Education Data Visualization: To Sift And Weigh Evidence, To Discern The True From The False...

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“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.

The function of education, therefore, is to teach one to think intensively and to think critically. But education which stops with efficiency may prove the greatest menace to society. The most dangerous criminal may be the man gifted with reason, but with no morals.

We must remember that intelligence is not enough. Intelligence plus character—that is the goal of true education. The complete education gives one not only power of concentration, but worthy objectives upon which to concentrate.”

Martin Luther King
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!
The Power Of Data Visualization

• **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
  • Providing a basis for advocacy
  • Strengthening public engagement
  • Developing policy
The Issues
How do we measure well-being?
The KidsCount Index uses 16 indicators across 4 domains to rank U.S. states on child well-being.
New Mexico has never moved above #43 in the rankings while other states have moved up. This becomes a deficit narrative for our state.
## KidsCount Indicators

<table>
<thead>
<tr>
<th>Domain</th>
<th>Indicator</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic Well-Being</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Child Poverty</td>
<td>Families below 100% FPL (Census)</td>
</tr>
<tr>
<td></td>
<td>Housing Cost Burden</td>
<td>Housing costs over 30% income (Census)</td>
</tr>
<tr>
<td></td>
<td>Idle Teens</td>
<td>16-19 not in workforce not in school (Census)</td>
</tr>
<tr>
<td></td>
<td>Secure Employment</td>
<td>No parent with regular year-round employment (Census)</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infant Mortality</td>
<td>Number of deaths of all infants per 1000 (CDC)</td>
</tr>
<tr>
<td></td>
<td>Low Birth Weight</td>
<td>Infants under 2500g (CDC)</td>
</tr>
<tr>
<td></td>
<td>Child Deaths</td>
<td>Deaths to children under 18 from all causes (CDC)</td>
</tr>
<tr>
<td></td>
<td>Health Insurance</td>
<td>No health insurance (Census)</td>
</tr>
<tr>
<td></td>
<td>Teen Deaths</td>
<td>Deaths of teens of all causes (CDC)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preschool Enrollment</td>
<td>% of children 0-5 enrolled in preschool (Census)</td>
</tr>
<tr>
<td></td>
<td>Math Achievement</td>
<td>Proficient as measured by NAEP</td>
</tr>
<tr>
<td></td>
<td>Reading Achievement</td>
<td>Proficient as measured by NAEP</td>
</tr>
<tr>
<td><strong>Family and Community</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High-Poverty Areas</td>
<td>Concentrated poverty, &gt;30% of persons under FPL</td>
</tr>
<tr>
<td></td>
<td>Single-Parent Families</td>
<td>Under 18 living with own single parent</td>
</tr>
<tr>
<td></td>
<td>Parental Education</td>
<td>Under 18 parents less than bachelor’s degree</td>
</tr>
<tr>
<td></td>
<td>Teen Births</td>
<td>Per 1,000 females ages 15-19</td>
</tr>
</tbody>
</table>
## Indicator Indexes

### Pros

1. At a high level, identifies areas for improvement in relation to childhood well-being in an easily-understandable format.

2. Provides a consistent annual measurement.

3. Has been revised recently (2012) to incorporate newly-available data.

### Cons

1. Creates a narrative of disadvantage and despair.

2. Using states as the unit of analysis masks nuances visible at the county, city, tract, school district or individual school level.

3. The index does not take improvement into account, and it ignores individual sub-populations.

4. The index does not consider the unique assets within communities.
The Narrative Of Disadvantage & Despair

“N.M. hits bottom in child well-being”
Albuquerque Journal, June 24, 2013

“The Narrative Of Disadvantage & Despair”
Albuquerque Journal, August 4, 2013

“Children fare worse in New Mexico”
Albuquerque Journal, April 12, 2014

“N.M.’s Child Death Rate Increases”
Albuquerque Journal, July 26, 2006

“New Mexico in bottom five in child well-being”
El Defensor Chieftain, July 31, 2010

“N.M. Still Battling Teen Pregnancy”
Albuquerque Journal, December 16, 2012

“More Children in Poverty Near Mexico Boarder”
Albuquerque Journal, February 10, 2005

“Severe child-abuse cases pile up in Albuquerque”
Albuquerque Journal, April 18, 2014

“Hunger, poverty need public policies”
Albuquerque Journal, October 21, 2013
What Can We Do With Data?

• Change the geographic unit of analysis to show a more nuanced picture.
• Focus on New Mexico’s specific concerns.
• Create a new narrative focusing on areas of success and opportunity.
• Develop the tools to strengthen the civic debates.
Changing the Geographic Unit of Analysis

“To save man from the morass of propaganda, in my opinion, is one of the chief aims of education.”
Census Tract-based Opportunity-Based Index

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 lower values for child maltreatment indicators.

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.
Focusing on New Mexico’s Critical Areas of Concern

“The complete education gives one not only power of concentration, but worthy objectives upon which to concentrate.”
CEPR’s Approach For Using Data To Help Our Communities Address Their “Worthy Objectives”

1. What are the most important issues facing our communities?

2. What local, state, and national help us address these issues?

3. How can we display the data in ways that enhance people’s understanding of the issues and bring them to the table to solve them together?

4. How can we analyze the data to highlight priorities, deploy resources, and monitor impact?

5. How can we work with people to help strengthen advocacy and accountability?
Percentage of Individuals Living Below Poverty Level with Less than High School Education

Source: U.S. Census Bureau American Community Survey 5-Year Estimates 2007 – 2011, Table S1501, Percentage Less than high school graduate.
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.
Youth Suicide Rate, 15-19 Years of Age, by County

Suicide Deaths Per 100,000 Population Ages 15-19

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
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.
Teen Birth Rate In Albuquerque, Ages 15-19

The data point in each census tract represents the number of live births to teen women per 1000 teen women, over the period 2001-2005.

For example, the census tract in the center with a teen birth rate of 106.4 means that there were 106 live births to teen women for every 1000 teen women who live in the census tract.

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.
Changing the Narrative

“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.”
Disparities between Enrollment and AP Enrollment, By Subgroup
APS High Schools
2009-10 & 2011-12 School Years

Survey Year
2009

Subgroup
Hispanic

2009 - Hispanic
Percentage AP Enrollment vs. Percentage Total Enrollment

VOLCANO VISTA HIGH SCHOOL: 2009
Four-Year High School Graduation Rate, English Language Learners (ELLs), Class of 2013, By School District

Statewide ELL = 54.4%
Statewide All Students = 70.3%

Source: NM Public Education Department, 4-Year Cohort High School Graduation Rate, Class of 2013.
One Of The Most Important Disparities In Doña Ana Are The Differences Between The Academic Proficiency Levels Of Students Who Are English Language Learners (ELL) And Other Students. The Ability To Speak Dual Languages Is A Unique New Mexican Asset To Be Cultivated.

Human Capital Development In The Paso del Norte Region

“The ability to fuel local growth by cultivating relevant skills is the best guarantee that the region will thrive in the future. A region that wants to be globally competitive needs to have a highly skilled workforce and knowledge-based economy In order to break out of the low wage equilibrium. The Paso del Norte Region needs to improve the educational attainment levels and widen access to higher education ...” (p. 17, The Paso Del Norte Region, Mexico and the United States. OECD, 2010).
Community Assets: Multi-Generational Households

Number of Hispanic Children Under Age 5

- 4 - 85
- 86 - 185
- 186 - 325
- 326 - 525
- 526 - 761

Number of Multi-Generational Households in PUMA

- 945 - 1039
- 1040 - 1586
- 1587 - 2171
- 2172 - 2769
- 2770 - 4055

Source: American Community Survey Public Use Microdata Sample, 2011. Multi-generational households include households with at least 3 generations living in the same dwelling.
Key Outcomes of High School Students Experiencing High & Low Levels of Caring and Supportive Relationships With Adults in the Community, New Mexico, 2009

- Cigarette Smokers: 21.5% (High), 28.6% (Low)
- Marijuana Users: 23.2% (High), 34.0% (Low)
- Cocaine Users: 3.8% (High), 8.7% (Low)
- Attempted Suicide: 7.0% (High), 18.3% (Low)
- Physical Fight: 33.7% (High), 45.3% (Low)
- Overweight or Obese: 24.4% (High), 37.0% (Low)

Relationship Between Elementary Grades And Elementary Student Mobility

What is going on with these schools?

Grey outlines show elementary school attendance boundaries.
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%
High School Habitual Truancy Rates: 2011-2012

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community
High School Habitual Truancy Rates: Improvement from 2010-2011 to 2011-2012

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCan, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

Color Key:
- Green: Greater than 5 point decrease
- Yellow: 0 - 5 point decrease
- Orange: 0 - 5 point increase
Develop The Data Tools To Strengthen The Civic Debates

“The function of education, therefore, is to teach one to think intensively and to think critically.”
What are the Advantages?

• All kinds of visualizations in one place
  – Maps
  – Charts
  – Tables

• Ingests all kinds of data sources and can update on the fly
  – Text files
  – Spreadsheets
  – Relational databases

• Interactive
  – Empowers your audience with the ability to exercise their own critical thinking skills
APS Habitual Truancy: 2010-2013

Box and Whisker plots graphically show data in relation to sample quartiles. Points represent APS schools. The top of the box shows the third quartile, the bottom of the box shows the first quartile, and the line in the box shows the median value. The upper and lower whiskers show all schools within 1.5 times the interquartile range. Only APS elementary schools show outliers.

Select a Level to View

High School
APS Habitual Truancy: 2010-2013

Select a Level
High School

APS High Schools
Label: % Habitually Truant in 2013, # Habitually Truant in 2013
Dot Color Shows Change from 2012 to 2013 (Red = Increase; Green = Decrease)
Dot Size Reflects Percentage Truant in 2013

Select a Year (Selecting Multiple Years Will Show Average)
(All)

Average Habitual Truancy Rates, APS Elementary, Middle and High Schools: All

Elementary 8.01%
High 26.45%
Middle 13.74%
New Mexico Counties Youth Risk & Resiliency Survey, 2011 High School Data Analysis Tool

View YRRS data by County, Grade Level, and Gender

View Multiple Indicators simultaneously by County - Create Composite Z-Scores

Compare Two Indicators by County

View Gender Disparities for Risk and Resiliency at the State Level

View Age Disparities for Risk and Resiliency at the State Level

Source: Green D, Peñaloza L, and FitzGerald C. 2012. New Mexico Youth Risk & Resiliency Survey: High School Survey Results 2011. Epidemiology and Response Division, New Mexico Department of Health, School and Family Support Bureau, New Mexico Public Education Department, and University of New Mexico Prevention Research Center.

Note: Not all YRRS indicators are included in the analyses presented here.

For more information, visit www.youthrisk.org

http://cepr.unm.edu/data-stories/new-mexico-yrrs.html
Useful References


