Digital Divides and Funding Flexibility: Consequences of Rural Classifications Used for Federal Education Programs

Doug Geverdt & Diane Snediker, U.S. Census Bureau, Education Demographic and Geographic Estimates (EDGE) Program

Abstract: *The Federal Communication Commission's (FCC) E-Rate program increases student access to technology by providing discounts for school districts to purchase telecommunications equipment and services. Districts located in rural areas receive discounts to help address the additional costs and difficulties resulting from geographic location. The E-Rate rural definition is one of three primary rural classifications used by federal education programs, and it offers the most relaxed criteria of the three for classifying rural districts. The definitions used for the U.S. Department of Education's Rural Education Achievement Program (REAP) and the National Center for Education Statistics (NCES) rural locale assignments are less accommodating and provide a more granular approach for classifying variation in rural areas. This analysis uses GIS and federal educational spatial data to compare the classifications used by the three programs. Results indicate that REAP rural eligibility would more than double in many states if the program adopted the relaxed E-Rate criteria. Adopting NCES rural locale classifications for REAP would produce less of an increase than the E-Rate definition, but would provide significantly more opportunity to differentiate and target program discounts to highly rural areas. This analysis reviews the geographic criteria for each program, explains our methods for comparing and analyzing the changes, and discusses the implications of using different classifications for different federal educational initiatives.*

Background: Americans have been concerned about the educational needs of children in rural areas since the nation began. Even before ratifying the U.S. Constitution, the founders made provision for educating generations of children on the frontier through state land ordinances that provided systematic set-asides for schooling. Many current federal education programs share a similar concern and attempt to provide supplemental resources to help address educational challenges associated with rural locations. Although the missions of these programs vary, they share a common administrative need to systematically identify rural schools and school districts. This may seem a simple task given the increasingly easy access to high quality spatial data, but it requires careful consideration of how the programs define rural areas. Different federal education programs rely on different rural definitions depending on the administrative needs and the history of the program. These differences would be insignificant if the definitions produced relatively similar outcomes, but they don't. A school or district that qualifies as rural for one federal education program may not qualify as rural for another. This analysis examines rural definitions used by three of the primary federal programs intended to support rural schools – E-Rate, REAP, and NCES Locales – and it specifically explores how eligibility for REAP would vary if the program adopted the NCES or E-Rate rural criteria.

REAP: The U.S. Department of Education's Rural Education Achievement Program (REAP) is an initiative that targets supplemental resources and provides additional administrative flexibility to schools and school districts that primarily serve rural areas. As part of the 2001 No Child Left Behind Act (a reauthorization of the 1965 Elementary and Secondary Education Act (ESEA)), REAP is the Department's flagship program for supporting rural education. The program includes two subparts – the Small Rural School Achievement program (SRSA) that focuses on rural school districts with less than 600 students, and the Rural Low-Income Schools program (RLS) that focuses on school districts in small towns and rural areas where 40% or more of the students have a family income at or below the poverty level. Unlike the RLIS program that provides assistance for school systems that serve rural areas along with small towns under 25,000, the larger SRSA program is limited to districts that only serve rural areas. The program does not classify rural districts directly, but instead requires that all schools in a district be classified as rural in order for the district to qualify as rural. Districts that qualify for the SRSA program are not only eligible for direct program funds, they also receive a waiver (REAPFlex) that gives the district additional flexibility in spending funds they receive from other federal education programs. REAP rural locale classifications depend on metropolitan area boundaries defined by the Office of Management and Budget (OMB) and urban and rural definitions developed by the Census Bureau. The locale framework used by REAP was originally designed in the mid-1980s, and will likely be revised as part of the next reauthorization of ESEA. The assignments are sometimes referred to as 'metro-centric' locale assignments because of the central role that metropolitan areas play in the assignment criteria. See Table 1 for REAP rural classifications.

E-RATE: The Federal Communication Commission's (FCC) E-Rate program was authorized by Congress as part of the Telecommunications Act of 1996 to help schools and libraries acquire telecommunications equipment and services needed to serve their students and communities. Institutions receive discounts ranging from 20% to 90% of the price of eligible services based on the location of the institution and the poverty status of the communities they serve. Schools and libraries in rural areas with high poverty levels receive larger discounts than institutions located in urban areas with lower levels of poverty. In 2014 the FCC reviewed and revised various parts of the program, including the definitions for urban and rural areas. The final E-Rate modernization plan implemented two changes that significantly affected the classification of rural schools and districts. First, the FCC replaced its 1997 metropolitan-based geographic framework with a new definition based loosely on the Census Bureau's urban area concept. E-Rate's new criteria define rural as all territory outside of Census Urbanized Areas and outside of Urban Clusters with a population of 25,000 or more. Urbanized Areas are large urban cores with a population of 50,000 or more, and Urban Clusters are small urban cores with a population less than 50,000 but greater than 2,500. About 92% of all Urban Clusters have a population less than 25,000. The second significant change adopted by the program was a shift in the unit of eligibility from schools to school districts. This shift streamlined the application process and provided greater flexibility for applicants, but it also created a new need to classify school districts. Because a school district may operate schools in both urban and rural areas, and a single program discount level needs to apply to the whole district, the FCC opted to classify the district based on a simple majority of school assignments. If most of the schools in a district are rural, then the district is classified as rural, and all schools in the district are treated as rural for discount purposes regardless of their actual location. See Table 1 for the E-Rate rural classification.

NCES: The U.S. Department of Education's National Center for Education Statistics (NCES) develops and applies a geographic locale indicator to all schools, school districts, and post-secondary institutions in the U.S. to support educational research and program administration. Unlike E-Rate and REAP, NCES does not provide discounts or funding to schools. Instead, as a statistical agency, NCES depends on locale indicators to develop nationally representative samples of schools and students from different types of geographic areas. The locale assignments are included in NCES surveys as a core institutional characteristic, and they are regularly used to disaggregate data and analyze social and educational conditions. The NCES locale framework is composed of four basic types (City, Suburban, Town, and Rural) that each contains three subtypes differentiated by population size and/or proximity to urban areas (see Figure 1). Rural subtypes are disaggregated into Fringe, Distant, or Remote depending on distance to Urbanized Areas and Urban Clusters. The NCES locale classifications rely on standard 2010 Census urban definitions, and can be fully collapsed into a basic urban/rural dichotomy or expanded into a more detailed collection of twelve distinct categories. NCES locale assignments are sometimes referred to as 'urban-centric' locale assignments because of the central role that urban areas play in the assignment criteria. Unlike REAP and E-Rate, NCES district locale assignments are based primarily on enrollment-weighted majority school assignments. See Table 1 for NCES rural locale classifications.

Table 1. Federal Education Program Rural Classifications and Criteria

REAP Classifications	
Rural, Outside Metropolitan Area (7)	Any incorporated place, Census-designated place, or non-place territory not within a metropolitan area and defined as rural by the Census Bureau.
Rural, Inside Metropolitan Area (8)	Any incorporated place, Census-designated place, or non-place territory within a metropolitan area and defined as rural by the Census Bureau.
E-Rate Classifications	
Rural	All territory outside of Census Urbanized Areas and outside of Urban Clusters with a population or 25,000 or more.
NCES Classifications	
Rural-Fringe (41)	Census-defined rural territory that is less than or equal to 5 miles from an Urbanized Area, as well as rural territory that is less than or equal to 2.5 miles from an Urban Cluster.
Rural-Distant (42)	Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an Urbanized Area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an Urban Cluster.
Rural-Remote (43)	Census-defined rural territory that is more than 25 miles from an Urbanized Area and is also more than 10 miles from an Urban Cluster.

Research Questions: E-Rate, REAP, and NCES provide important and widely used definitions for rural schools. Changes to these classifications and criteria could significantly affect the ability of districts across the U.S. to access supplemental resources intended to support students in rural areas. The purpose of this study was to compare the definitions used by the three educational programs and identify how program eligibility or program classifications would differ based on each definition. More specifically, we asked:

1. How does the distribution of urban and rural schools and school districts compare across programs?

2. Since each program uses a different method to determine school district assignments (i.e., REAP requires all rural, E-Rate requires majority rural, and NCES locales use an enrollment-weighted majority), and each method has the potential to include some rural schools in non-rural school districts, how many rural schools are located in rural districts? How many are not located in rural districts?

3. How would the volume and distribution of REAP rural school districts be affected if the REAP program adopted the NCES rural locale criteria? Would the change affect all states equally, or would some states be more affected than others? Likewise, how would the volume and distribution of REAP rural school districts be affected if the program adopted the E-Rate rural criteria instead? Would the change affect all states equally, or would some states be more affected than others?

FIGURE 1. NCES LOCALE CLASSIFICATIONS

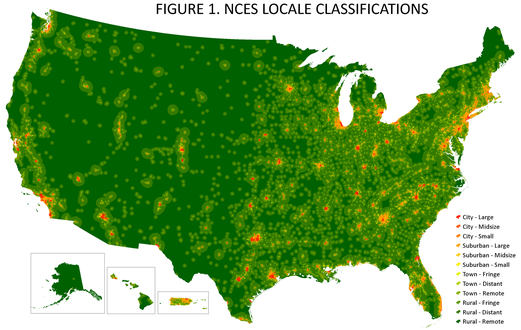


FIGURE 2. RURAL CHANGE IF REAP ADOPTED NCES CRITERIA

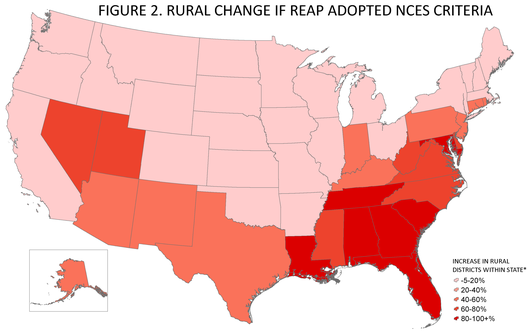


FIGURE 3. RURAL CHANGE IF REAP ADOPTED E-RATE CRITERIA

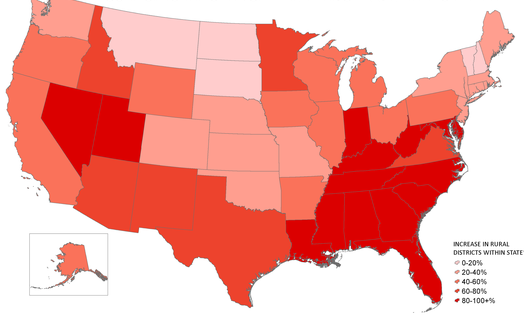


Table 2. Percent Distribution of Urban and Rural Schools and Districts by Program

	Total	REAP				NCES				E-Rate			
		Rural		Urban		Rural		Urban		Rural		Urban	
		Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
Schools	104,535	27,878	26.67	76,657	73.33	28,539	27.30	75,996	72.70	40,029	38.29	64,506	61.71
Rural Schools in Rural Districts		16,633	59.66			22,370	78.38			34,893	87.17		
Rural Schools in Non-Rural Dis-		11,245	40.34			6,169	21.62			5,136	12.83		
Districts	17,645	6,826	38.69	10,819	61.31	7,968	45.16	9,677	54.84	10,149	57.52	7,496	42.48

Table 3. Distribution of Urban/Rural School Districts by State and Program

STATE	REAP URBAN	REAP RURAL	NCES URBAN	NCES RURAL	ERATE URBAN	ERATE RURAL	PCT NCES RURAL	PCT REAP RURAL	PCT ERATE RURAL	REAP TO NCES RURAL (%)	REAP TO ERATE RURAL (%)
AK	22	32	6	48	3	51	88.89	59.26	94.44	50.00	59.38
AL	154	19	99	74	68	105	42.77	10.98	60.69	289.47	452.63
AR	134	141	118	157	58	217	57.09	51.27	78.91	11.35	53.90
AZ	554	129	524	159	467	216	23.28	18.89	31.63	23.26	67.44
CA	794	310	735	369	630	474	33.42	28.08	42.93	19.03	52.90
CO	75	110	72	113	37	148	61.08	59.46	80.00	2.73	34.55
CT	145	53	131	67	132	66	33.84	26.77	33.33	26.42	24.53
DC	63	1	63	1	63	1	1.56	1.56	1.56	0.00	0.00
DE	46	4	44	6	40	10	12.00	8.00	20.00	50.00	150.00
FL	65	9	56	18	41	33	24.32	12.16	44.59	100.00	266.67
GA	164	49	115	98	68	145	46.01	23.00	68.08	100.00	195.92
HI	1	0	1	0	1	0	0.00	0.00	0.00	0.00	0.00
IA	127	220	104	243	34	313	70.03	63.40	90.20	10.45	42.27
ID	83	73	69	87	39	117	55.77	46.79	75.00	19.18	60.27
IL	643	325	613	355	456	512	36.67	33.57	52.89	9.23	57.54
IN	277	122	237	162	173	226	40.60	30.58	56.64	32.79	85.25
KS	109	186	96	199	36	259	67.46	63.05	87.80	6.99	39.25
KY	114	63	89	88	48	129	49.72	35.59	72.88	39.68	104.76
LA	124	13	104	33	83	54	24.09	9.49	39.42	153.85	315.38
MA	342	69	331	80	316	95	19.46	16.79	23.11	15.94	37.68
MD	24	1	15	10	14	11	40.00	4.00	44.00	900.00	1000.00
ME	65	133	43	155	31	167	78.28	67.17	84.34	16.54	25.56
MI	612	308	575	345	478	442	37.50	33.48	48.04	12.01	43.51
MN	338	221	298	261	197	362	46.69	39.53	64.76	18.10	63.80
MO	219	351	204	366	112	458	64.21	61.58	80.35	4.27	30.48
MS	102	60	72	90	31	131	55.56	37.04	80.86	50.00	118.33
MT	77	345	67	355	25	397	84.12	81.75	94.08	2.90	15.07
NC	215	65	170	110	147	133	39.29	23.21	47.50	69.23	104.62
ND	47	178	47	178	20	205	79.11	79.11	91.11	0.00	15.17
NE	79	201	71	209	35	245	74.64	71.79	87.50	3.98	21.89
NH	74	112	69	117	58	128	62.90	60.22	68.82	4.46	14.29
NJ	596	85	570	111	571	110	16.30	12.48	16.15	30.59	29.41
NM	99	52	87	64	60	91	42.38	34.44	60.26	23.08	75.00
NV	14	5	11	8	5	14	42.11	26.32	73.68	60.00	180.00
NY	716	290	680	326	604	402	32.41	28.83	39.96	12.41	38.62
OH	832	285	795	322	697	420	28.83	25.51	37.60	12.98	47.37
OK	172	374	152	394	70	476	72.16	68.50	87.18	5.35	27.27
OR	100	100	92	108	52	148	54.00	50.00	74.00	8.00	48.00
PA	580	178	533	225	483	275	29.68	23.48	36.28	26.40	54.49
PR	1	0	1	0	1	0	0.00	0.00	0.00	0.00	0.00
RI	48	9	45	12	45	12	21.05	15.79	21.05	33.33	33.33
SC	72	28	47	53	33	67	53.00	28.00	67.00	89.29	139.29
SD	31	128	29	130	7	152	81.76	80.50	95.60	1.56	18.75
TN	113	28	65	76	34	107	53.90	19.86	75.89	171.43	282.14
TX	748	492	603	637	419	821	51.37	39.68	66.21	29.47	66.87
UT	125	17	115	27	101	41	19.01	11.97	28.87	58.82	141.18
VA	144	76	112	108	88	132	49.09	34.55	60.00	42.11	73.68
VT	35	201	43	193	12	224	81.78	85.17	94.92	-3.98	11.44
WA	165	150	158	157	107	208	49.84	47.62	66.03	4.67	38.67
WI	235	217	211	241	127	325	53.32	48.01	71.90	11.06	49.77
WV	34	23	20	37	14	43	64.91	40.35	75.44	60.87	86.96
WY	28	33	23	38	9	52	62.30	54.10	85.25	15.15	57.58

FIGURE 4. DISTRIBUTION OF RURAL SCHOOL DISTRICTS - REAP

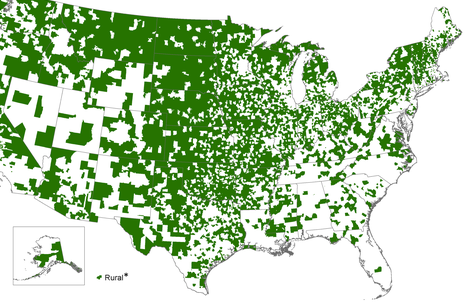


FIGURE 5. DISTRIBUTION OF RURAL SCHOOL DISTRICTS - NCES

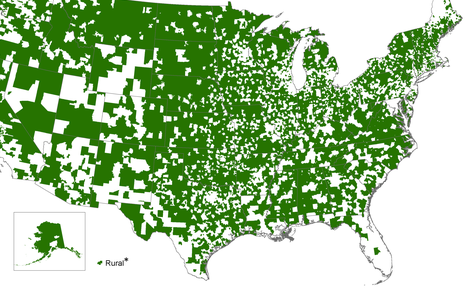
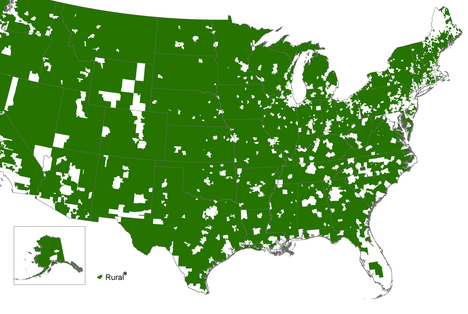


FIGURE 6. DISTRIBUTION OF RURAL SCHOOL DISTRICTS - ERATE



Methods and Data: Our analysis relied on a simple comparison of school locations relative to the urban/rural definitions used for each program, and it involved four primary steps and data sources. First, we created a shapefile of point locations for all public schools in the U.S. based on data available from the National Center for Education Statistics' (NCES) 2013-2014 Common Core of Data (CCD) school file. Each school included a unique school district identifier that facilitated district-level and state-level analysis. Second, we constructed a shapefile of E-Rate urban and rural areas for the U.S. based on the Census Bureau's 2014 TIGER/Line urban area layer. Since E-Rate classifies all Urban Clusters with population under 25,000 as rural, we joined this layer with a table of urban area population counts from the 2010 Census, and removed all Urban Clusters that failed to meet the population threshold. Third, we identified REAP boundaries using the REAP locale boundary layer developed for NCES by the Census Bureau's Education Demographic and Geographic Estimates program. These boundaries will be released for the first time in spring 2015, and they were constructed from 2014 TIGER/Line data for metropolitan areas, urban areas, and places. Place-level population (to determine city and town size thresholds) was based on 2014 estimates from the Census Bureau's population estimates program. Lastly, we represented NCES locale boundaries using the NCES locale boundary layer. Like the REAP layer, the NCES locale layer was developed for NCES by the Census Bureau to support research and analysis, and will be released for the first time in spring 2015. The NCES locale layer was constructed from 2014 TIGER/Line urban and place boundaries. We spatially joined school points to the E-Rate, REAP, and NCES locale boundaries, and retained urban/rural assignments for each of the program layers. We then aggregated this information to the school district level and applied the applicable program criteria to create final district-level urban/rural assignments. Once the final school and district files were prepared, we used SAS, ArcGIS, and Excel to compare, review, and summarize results for schools, districts, and states.

Results – National-level Differences: Differences in rural definitions resulted in substantial differences in school and district-level assignments. At the school level, the inclusion of small urban clusters in the E-Rate rural definition resulted in 38% of schools being identified as rural, while the more traditional definitions of rural shared by NCES and REAP resulted in both programs classifying about 27% of schools as rural (see Table 2). Differences become more pronounced at the district level where 39% of districts were defined as rural by REAP, 45% were defined as rural by NCES, and 58% were defined as rural by E-Rate. In practical program terms, the results suggest that if the REAP program adopted the E-Rate rural definition, geographic eligibility for the REAP program would increase by 49%. These district-level differences reflect equally important differences in school assignments within districts. While 87% of rural schools are included in rural districts under E-Rate, only 60% of rural schools defined by REAP are included in rural districts. In other words, about 40% of all schools classified as rural under REAP are located in districts that do not qualify as rural for the REAP program. This district-school discrepancy is substantially lower for E-Rate, but even the FCC's more relaxed definitions result in more than 5,000 rural schools being located in majority non-rural districts that are ineligible for rural discounts.

Results – State-level Differences: Differences in program definitions resulted in a variety of differences between states, but the state-level analysis revealed two dominant findings. First, different definitions have a profound impact on the classification of rural districts and their subsequent eligibility for program resources. As expected, the REAP criteria offer consistently more restrictive rural classifications for states relative to the NCES and E-Rate criteria. If the REAP program adopted E-Rate rural criteria for program eligibility, 13 states would see their number of eligible rural districts increase by more than 100%, and in some cases more than 200% (see Table 3). More than half of all states would increase their number of REAP-rural districts by more than 50%, while states that were already heavily rural – like Montana, North Dakota, New Hampshire, and Vermont – would experience smaller increases of 10-20%. The second critical finding is that different program definitions have clear regional effects (see Figures 5 and 6). One of the significant effects of REAP's all rural criterion is that it imposes a heavier burden on larger districts. Large, geographically heterogeneous districts may have a sufficient number of rural schools to qualify as rural for E-Rate, or a sufficient number of students in rural schools to qualify as rural for NCES locales, but a single non-rural school is sufficient to disqualify a district from rural eligibility for REAP. This would perhaps be a minor issue if school districts in the U.S. were randomly distributed by size, but school district geographic structure has distinct regional differences. Most notably, school districts in the mid-Atlantic and southern states (as well as Nevada and Utah) tend to conform to county or city boundaries. As a consequence, the average physical size of districts in these states tends to be relatively large. The influence of district size on program eligibility is clearly evident in Figure 6. Of the 13 states that would increase their REAP rural districts by 100% or more under the E-Rate rural criteria, 12 are states with county-based districts.

Conclusions: Federal education programs rely on different rural definitions depending on the administrative needs and history of the program, and the differences in rural criteria have different effects for funding and program eligibility. Each of the programs leaves some rural schools behind when developing district-level rural assignments, but this partly reflects the objectives and priorities of the programs. E-Rate is a large, well-funded program with a broad mission to bring much-needed telecommunication infrastructure to disadvantaged communities throughout the U.S. Therefore the criteria to receive rural discounts are relatively broad and inclusive. REAP is much smaller rural-centric program with a fraction of the funding (relative to E-Rate). Therefore the program relies on a more restrictive definition to help target its limited resources. These differences pose mixed incentives for current and potential program participants with regard to REAP reauthorization. On one hand, districts that are not currently eligible for REAP may advocate for a reauthorized program to adopt the rural criteria recently implemented by E-Rate. This would create consistency between the programs and make substantially more districts eligible for REAP, but it would also dilute very limited program funds and make it more difficult to identify and serve those rural districts that are most geographically challenged. The NCES locales occupy a middle-ground. They produce more rural districts, cover more rural schools and students, and do more to mitigate regional issues than REAP, but notably less than E-Rate. They also provide flexibility to craft potential alternatives to the seemingly contrary inclusive-exclusive program dilemma. For example, REAP could extend no-cost REAPFlex authority to all districts that serve NCES towns and/or rural areas (which would be slightly broader than E-Rate, since it would include all Urban Clusters), but use the rural subtypes (Remote, Distant, Fringe) to target program funds to districts based on a tiered approach that reflects the highest level of geographic need. Regardless of REAP reauthorization, this analysis demonstrates that geographic definitions indeed impact federal education programs, and researchers and policy makers would do well to carefully consider geographic criteria in their analyses and program plans.

* Insets are not included for Hawaii and Puerto Rico because they function as single school districts for program purposes and are both classified as urban districts.

United States Census Bureau

The purpose of this analysis is to promote research and discussion. The views expressed are those of the authors and do not necessarily represent of the views of the U.S. Census Bureau.