Geospatial Mapping & Student Success: Breaking Barriers & Building Community

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Data... Insight... Impact
What Are The Barriers That Separate Us?
A Sense Of Disadvantage & Despair
Geospatial Mapping

Geospatial mapping is an approach to applying statistical analyses, data visualization, and other analytic techniques to data that have geographical dimensions.

We have focused on major educational issues around equity, educational achievement and attainment, early childhood, health, juvenile justice, economic development and inter-generational poverty.

• Geospatial Mapping approaches make these variables obvious and easier to understand in the specific context of educational achievement.

• Some authors (e.g. Hogrebe & Tate, 2012) argue that a geospatial perspective is essential in developing a type of visual political literacy in the areas of education, health and human services.
Mapping Is Powerful

• Geospatial mapping is an important tool for policy development because:
  o images, illustrations, and graphic representations strongly support learning, understanding and other aspects of cognition
  o maps have long been useful in engaging multiple groups in civic debates and other political discussions because they can be used as planning tools.
• Geospatial mapping is used extensively in other fields including health and human services, natural resources, public safety, defense, and urban and regional planning.
• The data in the maps are immediately accessible to a wide range of audiences including policy-makers, community members, educators, students, and parents.
• Maps are powerful conversation starters. Everybody sees something different in the maps based on their perspectives and experiences.
• Maps equalize the conversations among different groups at the table. People want to know what others think!
How We Use Mapping and Data Visualization

- **Advocacy**: Our assumptions and arguments
  - Education, Statesmanship, and The Civic Debate
  - A C i l d’ C a n c e For S u c c e

- **Description**: Making the data accessible to all audiences
  - Painting the picture of urgency
  - Identifying risk, needs, and assets

- **Analysis**: Making sense of the data
  - Identifying gaps in resources
  - Setting priorities
  - Measuring impact

- **Action**: Using data for change
  - Strengthening public engagement and civic debate
  - Focus the narrative on success and opportunity
  - Developing policy
  - Creating the basis for mutual accountability
Education, Statesmanship And The Civic Debate

“...wherever the people are well informed, they can be trusted with their own government...If a nation expects to be ignorant and free, in a state of civilization, it expects what never was and never will be.”

Thomas Jefferson

“A good leader can engage in a debate frankly and thoroughly, knowing that at the end he and the other side must be closer, and thus emerge stronger.”

Nelson Mandela

“To save man from the morass of propaganda, in my opinion, is one of the chief aims of education. Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction.’

Martin Luther King
• **Early Foundations**
  – Family income: Percent of children in families with incomes at least 200% of poverty level
  – Parental education: Percent of children with at least one parent with a postsecondary degree
  – Parental employment: Percent of children with at least one parent working full time and year-round
  – Linguistic integration: Percent of children whose parents are fluent English speakers

• **School Years**
  – Preschool enrollment: Percent of 3- and 4-year-olds enrolled in preschool
  – Kindergarten enrollment: Percent of eligible children enrolled in kindergarten programs
  – 4th grade reading: Percent of 4th grade public school student “proficient” on NAEP
  – 8th grade math: Percent of 8th grade public school student “proficient” on NAEP
  – High school graduation: Percent of public high school students who graduate with a diploma
  – Young adult (18 – 24) education: Percent of young adults (18 – 24) enrolled in postsecondary education or with a degree

• **Adult Outcomes**
  – Adult educational attainment: Percent of adults (25 – 64) with a 2- or 4-year postsecondary degree
  – Annual income: Percent of adults (25 – 64) with incomes at or above national median
  – Steady employment: Percent of adults (25 – 64) in labor force working full time and year-round

A Child’s Chance For Success: Impact On Generations That Follow For Better Or Worse

Early Foundations
- Family income
- Parental education
- Parental employment
- Linguistic integration

School Years
- Preschool enrollment
- Kindergarten enrollment
- 4th grade reading
- 8th grade mathematics
- High school graduation
- Young adult [18-24] education

Adult Outcomes
- Adult educational attainment
- Annual income
- Steady employment

New Mexico Children's Chances For Success Are Among The Worst In The Nation, 2013

2013 Quality Counts Children’s Chances For Success Index is based on measures of Family Status, Progress Through School, and Adult Outcomes.

Early Foundations: Teen Births Per 1000, 2009

School Years: High School Graduation Rates, By State 2009-2010

Source: National Center for Education Statistics, Public School Graduates and Dropouts from the Common Core of Data: School Year 2009 – 2010
School Year New Mexico’s College Graduation Rate Are Among The Worst In The Nation

The 2009 six-year graduation rates of bachelor degree students by state for the entering cohort of 2003. The average college graduation rate for the U.S. is 55.5%.

This map shows percent of population that is not in the labor force or attending school, with no degree beyond high school.

Colors indicate distance from national mean with redder states having higher rates of unemployed persons not attending school or having beyond a high school degree.

Source: Annie E. Casey Foundation, KIDS COUNT Data Center, [www.kidscount.org](http://www.kidscount.org)
As Go Our Children, So Goes Our Community
Focusing on New Mexico’s Critical Areas of Concern

“Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction.”
Percentage of Birth Mothers Without a High School Diploma, by New Mexico School District

Research has shown a link between parental education levels and child outcomes such as educational achievement and attainment.

Source: New Mexico Birth Certificate Database, Bureau of Vital Records and Health Statistics, New Mexico Department of Health. Taken from New Mexico Community Data Collaborative. 2012.
3rd Grade Reading Proficiency, by Ethnic Group

Source: New Mexico Public Education Department, NMSBA Proficiencies By Grade, All Students, School Year 2011-2012.
Source: Albuquerque Public Schools, RDA Department, 2011-2012 School Year. A student is identified as a Habitual Truant when the student has accumulated 10 or more days of unexcused absences.
Percentage Of APS Middle School Students Who Were Habitually Truant In 2011-2012

Source: Albuquerque Public Schools, RDA Department, 2011-2012 School Year. A student is identified as a Habitual Truant when the student has accumulated 10 or more days of unexcused absences.
Percentage Of APS High School Students Who Were Habitually Truant In 2011-2012

Source: Albuquerque Public Schools, RDA Department, 2011-2012 School Year. A student is identified as a Habitual Truant when the student has accumulated 10 or more days of unexcused absences.
Early Warning Indicator:
Percentage Of APS Students Entering 9th Grade With One or More F Grades And 5 Or More Absences In 8th Grade Core Courses

Source: Albuquerque Public Schools, School Max, 2011-2012 School Year. Data provided by APS RDA Department. Analysis performed by CEPR.
Percentage Of Middle School Students Who Seriously Considered Attempting Suicide

Source: New Mexico Youth Risk and Resiliency Survey, 2009, New Mexico Departments of Health and Public Education and U.S. Centers for Disease Control and Prevention (CDC). Students were asked, “During the past 12 months, did you ever seriously consider attempting suicide?” The percentage reported reflect respondents who answered “yes.”
Percentage Of High School Students Who Were In A Physical Fight On School Property

Source: New Mexico Youth Risk and Resiliency Survey, 2009, New Mexico Departments of Health and Public Education and U.S. Centers for Disease Control and Prevention (CDC). Students were asked, "During the past 12 months, how many times were you in a physical fight on school property?" The percentage reported reflects respondents who answered one or more times.
Counties shaded green have rates below the national average of 7.6. Counties shaded orange have rates above the national average but below the state average of 18.3. Counties shaded red have rates above both the state and national averages.

Source: New Death Certificate Database, Bureau of Vital Records and Health Statistics, New Mexico Department of Health. The suicide rate for each county is averaged over the time period 2003 to 2012 and includes all New Mexico residents, ages 15-19. The national average is based on data from the Centers for Disease Control and Prevention over the time period 1999 to 2007 and includes all youth, ages 15-19.
Percentage of 16-19 Year Olds Not in School or Labor Force, By County

National average = 5.4%
State Average = 7.6%

Source: U.S. Census, American Community Survey 2008-2012, 5-Year Estimates. Table B14005. SEX BY SCHOOL ENROLLMENT BY EDUCATIONAL ATTAINMENT BY EMPLOYMENT STATUS FOR THE POPULATION 16 TO 19 YEARS
Source: U.S. Census Bureau American Community Survey 5-Year Estimates 2007 – 2011, Table S1501, Percentage Less than high school graduate.
Educational Attainment In Central New Mexico
Adults 25 And Over, With An Associate’s Bachelor’s Or Graduate Degree, 2011

Source: U.S. Census, American Community Survey 2011, 5-Year Estimates
How Does Albuquerque Compare to Other Communities?

Percentage of the Population, 25-64 Years of Age, With an Associate's Degree or Higher

San Jose-Sunnyvale-Santa Clara, CA Metro Area 54.3%
Raleigh-Cary, NC Metro Area 52.5%
Seattle-Tacoma-Bellevue, WA Metro Area 48.1%
Austin-Round Rock-San Marcos, TX Metro Area 47.3%
Colorado Springs, CO Metro Area 46.1%
Portland-Vancouver-Hillsboro, OR-WA Metro Area 43.6%
Salt Lake City, UT Metro Area 40.3%
Ogden-Clearfield, UT Metro Area 40.2%
Tucson, AZ Metro Area 38.6%
Albuquerque, NM Metro Area 38.0%
Oklahoma City, OK Metro Area 35.4%
Tulsa, OK Metro Area 35.3%
Reno-Sparks, NV Metro Area 35.2%
Las Vegas-Paradise, NV Metro Area 29.6%
El Paso, TX Metro Area 27.8%
McAllen-Edinburg-Mission, TX Metro Area 20.9%

This powerful map by the Joint Center For Political and Economic Studies shows that life expectancy can vary by 28 years depending on where one lives in Bernalillo County.

Source: Map produced by Joint Center For Political and Economic Studies (September, 2012) Place Matters For Health In Bernalillo County: Ensuring Opportunities For Good Health For All.
Identifying Gaps In Resources
Percentage Of Albuquerque High School Students Who Have Had Sexual Intercourse

Source: New Mexico Youth Risk and Resiliency Survey, 2009, New Mexico Departments of Health and Public Education and U.S. Centers for Disease Control and Prevention (CDC). Students were asked, “During your life, with how many people have you had sexual intercourse?” The percentage reported here reflects respondents who answered one or more people.
Source: New Mexico Community Data Collaborative. The rates shown here reflects the average number of children per 1000 women born to teen mothers (ages 15-19) between 2001 and 2005. Rates are reported by census tract; high school boundaries are overlaid to provide perspective. In 2005, the statewide teen birth rate was 62 per 1000, and the nationwide rate was 40 per 1000 (Kids Count Data Center, http://datacenter.kidscount.org).
Capacity of 4- and 5-Star Licensed Child Care Centers in Albuquerque

Source: New Mexico Community Data Collaborative, December 2010. Enrollment data are reported by program site. Elementary school boundaries are overlaid to provide perspective.
Exploring Visual Correlations
Relationship Between Elementary Grades And Elementary Student Mobility

What is going on with these schools?

Elementary School Grades

A
B
C
D
F

Elementary School Mobility

5.2% - 12.7%
12.8% - 19.2%
19.3% - 25%
25.1% - 33%
33.1% - 53.2%

Grey outlines show elementary school attendance boundaries.

Source: School grades from New Mexico Public Education Department website
Are These Schools Beating the Odds?
Graduation Rate > 70%, Remediation Rate At UNM < 30%, Child Poverty > 30%

<table>
<thead>
<tr>
<th>High School</th>
<th>Total School Enrollment (2011-2012)</th>
<th>Graduation Rate</th>
<th>Remediation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaparral High</td>
<td>1,080</td>
<td>77.8%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Logan High</td>
<td>127</td>
<td>86.6%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Magdalena High</td>
<td>127</td>
<td>72.9%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Mosquero High</td>
<td>27</td>
<td>98.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Tularosa High</td>
<td>273</td>
<td>86.5%</td>
<td>14.3%</td>
</tr>
</tbody>
</table>

Percent of Children in Poverty in District
- 0% - 10%
- 11% - 21%
- 22% - 30%
- 31% - 39%
- 40% - 51%
Setting Priorities
Child Maltreatment Risk Factors And Opportunity Mapping In Bernalillo County

The CDC has identified several factors related to high risk for child maltreatment. The following maps show areas where risks for these factors are lower and higher in Bernalillo County. The goal is to introduce a possible technique for identifying neighborhoods that may benefit from resources.

- The best opportunity for children to grow up without becoming victims of maltreatment include:
  - Having parents with higher education levels;
  - Living in a household with 2 parents;
  - Living in a household with income above poverty level;
  - Living in a household with fewer dependent children;
  - Living in neighborhoods with low unemployment;
  - Living in neighborhoods where people have lived at least a year in the same house;
  - Living in neighborhoods with a lower density of alcohol outlets.

Where are these areas in Bernalillo County?

Source: http://www.cdc.gov/violenceprevention/childmaltreatment/riskprotectivefactors.html
Individual Child Maltreatment Risk Mitigation Factors

Education Greater Than AA Degree  Few Single Parent Households  Few Families Living Under Poverty Level

Low Residential Mobility  Low Unemployment  Smaller Family Size  Few Alcohol Licenses

Source: Unemployment, family size, single parent household, household mobility, family poverty model input layers from the U.S. Census Bureau, 2010 Decennial Census, census tract level. Alcohol license data from New Mexico Community Data Collaborative, compiled by New Mexico Department of Health.
Opportunity For A Safe Childhood

Based on the CDC factors, tracts with a higher score have fewer child maltreatment indicators.

Opportunity Score
- High
- Moderately high
- Average
- Moderately low
- Low

Source: Unemployment, family size, single parent household, household mobility, family poverty model input layers from the U.S. Census Bureau, 2010 Decennial Census, census tract level. Alcohol license data from New Mexico Community Data Collaborative, compiled by New Mexico Department of Health.
Using The Maps To Address Issues Of Community Equity: Where Are The Hispanic Children In Relation To Opportunity?

This map clearly shows the concentration of Hispanic children under the age of 5 in lower opportunity areas.

**Opportunity Score**
- High
- Moderately high
- Average
- Moderately low
- Low

**Number of Hispanic Children Under Age 5**
- 4 - 85
- 86 - 185
- 186 - 325
- 326 - 525
- 526 - 761

Source: Unemployment, family size, single parent household, household mobility, family poverty model input layers from the U.S. Census Bureau, 2010 Decennial Census, census tract level. Alcohol license data from New Mexico Community Data Collaborative, compiled by New Mexico Department of Health.
Measuring Impact
Percentage Of APS High School Students Who Were Habitually Truant In 2011-2012

Source: Albuquerque Public Schools, RDA Department, 2011-2012 School Year. A student is identified as a Habitual Truant when the student has accumulated 10 or more days of unexcused absences.
Change in Percentage of APS High School Students Who Were Habitually Truant 2010-2011 To 2011-2012

Source: Albuquerque Public Schools, RDA Department. A student is identified as a Habitual Truant when the student has accumulated 10 or more days of unexcused absences.
According to the Alliance for Excellent Education, there are nearly 2000 high schools nationally that graduate less than 60% of their students within four years. These schools disproportionately produce 51% of the nation’s dropouts.

APS has four high schools with less than a 60% graduation rate.

Source: NM Public Education Department, 4-Year Cohort High School Graduation Rate, Class of 2012. Alliance for Excellent Education statistics taken from http://www.all4ed.org/about_the_crisis/schools/dropout.
Change in APS High School Graduation Rate 2010-2011 To 2011-2012

Data Not Available

Source: NM Public Education Department, 4-Year Cohort High School Graduation Rate.
What Are The Bridges That Need To Be Built Among Australians?

What Data Are Available?

What Data Could Be Used To Build Those Bridges?
Table 1  Definition of ARIA Geographic Areas and Location Examples

<table>
<thead>
<tr>
<th>ARIA Classes</th>
<th>Geographic area</th>
<th>Definition of classification</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly</td>
<td>Major Cities areas</td>
<td>Geographic distance imposes minimal restriction upon accessibility to the widest range of goods, services and opportunities for social interaction.</td>
<td>Canberra (VIC) Cessnock (NSW)</td>
</tr>
<tr>
<td>Accessible</td>
<td>Inner Regional areas</td>
<td>Geographic distance imposes some restriction upon accessibility ……</td>
<td>Coffs Harbour (NSW)</td>
</tr>
<tr>
<td>Moderately</td>
<td>Outer Regional areas</td>
<td>Geographic distance imposes a moderate restriction upon accessibility ……</td>
<td>Quondong (NSW)</td>
</tr>
<tr>
<td>Accessible</td>
<td>Remote areas</td>
<td>Geographic distance imposes a high restriction upon accessibility ……</td>
<td>Buckleboo (SA)</td>
</tr>
<tr>
<td>Very Remote</td>
<td>Very Remote areas</td>
<td>Geographic distance imposes the highest restriction upon accessibility ……</td>
<td>Mimili (SA)</td>
</tr>
</tbody>
</table>
Regional Identifiers
- Inner Regional Australia
- Major Cities of Australia
- Outer Regional Australia
- Remote or Very Remote Australia

Thank you to John Cresswell and Catherine Underwood. Any errors in data or interpretation are ours!
Full-Time Teachers Holding A Bachelors’ Degree In Education

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Full-Time Teachers Holding A Bachelors’ Degree In Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Regional</td>
<td>52%</td>
</tr>
<tr>
<td>Remote/ Very Remote</td>
<td>68%</td>
</tr>
<tr>
<td>Major Cities</td>
<td>69%</td>
</tr>
<tr>
<td>Outer Regional</td>
<td>74%</td>
</tr>
</tbody>
</table>

Full-Time Teachers Holding A Bachelors’ Degree In Education

- 52%
- 53% - 68%
- 69%
- 70% - 74%
The 2000 PISA Data On Access To The Internet

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Link To Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote/ Very Remote</td>
<td>41%</td>
</tr>
<tr>
<td>Outer Regional</td>
<td>49%</td>
</tr>
<tr>
<td>Inner Regional</td>
<td>63%</td>
</tr>
<tr>
<td>Major Cities</td>
<td>72%</td>
</tr>
</tbody>
</table>

Link To Internet:
- Light Green: 41%
- Light Green: 42% - 49%
- Light Green: 50% - 63%
- Light Green: 64% - 72%
- Light Green: 64% - 72%
The 2000 PISA Data on Mother’s Socioeconomic Status (SES) Level

Mother’s SES Level
(OECD Mean = 49; Higher Number = Higher SES)

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Mother’s SES Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote/ Very Remote</td>
<td>45</td>
</tr>
<tr>
<td>Outer Regional</td>
<td>46</td>
</tr>
<tr>
<td>Inner Regional</td>
<td>50</td>
</tr>
<tr>
<td>Major Cities</td>
<td>54</td>
</tr>
</tbody>
</table>

The OECD index of socioeconomic status ranged from 0 to 90.
Questions?
Useful References


Useful References (Continued)


Winograd, P., Ballard, A. & Timm, J. (May, 2014). Education Data Visualization: To Sift And Weigh Evidence, To Discern The True From The False... Presented at the Invitational Summit on Education Data Visualization. The University of Texas, Austin, Texas.