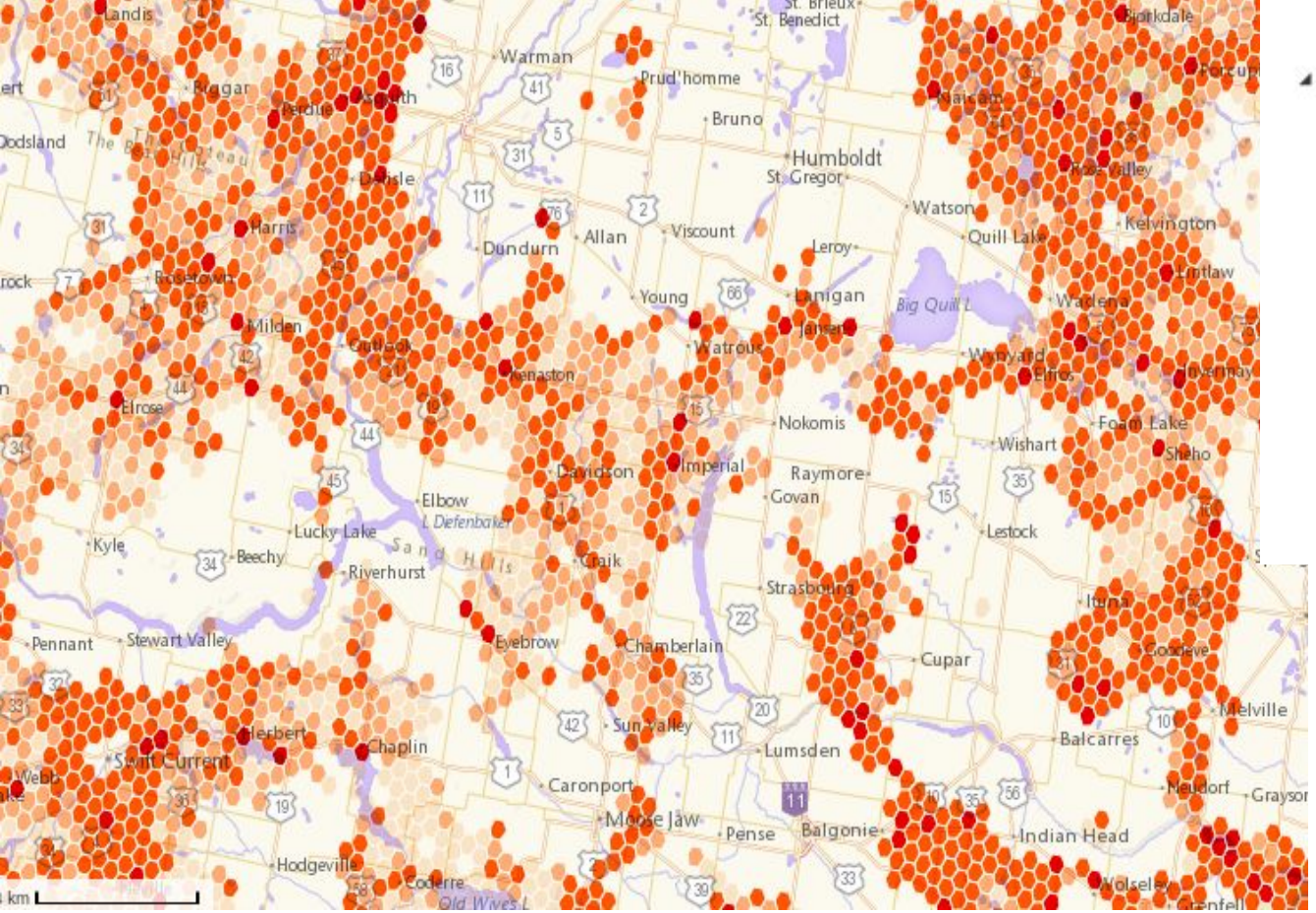
The Rumie Initiative has created the LearnCloud, an online repository of high-quality, free educational resources provided by a community of educators and volunteers around the world. Rumie gathers quality learning content from the Internet, curates and shares it through the LearnCloud, and makes it available offline via smartphones and low-cost tablets that are delivered to remote, indigenous communities in Canada and underserved communities around the world.

https://www.rumie.org/

Providing a smart delivery system to distribute education content

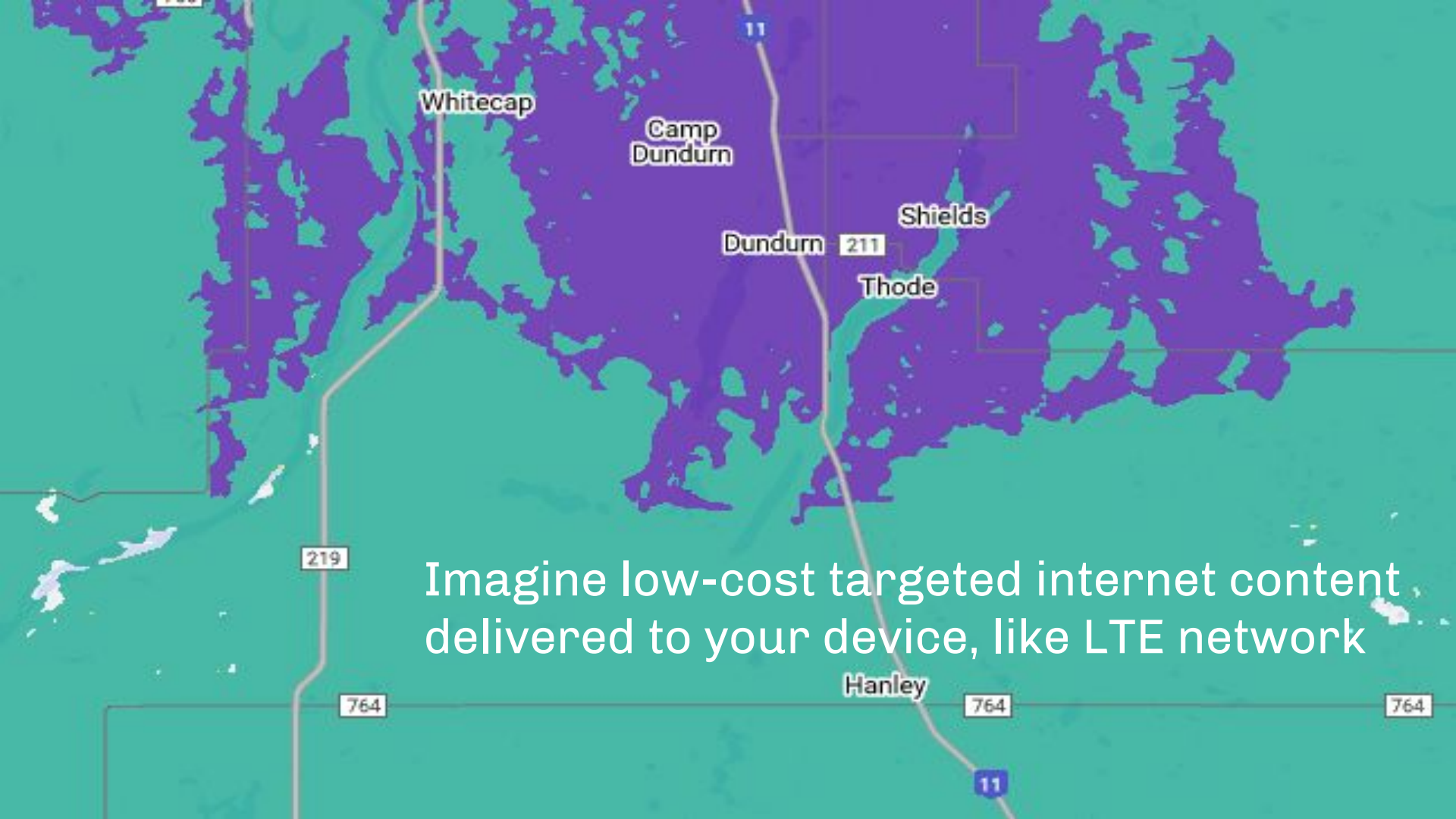
Census divisions with less than 65% of population (25-64) with high school diploma [2]





Underserved Population Density

0.535 person/sq.km


Whitecap
Camp
Dundurn
Shields
Dundurn
211
Thode
219
Imagine low-cost targeted internet content
delivered to your device, like LTE network
Hanley
764
764
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11

Deliver Internet-based education contents to remote students through a moving wireless local network

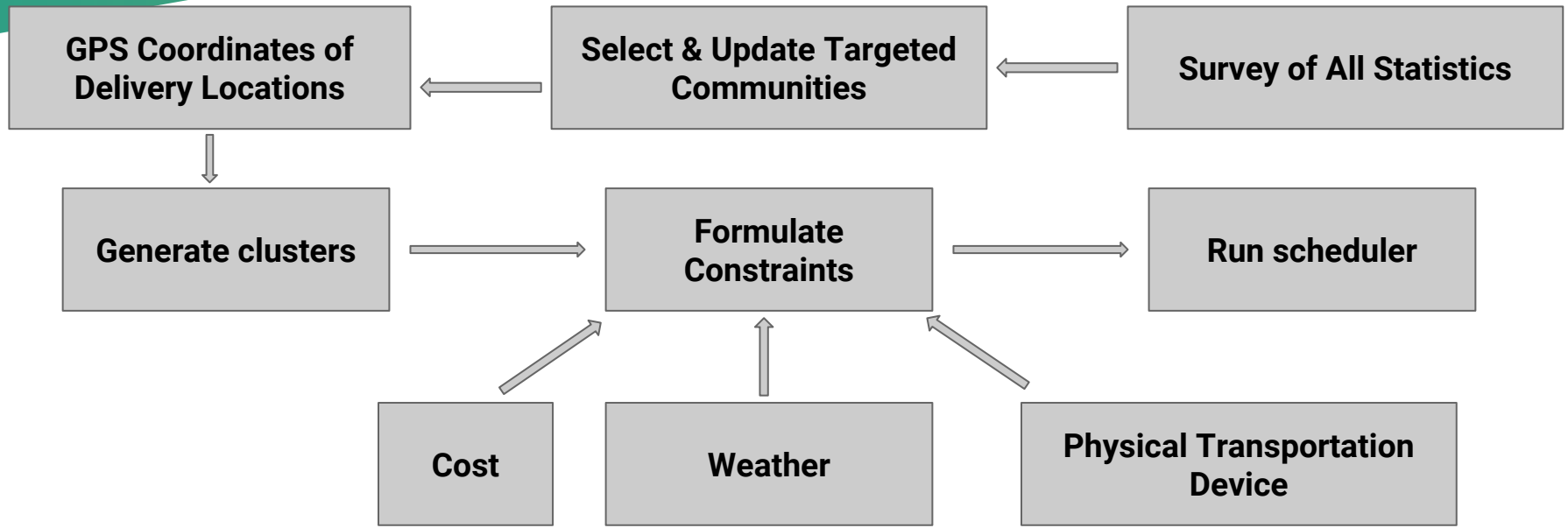
Local Access Network (i.e. Raspberry-Pi based)

Customized Scheduler Algorithm

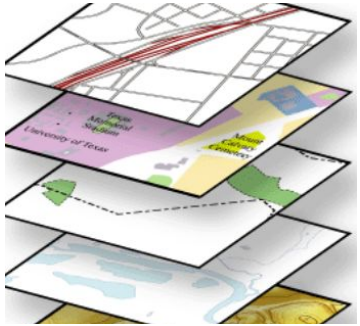
learnCloud

Preload Content on memory storage (e.g. SD card)

Breakdown of Technical Solutions



Solution: Process Raw Data



Maps of :

Communities with low internet access

Population Density

Education Level

Targeted Delivery Locations

GPS Coordinates

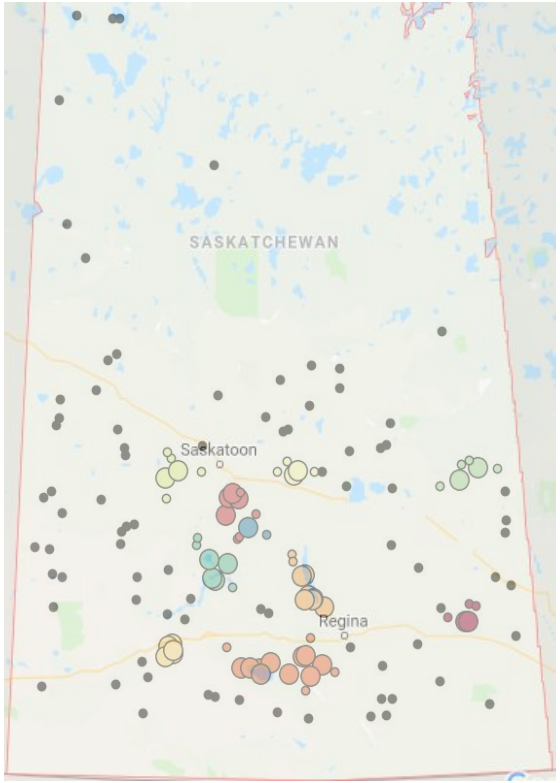
Updates

{“Fort Kent, AB”: (54.31, -110.61), “Nesslin Lake, SK”: (53.93, -106.78) … }

Solution: Clusters

Generate Clusters

- Identify communities with no access to Internet
- Group them according to the range of the delivery vehicle



Solution: Model as CSP

Variables

Timeslots corresponding to the hours of a day

Domains

Names of communities in a cluster

Constraints

1. Distance between points
2. User needs
3. Weather conditions

Solution: Set-up

Regions

{‘Region A’: (latA, lonA),

‘Region B’: (latB, lonB),

‘Region C’: (latC, lonC),

‘Region D’: (latD, lonD)}

Weather conditions

{‘Timeslot T7_1’: [‘Region A’],

‘Timeslot T8_1: [‘Region B’],

…

‘Timeslot T23_1’: [],

‘Timeslot T7_2’: [‘Region A’]

… }

User needs

{‘Region A’: 4,

‘Region B’: 3,

‘Region A’: 5,

‘Region D’: 5}

Other variables

MAX_DIST = 10 (km)

MAX_DAYS = 3 (hr)

Solution: Scheduler

Input

```
Regions
West End, SK [  50.5496565 -102.418496 ]
Bangor, SK [  50.8068178 -102.3410638]
Bird's Point, SK [  50.5456723 -102.3728355]
Melville Beach, SK [  50.6157763 -102.7268111]
Atwater, SK [  50.7742229 -102.2268326]

Min hours in each community
West End, SK 4
Bangor, SK 4
Bird's Point, SK 4
Melville Beach, SK 4
Atwater, SK 4
```

Output

```
---------- CLUSTER 1 ------------
########## DAY 1 ##########
('West End, SK', '7:00-24:00')
------------------------------

########## DAY 2 ##########
('Bangor, SK', '7:00-24:00')
------------------------------

########## DAY 3 ##########
("Bird's Point, SK", '7:00-16:00')
('Melville Beach, SK', '16:00-17:00')
('Atwater, SK', '17:00-18:00')
('Melville Beach, SK', '18:00-19:00')
('Atwater, SK', '19:00-20:00')
('Melville Beach, SK', '20:00-22:00')
('Atwater, SK', '22:00-24:00')
------------------------------
```

https://gitlab.com/philip-huang1/hacktheglobe

Comparisons

	Cost	Speed	Content
“MovWiFi”	Free	Update every week	Targeted resources & Ads
Internet	Infrastructure not available		
LTE	$15/GB	Real Time	User specified
Mailing USB Storage	Delivery: $18.39 USB ($20)	~6 Business Days	Targeted Resources

Funding

Partnerships

- Rumie
- Advertisement Clients
- Fundraising

Product Ads

Campaign Ads

Public Service Announcements

Execution

1. Identify target community (ie. cluster)
2. Contact community for logistics
3. Deploy small team of trainers
4. Training period for the locals to operate the system
5. Quarterly check-ins (if needed) to assess impact

Metrics for Success

Efficiency

Assess the total times that a person was using the service

Cost effectiveness

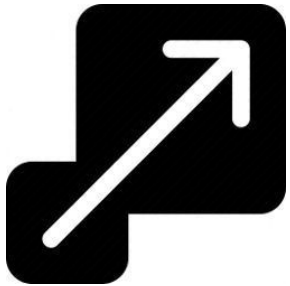
Assess the efficiency per dollar spent over a time span (eg. 1 month)

Business Scalability

- Expand business to countries in Africa
- Streamlined training process (1 week)
- Scheduler can be extended to distribute other resources

Software Scalability

- Dynamic user feedback to update constraints
- Add more constraints to make models more realistic
- Extend model to represent different regions (and potentially new problems!)



Example: Crisis Relief

- Delivering wifi access to remote regions might be critical when existing infrastructure is down
- Can be extended to deliver relief kits

Thank you!

Questions?

Indigenous Communities

Qiqitaq High School, NWT

Preserving Tradition/Culture

- Rumie allows customized content
- Our system allows user feedback and a collaborative experience

Citation

[1] “Internet Access and Education: Key considerations for policy makers,” *Internet Society*. [Online]. Available: https://www.internetsociety.org/resources/doc/2017/internet-access-and-education/. [Accessed: 17-Mar-2019].
[2] Statistics Canada, “Canada – Percentage of the population aged 25 to 64 by highest level of educational attainmentFootnote 1 in 2016, by 2016 census division (CD),” *Thematic maps – Education - Canada*, 30-Oct-2017. [Online]. Available: https://www12.statcan.gc.ca/census-recensement/2016/geo/map-carte/ref/thematic-thematiques/edu-sco/map-eng.cfm?TYPE=1#a6. [Accessed: 16-Mar-2019].