Final Narrative Report – Public Interest Technology in Tribal Communities

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Project Summary

The goals and objectives of the proposed project were to build a career placement/pipeline model and build a working group at RIT of students and faculty who desire to work in PIT within tribal communities. Objectives were met by first identifying the general areas of need for PIT among tribal communities with which RIT has well-established relationships (tribes affiliated with the principal investigator and RIT Future Stewards Program). These areas of needs were communicated to interested RIT students and faculty members interested in applying for student fellowships or faculty mini-grants. Proposals from students and faculty were accepted, reviewed, and awarded. This project presents a reproducible model for a career pathway/pipeline, identifies institutional resources for PIT, and outlines the future direction of the working group.

General areas of need for PIT were identified for four tribal communities, including Seneca Nation of Indians, New York State Johnson O'Malley Schools, Ganondagan State Historic Site, and Cherokee Nation. Faculty and students in communication and collaboration with these communities proposed projects to address these needs. A total of three projects were selected and three faculty mini-grants, and three student fellowships were awarded, Projects were carried out beginning June 2021. Final reports for these projects were submitted in January 2022 (See below).

Progress Towards Objectives

Four faculty and students were able to coordinate complete projects with several tribal communities. These projects all required technological and analytical expertise that were not otherwise available to the tribal communities. The model was to build upon/establish relationships with tribal communities, identify critical areas of public interest technology needs of those communities, fund faculty and students interested in working with tribal these communities, and then work together to complete a project. Communities would benefit from these projects and the faculty and students gained experience in working with tribal communities. PIT-UN in Tribal Communities successfully accomplished all of these objectives.

Challenges or Lessons Learned

More challenging, was building a network of faculty and students from diverse fields of expertise whereby they could share experiences and work together. A PIT-UN in Tribal Communities website was developed in collaboration with Open@RIT to coordinate the fostering of a cohesive group, but participation was minimal. Lessons learned is that the funded researchers found value in working directly with tribal communities, there was little apparent desire to broaden their participation in a broader sense.

Equity Diversity, and Inclusion

Two of the three funded RIT faculty participants were Native Americans. Additionally, great effort was made to recruit RIT Native American students. However, many students who expressed interest ultimately had other funded opportunities. All of the projects were aimed at

identifying tribal resources for future protection, sharing tribal culture and history, or providing critical data and analysis for Native American education.

Network Impact

This project demonstrated that tribal communities have public interest technology needs that could be filled by a university network. By working with tribal communities to identify their needs, a pathway/ career pipeline could be created by providing students with the means to practically apply their expertise towards these needs, and gain valuable experience in working with tribal communities.

Institutionalization of Public Interest Technology

For this project, there was superb support from RIT leadership and program administrators. I can envision how public interest technology could become institutionalized in the long-term. Technology experts in this project had a desire to work with tribal communities. However, they appeared to view it primarily from the perspective of their own disciplines rather than within the broader discipline of public interest technology. The stated definition of PIT appears straightforward, but is less so in its broader application, although three RIT faculty are interested in continuing a working group. There is great potential for PIT-UN in Tribal Communities, but more work needs to be done in clarifying the discipline of PIT and gaining buy-in by experts.

Assisting in the development of flood risk control metrics for GIS based flood risk analysis and future climate change scenarios using ArcGIS and HEC-RAS for emergency management policies for the Seneca Nation of Indians

Working with Seneca Nation of Indians Emergency Management Services, researchers Karl Korfmacher (faculty) and Peter Hogya (student) developed a series of geospatial databases, maps, and web tools for helping to assess flood inundation in the Cattaraugus HUC 8 watershed. Advancements in the ArcGIS Pro ArcHydro modeling tool kit allowed the researchers to use those tools, rather than the more complicated HEC model from the US Army Corps of Engineers, to create these initial flood assessment tools.
The analysis was conducted following a Height Above Nearest Drainage (HAND) approach using ArcHydro tools, as outlined in a series of **ArcHydro in Action** web seminars (Session 1 - Arc Hydro in ArcGIS Pro; Session 2 - Arc Hydro: Flooding and Forecasting; Session 3 – Arc Hydro: Hydrology and Hillslope; Session 4 – Arc Hydro: Support for Hydrologic and Hydraulic Modelling). This resulted in a series of interactive maps that show building footprints and areas of inundation from flood waters at various depths. While these maps do not represent actual floods based on field observations or recorded measurements, the areas indicated as inundated at various flood levels can be used for advanced planning and proactive flood mitigation strategies and policies. Data were primarily obtained from the Geospatial Data Gateway, maintained by the Natural Resource Conservation Service. Building footprints are from a Microsoft database and accessed through the Cornell University Geospatial Information Repository (CUGIR)
An **ArcGIS Map Project Package** was created for the database and made available for download and use with ArcGIS Pro (https://arcg.is/0n9m1T). On-line webmaps of the model parameters and results can be accessed here (Subbasins, Flood Depths, Inundation, Hydrologic Soils Group, Land Use Land Cover 2019, and Elevation). An **ESRI Dashboard Portfolio** was also created that provides access to gauging station information and maps (https://arcg.is/1iiizj0). A Storymap is also being created that provides images of the maps, links to the data, and a general outline of the analysis (https://arcg.is/0q9i5b).

3d virtual longhouse for Ganondagan State Historic

An interactive game featuring a virtual longhouse was developed for Ganondagan State Historic Site (Ganondagan) in Victor, NY. Ganondagan plans to use the technology to facilitate the teaching and learning of Haudenosaunee culture in 4th grade classrooms across NYS.

RIT Contributors:
Roles and responsibilities described in proposal were maintained throughout the project.

- Mindy Magyar (Mi'kmaq descent). Associate Professor, Industrial Design Program, School of Design, CAD
- Morgan Hamilton. RIT Student, 3DDD BFA Program, School of Design, CAD
- Simarjot Khanna. RIT Student, Dept of Software Engineering MD Program, GCCIS

Ganondagan/Friends of Ganondagan/Seneca Contributors:

- Peter Jemison (Seneca), Historic Site Director, Ganondagan NY State Historic Site
- Jeanette M. Jemison (Seneca), Program Director, Friends of Ganondagan
- Meg Joseph, Executive Director, Friends of Ganondagan
- Ansley Jemison (Seneca), Cultural Liaison, Ganondagan NY State Historic Site
- Michael Galban (Washoe-Paiute), Curator/Historian/Interpretive Program Assistant, Ganondagan NY State Historic Site
- Tonia Loran Galban (Mohawk), Senior Interpretive Guide, Ganondagan NY State Historic Site
- Sara Droney (Seneca), Language Department, Seneca Nation of Indians

The project kicked off according to schedule. Most of the work was completed by mid-August, with a working prototype delivered in October 2021. The timeline was extended to accommodate Ganondagan's schedule.

Key Milestones:

5/25/2021 RIT Team Meet & Greet
6/8/2021 Project Kick-off at Ganondagan
6/16/2021 Longhouse Educational Visit
6/29/2021 Photography session at Longhouse
7/14/2021 Design Development presentation/discussion
8/4/2021 Design Development presentation/discussion
8/10/2021 Demo at Ganondagan Educators' Day
10/20/2021 Working prototype delivered
11/11/2021 Narration provided by Ganondagan

Next Steps:

We anticipate delivering an updated version to Ganondagan, as Simar generously agreed to refine the game by integrating audio provided by Ganondagan. Should there be an opportunity, there remain ample opportunities to either enhance the existing game and/or develop others.

District Level Estimates of the Native American School-Age Population

Jeffrey D. Burnette, Ph.D.

This project had the following deliverables:

- Develop a STATA algorithm that implements the process developed by Burnette (2021) for estimating American Indian and Alaska Native (AI/AN) school-age enrollment totals for all New York state school districts contained in both the American Community Survey – Educational Tabulation (ACS-ED) and Common Core of Data (CCD).
- Obtain an estimate of the American Indian and Alaska Native school-age population (students 3 or older and enrolled in grade 12 or lower) for each school district in New York state contained in both the Common Core of Data and American Community Survey – Educational Tabulation.
- Organize estimates into a user-friendly format and disseminate these totals to areas likely to develop Johnson O'Malley (JOM) Programs.

Background

The main issue with AI/AN data discussed in Burnette (2021) was that the CCD only published data for single-race, non-Hispanic AIs/ANs. Consequently, students eligible to participate in the Johnson O'Malley (JOM) Program because they possessed at least ¼ degree of Indian blood or were enrolled citizens of a federally recognized tribe were likely to be excluded from student population totals. Burnette (2021) argued that data from the CCD from 2005 – 2009 and the period from which the total number of students is desired could be combined with that from the ACS-ED from the same timeframe to produce a current total that served to approximate the total number of AIs/ANs that would have chosen to select only AI/AN if required to select from mutually exclusive identity categories and did this at the national level.

The proposed project sought to implement Burnette (2021) at the district level in an attempt provide adjusted totals for school districts likely to develop a JOM program. To accomplish this, school district level data was obtained from the Common Core of Data (CCD) and merged it with that from the American Community Survey – Educational Tabulation (ACS-ED). Currently, there are 683 distinct school geographies in New York state. The CCD reported data for 677 of these, while the ACS-ED reported it for 633. From these, 434 districts reported at least one American Indian or Alaska Native (AI/AN) student to the CCD during the period 2015-2019. Whereas, the ACS-ED only estimated 178 school districts had at least one AI/AN student and there were only 145 school districts where both the CCD and ACS-ED reported more than one AI/AN student.

At present, there are only two JOM Programs in New York state. These are associated with the Seneca Nation of Indians and the Mohawk Nation. Seneca students largely attend one of seven school districts across three different reservation areas. While, Mohawk students predominantly attend either Massena or Salmon River Central School District.

A couple of different criteria were used to identify districts that may be potential applicants to the Bureau of Indian Education to develop a JOM Program. First, I identified 36 school districts that

overlapped with American Indian and Alaska Native Reservation Areas.[1] Of these only 13 have data in both the CCD and ACS-ED from 2005-2019. The other 23 districts reported had at least one AI/AN student in the district according to the CCD. A second criteria, focused on identifying school districts with more than 50 AI/AN students that also demonstrated a willingness to provide academic and/or cultural resources specifically for AI/AN students. This resulted in a detailed concentration on 18 school districts, displayed in Table 1. Of these, 9 schools were currently associated with tribal nations that currently have a Johnson O'Malley Program (Seneca Nation of Indians, and Mohawk Nation).

Table 1: Contact Information for School Districts with Significant American Indian and Alaska Native (AI/AN) Student Populations or Support

School District	Tribal Nation Being Served	AI/AN Homeland Area	Contact Person for AI/AN Students	Email for Contact Person
Massena	Mohawk	Not in AI/AN Homeland	Rod Cook	rcook@srmt-nsn.gov
Salmon River	Mohawk	St. Regis Mohawk Reservation	Rod Cook	
Allegany-Limestone	Seneca	Allegany Reservation	Trudy Jackson	trudy.jackson@sni.org
Cuba-Rushford	Seneca	Oil Springs Reservation	Trudy Jackson	
Evans-Brant	Seneca	Cattaraugus Reservation	Trudy Jackson	
Gowanda	Seneca	Cattaraugus Reservation	Trudy Jackson	
Randolph	Seneca	Allegany Reservation	Trudy Jackson	
Salamanca City	Seneca	Allegany Reservation	Trudy Jackson	
Silver Creek	Seneca	Cattaraugus Reservation	Trudy Jackson	
Akron	Tonawanda Seneca	Tonawanda Reservation	Jodi Patterson	jpatterson@akronschools.org
LaFayette	Onondaga	Onondaga Nation Reservation	Asa Shenandoah	ashenandoah@lafayetteschools.org
Niagara-Wheatfield	Tuscarora	Tuscarora Nation Reservation	Jaime Gilbert	jgilbert@nwcsd.org
Southampton Union Free	Shinnecock	Shinnecock (state) Reservation	Kenneth Coard	Phone: (631) 283-6143
Buffalo City	None	Not in AI/AN Homeland	Charity Hill	Phone: (716) 816-3183
Niagara Falls City	None	Not in AI/AN Homeland	Noreen Hill	nhill@nfschools.net
North Syracuse	None	Not in AI/AN Homeland	Nicholas Scholz	nscholz@nscsd.org
Rochester City	None	Not in AI/AN Homeland	Regan Kluver	rekluver@rochesterschools.org
Syracuse City	None	Not in AI/AN Homeland	Lori Smith	lherne@scsd.us

District Level Enrollments and Adjusted Enrollment Totals

An algorithm was written to implement Burnette (2021) for each school district in the United States and the results for the 18 identified school districts were inspected. Upon close examination of the updated estimates, it was determined that estimates obtained at the school district level using Burnette (2021) were unreliable due to the large inconsistencies in ACS-ED data. For instance, as displayed in Table 2, the school district serving the Onondaga Nation, Lafayette Central reported an average of 283 single-race, non-Hispanic AI/AN students each year from 2015-2019, but the ACS-ED estimated that there were none. Other dramatic underestimates also occurred from 2015 – 2019 for Gowanda (ACS-ED: 253 students, CCD: 435), Akron (ACS-ED: 20 students, CCD: 162), Salmon River (ACS-ED: 565 students, CCD: 946), and Evan-Bryant Central (ACS-ED: 253 students, CCD: 435).

The ACS-ED didn't just underestimate the number of students. It also overestimated the number of single-race, non-Hispanic AI/AN students in Allegany-Limestone (ACS-ED: 65 students, CCD: 5), and the City of Rochester (ACS-ED: 440 students, CCD: 52). It also showed great variability over 5-year periods. For instance, the ACS-ED estimated that the AI/AN population in Allegany-Limestone changed from 20 students from 2005 – 2009 to an average of 4 students per year for 2010 – 2014 and then increased to 65 students for 2015 – 2019. The uncertainty in the ACS-ED is best understood by examining its margin of error for the 2015 – 2019 estimate (67), not displayed. This suggests that the total number of

[1] The Unkechaug Nation (Poospatuck Reservation) is recognized by the state of New York, but not by the Federal government. Consequently, Unkechaug students are not eligible for the JOM Program.

American Indian and Alaska Native students in the school could just as likely be zero. Similar types are issues are exhibited in the data for the Rochester City School District.

Table 2: Reported Enrollment from the Common Core of Data and Estimated Enrollment American Community Survey – Educational Tabulation Estimated Enrollment Totals for Single-Race, non-Hispanic American Indian and Alaska Native Students by District and Year

School District	CCD: Total 2005 - 2009	ACS-ED: Total 2005 - 2009	CCD: Total 2010 - 2014	ACS-ED Total 2010 - 2014	CCD Total 2015 - 2019	ACS-ED: Total 2015 - 2019
Massena	317	0	319	90	237	90
Salmon River	1022	485	1003	665	946	550
Allegany-Limestone	10	20	8	4	5	65
Cuba-Rushford	3	4	2	0	1	4
Evans-Brant	269	75	300	135	316	185
Gowanda	404	295	291	285	253	280
Randolph	14	15	23	50	39	55
Salamanca City	487	310	487	315	431	330
Silver Creek	157	15	137	60	132	10
Akron	161	190	175	80	167	20
LaFayette	250	25	263	20	283	0
Niagara-Wheatfield	307	260	283	210	245	195
Southampton Union Free	120	45	133	35	120	0
Buffalo City	527	325	397	110	232	125
Niagara Falls City	290	65	234	55	171	75
North Syracuse	124	100	61	15	56	0
Rochester City	109	245	73	345	52	440
Syracuse City	294	250	286	245	220	180
Mean Value	270	151	249	151	217	145

Note: Common Core of Data totals and mean values are based upon author's calculations.

Unreliable Data and Concerns About Disseminating the Results

I was concerned that disseminating the results of these estimates would at best be of little use to administrators, and potentially cause confusion or harm if somehow distributed to the public. Consequently, I decided not to contact administrators and instead turned my focus to producing an analysis that identified those areas with the greatest need for investment to obtain reliable estimates that could then be used to improve resource allocations for AIs/ANs in elementary and secondary schools. Two basic statistics were calculated for each district: the coefficient of variation (CV) and the absolute percentage difference from the CCD. Both of these provide an estimate of the certainty or quality of ACS-ED estimates.

CV uses the margin of error and divides it by the critical z-score for a 90% confidence level and the estimate in order to calculate the percentage of difference an estimate is expected to exhibit. It has been frequently used to assess the reliability of ACS data and can be thought of as the relative standard deviation (Spielman, Folch and Nagle, 2014; Spielman and Folch, 2015; Jurjevich, 2018). In the case of American Indians and Alaska Natives, the estimates tend to be relatively small with a comparatively large margins of error that generate comparatively large CVs. These values are frequently classified according to a standard recommended by the Environmental Systems Research Institute to convey poor, low,

moderate, and high-quality estimates depending upon whether the CV is ≥ 1, between 1 and 0.4, between 0.4 and 0.12, or less than 0.12, respectively (ESRI, 2014).

Since both the ACS-ED and CCD measure the number of single-race, non-Hispanic American Indians and Alaska Natives and the CCD comes from measuring all public-school districts the absolute percentage difference between the two is a measure of the actual error of the ACS-ED estimate. Absolute percentage error has been used to assess the accuracy of ACS data and related estimates (Graves and Gerney, 2018; Baker, Swanson, and Tayman, 2021). Each of these studies calculate the mean absolute percentage error (MAPE) to determine the overall accuracy of an estimate for different observations. To make comparisons easy, I have applied the definitions used for CV to categorize absolute percentage errors. As a result, when the error for the estimate is equal to or greater than the size of the estimate it is determined to be highly inaccurate. Every district where the ACS-ED estimated there are no AI/AN students, but the CCD reports there are AIs/ANs is classified as highly inaccurate. Whereas, those where the error is less than 12% of the estimate size are considered highly accurate. Table 3 presents the results of CV and absolute percentage error calculations for each school district from 2005 – 2019 as well as the AI/AN student totals for 2015-2019 based upon Burnette (2021).

Table 3: Adjusted Student Totals with Reliability and Accuracy Measures by District

School District	2015-2019 Adjusted Student Total AI/AN Alone	2015-2019 Adjusted Student Total AI/AN AOIC	CV 2005-2009	CV 2010-2014	CV 2015-2019	Absolute Percentage Error 2005-2009	Absolute Percentage Error 2010-2014	Absolute Percentage Error 2015-2019
Massena	381	425	.	0.55	0.45	1.00	0.72	0.62
Salmon River	1038	1189	0.23	0.12	0.17	0.53	0.34	0.42
Allegany-Limestone	57	72	0.55	0.76	0.63	0.96	0.47	11.04
Cuba-Rushford	3	3	1.37	.	1.52	0.54	1.00	2.33
Evans-Brant	301	304	0.45	0.31	0.28	0.72	0.55	0.41
Gowanda	328	361	0.25	0.17	0.22	0.27	0.02	0.11
Randolph	43	25	0.73	0.56	0.30	0.07	1.19	0.40
Salamanca City*	391	434	0.17	0.17	0.13	0.36	0.35	0.23
Silver Creek	141	149	1.01	0.64	0.79	0.90	0.56	0.92
Akron*	6	26	0.36	0.50	0.58	0.18	0.54	0.88
LaFayette*	210	210	1.07	0.82	.	0.90	0.92	1.00
Niagara-Wheatfield*	228	238	0.27	0.24	0.33	0.15	0.26	0.20
Southampton Union Free*	69	86	0.45	0.59	.	0.63	0.74	1.00
Buffalo City*	353	354	0.34	0.36	0.50	0.38	0.72	0.46
Niagara Falls City	274	538	0.45	0.50	0.45	0.78	0.77	0.56
North Syracuse*	25	130	0.55	0.73	.	0.20	0.75	1.00
Rochester City	271	417	0.36	0.25	0.28	1.24	3.73	7.49
Syracuse City*	232	410	0.36	0.26	0.30	0.15	0.14	0.18
Mean Value	242	298	0.53	0.44	0.46	0.55	0.77	1.63

Note: All adjusted totals are based upon either the growth of single-race, non-Hispanic AIs/ANs or non-Hispanic AIs/ANs alone or in combination with other races. It should be noted that the purpose of these adjusted totals is to account for the decline in CCD totals that results from the Department of Education limiting its definition of AI/AN from those who predominately identify as AI/AN to single-race, non-Hispanic and CCD totals are not estimates. Consequently, anytime the adjusted total is less than the CCD total the CCD total should be left unadjusted. School districts where the CCD should be left unadjusted are denoted with *.

Especially problematic is the result that nearly half of the adjusted totals deriving from Burnette (2021) are less than the actual value reported by the CCD. Perhaps this shouldn't be surprising given the large percentage error associated with AI/AN estimates. For 2015-2019, the mean absolute percentage error is 1.63. Meaning that the average estimate is just over 61% of the size of its average error. This is largely due to two school districts, Allegany-Limestone and Rochester City. The ACS-ED estimate for Allegany-Limestone is particularly interesting since, it is suggested that the AI/AN student population

decreased from 20 in 2005-2009, to 4 in 2010-2014, and then increased to 65 from 2015-2019 in an area where the district student population exhibited a slight decrease. The CCD reports the district student population to be 1,355 for 2005-2009, 1,198 for 2010-2014, and 1,144 for 2015-2019. By comparison, the ACS-ED estimated the student population to change from 1,205 to 1,120 to 1,105 over the same period. Other districts appear to partially offset these errors as ACS-ED estimates move in the opposite direction for districts like Akron and Niagara-Wheatfield.

The mean CV for ACS-ED estimates range from 0.44 to 0.53 during the period spanning 2005-2019. As a result, estimates from each of the examined time periods are considered low quality according to the ESRI classification scheme when only considering the margin of error determined by the Census. When absolute percentage error is used to assess the accuracy of single-race, non-Hispanic AIs/ANs only one district is found to have an error of less than 12%, Gowanda. In that district, the CCD total would be revised upward from 253 to 328 or 361 depending upon which AI/AN growth rate is used. Overall, the vast majority of school districts, 14 out of 18, are found to have absolute percentage errors of 40% or more. The end result is a determination that estimates of AI/AN student enrollment at the school district level are at too fine of a spatial resolution given the amount of sampling done by the Census to be considered acceptable for research.

Improving Demographic Data to Increase Federal Funding

While it is not currently possible to use the algorithm developed by Burnette (2021) to improve the demographic data for K-12 AI/AN students to increase federal funding, it is possible to identify which school districts are in the greatest need of additional resources to improve upon the quality of estimates used to develop policies impacting K-12 AI/AN students. In addition, it's also possible to develop materials that can be used by Tribal communities and other advocates for K-12 AI/AN students to demonstrate the need for additional resources and reduce data inequality. The lack of data quality concerning AIs/ANs is often discussed, but has not been systematically documented. Using statistics like CV and absolute percentage change can be used to quantify and demonstrate the data inequality experienced by K-12 AI/AN students, their families and their communities. Figure 1 displays the results of mapping these calculations to their school district location for the state of New York.

One striking observation from the graphs of Figure 1 concerns the difference in the number of districts shaded black between for the coefficient of variation and absolute percentage difference from CCD, 492 versus 144. This is the number of districts where the ACS-ED estimates there are no AI/AN students but the individual school district has recorded enrolled AI/AN students. Consequently, the ACS-ED has estimated incorrectly that there are no AIs/ANs in 348 out of the 633 reported districts and missed 1,873 AI/AN students. By comparison, there are no districts where a similar error has been made concerning White students.

The other obvious difference concerns the quality of estimates for AI/AN students versus that for White students. The map of CV values demonstrates the reliability of AI/AN and White student data based upon the Census' own measurement concerning the margin of error. Most notable, is that all the estimates for White students are classified as either high or moderate quality. A stark contrast to AI/AN student data; only 176 out of the 191 estimates (92.1%) are classified as either low or poor quality. This trend is also seen when examining the absolute percentage error from the CCD with 519 out of 539 classified (96.3%) as low or poor quality. Meanwhile, only 24.6% of the 623 estimates for White students were classified as low or poor quality. Combined, these results demonstrate that the data concerning race at the school district level within the ACS-ED have reliability issues that require researchers to

proceed with extreme caution. They also demonstrate that data for AI/AN students are in need of significant improvement via increasing the sample size to ensure equity in explanatory power. The lack of explanatory power and reliability makes it difficult and at times impossible for researchers to conduct analysis at the level required for policy and evaluation.

Collaborating with Tribal Communities

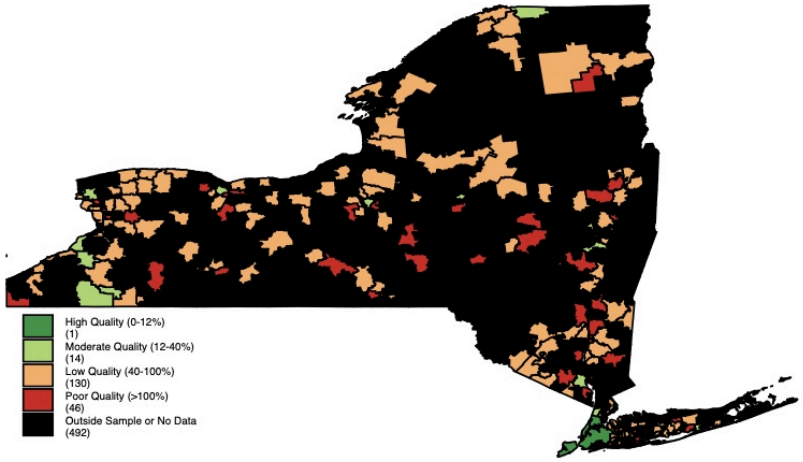
The analysis presented here is currently being expanded and further developed into a new manuscript ": Missing the Next Generation of Native American Scholars: Patterns of Uncertainty and Concerning Data Quality in the ACS-ED, 2005 – 2019". It is anticipated that, within the few weeks, this research article will be disseminated to the National Congress of American Indians, the National Johnson O'Malley Association and the National Indian Education Association with an acknowledgement that it was the result of research supported by a grant from the Public Interest Technology University Network. It will also be submitted to the academic journal, *Applied Geography*, for peer review with the same acknowledgment of support. In my communication with these organizations, I will ask for their feedback and for ways that I may support their advocacy efforts for improving data quality for AIs/ANs.

Project Outcomes

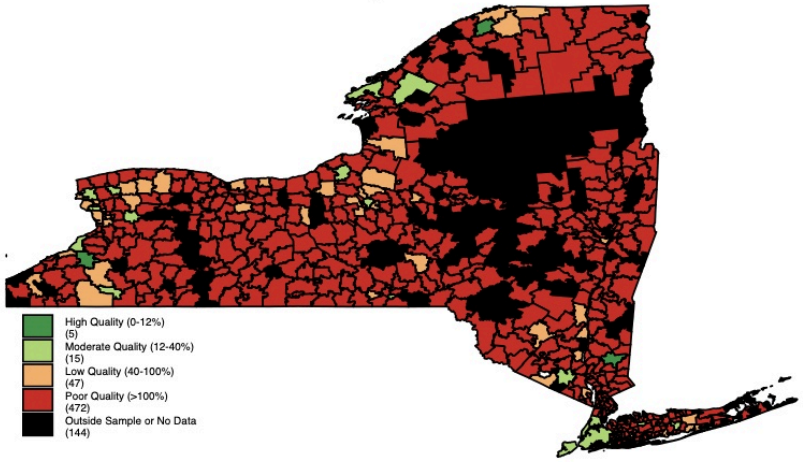
- Identified nine potential school districts without a currently existing JOM Program but with a significant AI/AN population and existing resources devoted to assisting the academic or cultural development of AI/AN students.
- Obtained contact information for administrators of the two existing JOM Programs and for the nine potential new applicants.
- Developed a STATA algorithm that implemented the process developed by Burnette (2021) for estimating American Indian and Alaska Native school-age enrollment totals for all New York state school districts contained in both the American Community Survey – Educational Tabulation (ACS-ED) and Common Core of Data (CCD).
- Obtained an estimate of the American Indian and Alaska Native school-age population (students 3 or older and enrolled in grade 12 or lower) for each school district in New York state contained in both the Common Core of Data and American Community Survey – Educational Tabulation.
- Organized estimates into a user-friendly format.
- Identified reliability issues with ACS-ED data at the district level that generated concerns that providing adjusted enrollment totals would not be helpful to school administrators.
- Developed an analysis that measures the quality of AI/AN population estimates in the ACS-ED at the district level. Ultimately, it identified which school districts are in need of increased sampling by the ACS as well as those providing high quality estimates.
- Began development of a manuscript based upon the analysis conducted that will be disseminated it to the National Congress of American Indians, the National Johnson O'Malley Association, the National Indian Education Association and submitted to the academic journal *Applied to Geography* for peer review.

Figure 1: Reliability and Accuracy of Estimates from the ACS-ED by Race Category and School District

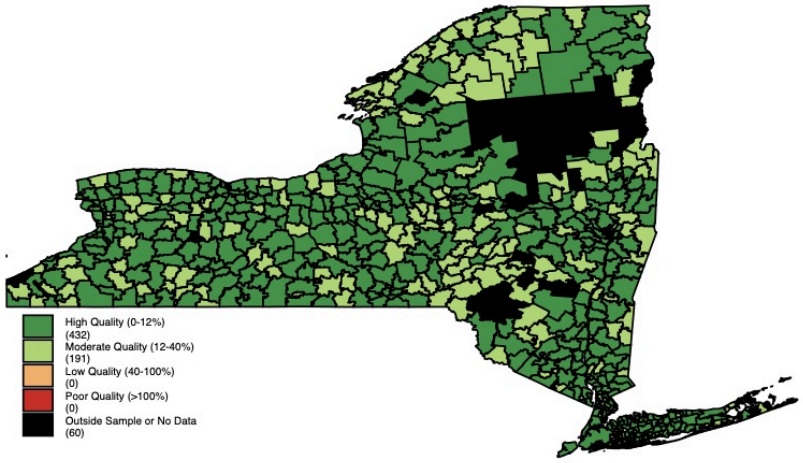
American Indian and Alaska Native Students
Coefficient of Variation



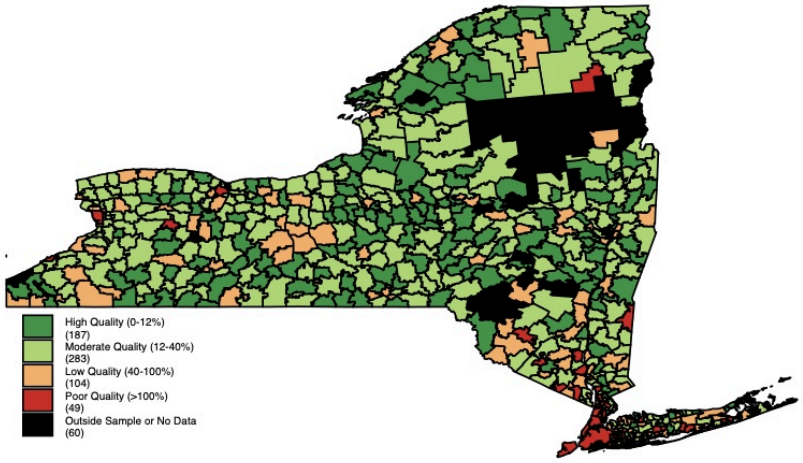
American Indian and Alaska Native Students
Absolute Percentage Difference from CCD



American Indian and Alaska Native Students
Coefficient of Variation



American Indian and Alaska Native Students
Absolute Percentage Difference from CCD



References

Baker, J., Swanson, D., & Tayman, J. (2021). The accuracy of Hamilton–Perry population projections for census tracts in the United States. *Population Research and Policy Review*, *40*(6), 1341-1354.

Burnette, J. D. (2021) Why Is the Total Enrollment of American Indian and Alaska Native Precollegiates Such a Difficult Number to Find? *Journal of American Indian Education*, *60*(1–2), 162–186. https://doi.org/10.5749/jamerindieduc.60.1-2.0162

Environmental Systems Research Institute (ESRI) (2014) The American Community Survey. https://www.esri.com/library/whitepapers/pdfs/the-american-community-survey.pdf. Accessed 21 Dec 2021

Graves, W., & Gerney, B. (2018). Evaluation of commercial demographic data accuracy: Testing for input bias in the location analysis process. *Applied Geography*, *97*, 152-160.

Jurjevich, J. R., Griffin, A. L., Spielman, S. E., Folch, D. C., Merrick, M., & Nagle, N. N. (2018). Navigating statistical uncertainty: How urban and regional planners understand and work with American community survey (ACS) data for guiding policy. *Journal of the American Planning Association*, *84*(2), 112-126.

Spielman, S. E., & Folch, D. C. (2015). Reducing uncertainty in the American Community Survey through data-driven regionalization. *PloS one*, *10*(2), e0115626.

Spielman, S. E., Folch, D., & Nagle, N. (2014). Patterns and causes of uncertainty in the American Community Survey. *Applied Geography*, *46*, 147-157.