

GIS Analysis Identifying the Top Three States Facing Major Budget Gaps and the Resulting Impact on Public Education

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Abstract

The current economic climate has had devastating impacts across the spectrum of public institutions that receive federal funding. More and more federally funded programs are seeing dramatic cutbacks and are reducing their overall staff numbers. States that receive funds for public education have not been left untouched by this downturn in the economy. As money coming from the United States government is scaled back, the state education systems have to adjust and modify their own budgets accordingly in order to maintain balanced budgets. Geographic Information Systems (GIS) has the ability to spatially analyze significant factors of importance to public education. These include funding as well as enrollment and budget gaps. With recent estimates of budget deficits in the billions of dollars, GIS can help provide a comprehensive examination of these factors and visually display this layered information in a clear and effective manner. This presentation can then, in turn, be used to identify trends and communicate a relevant and meaningful message.

Introduction

The items that build the budget of any one state are always highly contested and sometimes even controversial. State-funded education is no exception. With recent economic downturns, the representatives that write the budget for their state are under increasing pressure from their constituents to allocate money to publicly funded education institutions in a responsible manner. In taking this input from the voters, representatives have to find a way to stretch out what money exists and preserve what jobs they can.

For Fiscal Year 2011 (which starts July 1st in most states), at least 46 states will face shortfalls in their budgets

(Johnson and McNichol, 2010).

Additionally, The U.S. Department of Education (2010) projects that public school enrollment will continue on an upward trend annually through 2018. Should budget shortfalls and public school enrollment continue to increase, funding for schools, as well as other educational services, will be stretched thin.

This research project will focus on the top three states that face the largest budget shortfall for Fiscal Year 2011. Analysis will involve determining the current and estimated funding for each state, the current and future public school enrollment numbers, and finally, analyzing public school teacher salaries. Results and discussion will then follow

with evaluation and comparison of the aforementioned factors.

Methods

Identifying the Top 3 States with a Projected Budget Shortfall

The first step in the process involved collecting the data for budget gaps for Fiscal Year (FY) 2011. This information was readily available online through the Center on Budget and Policy Priorities (Johnson and McNichol, 2010). Once collected, the state-wide budget gaps were imported into ESRI’s ArcMap as a Microsoft Excel Spreadsheet. United States Base data from ESRI’s Data & Maps was also used to join to the budget gap data in the spreadsheet. Once joined, each state was then symbolized as stated below.

The first visual analysis was performed on the mere existence of a projected shortfall symbolized by color, by state (Figure 1). Upon visualizing this, it was not only quickly visible which states had gaps, but those that did not. Only four states (Alaska, Arkansas, Montana, and North Dakota) are shown without a projected shortfall for FY 2011.

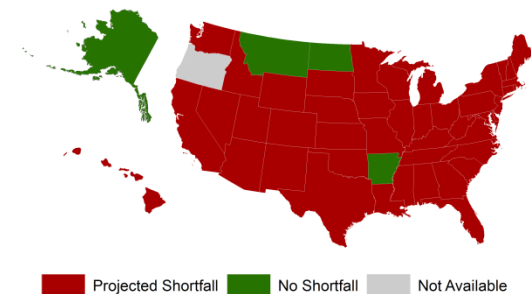


Figure 1. States with projected budget shortfalls for FY11.

The next step involved visualizing the actual number (in

billions) that represented each state’s gap. A simple, shaded color ramp was used to symbolize states. The projected shortfall amount ranged from 84 million to 13.5 billion. From examination of Figure 2, the states that fall on the high and low ends of the budget gap spectrum are instantly visible. The states with the largest shortfalls included Illinois, California, New York, New Jersey, North Carolina and Connecticut. States with the smallest budget shortfall were comprised of Idaho, South Dakota, Nebraska, Kansas, Wyoming and New Mexico.

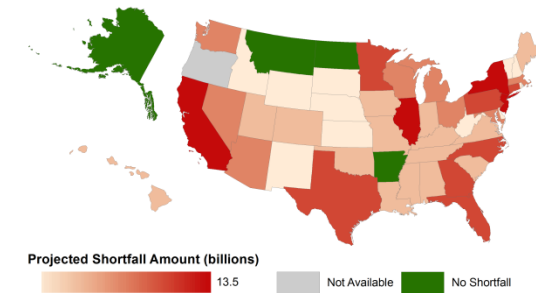


Figure 2. Visualizing the projected budget shortfall amount for each state in billions of dollars.

Figure 2 gives an initial view into the budget gaps, however, looking at the data normalized as the percent of the FY2010 budget provided a more accurate assessment of which states had the largest gap (Figure 3). This data was also obtained from the Center on Budget and Policy Priorities (Johnson and McNichol, 2010) and was simply added to the dataset as a new field, tied to its respective state.

Using the percentage of FY2010 numbers, the top three states with the largest gap were identified. The top three states were Nevada (56%), New Jersey (37%) and Illinois (36%). When the same three states are ranked by largest budget gap in billions of dollars,

they fall as Illinois (\$13.5), New Jersey (\$10.7) and Nevada (\$1.8).

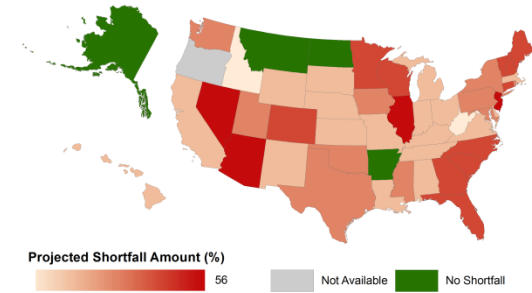


Figure 3. The projected budget shortfall amount for each state as a percentage of their FY2010 budget.

Determining Current and Estimated Educational Funding

After identifying the top three states with the largest budget gap, the next step was to acquire data regarding federal funding for education. This data was available online through the President's Budget State Tables for the U.S. Department of Education report (U.S Department of Education, 2010). The data was retrieved from the report, and entered into Microsoft Excel. The data for the top three states was then extracted and formatted to create descriptive visualizations and summaries.

Figure 4 shows the top three states educational funding (in billions of dollars) for 2009, 2010 and estimated for 2011.

From Figure 4, it can be noted that Federal funding for Illinois and Nevada declined in 2010 and is projected to continue to do so in 2011. New Jersey also shows a projected decline for 2011. Illinois will see an estimated 8.8% decrease in Federal funding while Nevada and New Jersey will see decreases around 6% (Table 1).

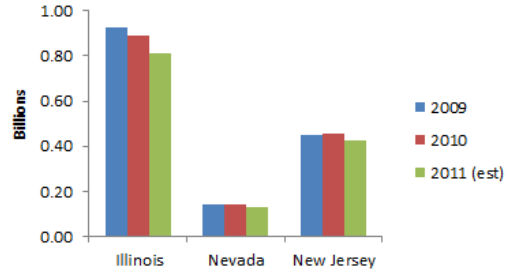


Figure 4. Chart showing federal funding for education for 2009, 2010 and estimated for 2011.

Table 1. Fiscal Year 2010 to 2011 federal educational funding changes in both dollars and percent.

| Change Fiscal Year 2010 to 2011 | | |
|------------------------------------|-------------|---------|
| | Amount | Percent |
| Illinois | -78,552,114 | -8.8 |
| Nevada | -9,261,068 | -6.6 |
| New Jersey | -30,754,743 | -6.8 |

The decreases shown in Table 1 have more than doubled for Illinois and Nevada. Illinois went from a 3.9% decrease to an 8.8% decrease while Nevada went from a 2.5% decrease to a 6.6% decrease (Table 2).

Table 2. Fiscal Year percent changes to federal funding for education.

| | Change Fiscal Year 2009 to 2010 | Change Fiscal Year 2010 to 2011 |
|-------------------|---------------------------------------|---------------------------------------|
| Illinois | -3.9% | -8.8% |
| Nevada | -2.5% | -6.6% |
| New Jersey | 1.4% | -6.8% |

New Jersey actually saw an increase from 2009 to 2010 however the

projected 2011 change was a decrease of -6.8%.

Collecting Public School Enrollment Numbers

Next, data pertaining to public school enrollment for the top three states facing a budget gap were collected. This data was obtained the National Center for Education Statistics (NCES, 2010) through their Condition of Education report. This report was available for download in PDF format and was converted to a Microsoft Excel spreadsheet for further analysis. Once the data were converted, all but the top three states were filtered to show the actual and projected numbers as well as the percent change (Table 3).

Table 3. Actual and projected public school enrollment numbers (in thousands) with percent change.

| | Actual Enrollment 2007-08 | Projected Enrollment 2019-20 | Percent Change |
|------------|---------------------------|------------------------------|----------------|
| Illinois | 2,113 | 2,061 | -2.4% |
| Nevada | 429 | 579 | 34.8% |
| New Jersey | 1,382 | 1,339 | -3.1% |

Both Illinois (-2.4%) and New Jersey (-3.1%) showed a decrease in enrollment while Nevada showed a 34.8% increase.

To visually analyze the information, the data were imported into ArcMap and joined to a U.S. shapefile on the state name field. It was then symbolized using a simple, shaded color map using the Percent Change field in the table. The layer was then duplicated leaving one copy 75 % transparent and the other only showing the top three states (Figure 5).

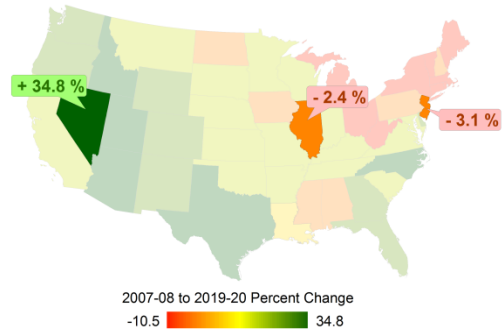


Figure 5. 2007-08 to 2019-20 percent change of public school enrollment numbers.

Gathering Public School Teacher Salaries

The final step in the analysis was to gather public school teacher salary data. This data was downloaded from the NCES through their Digest of Education Statistics report (NCES, 2010). After downloading the information, the top three states were extracted and analyzed. Table 4 shows that both Illinois (6.5%) and Nevada (0.2%) had an increase in teacher salaries while New Jersey realized a decrease of 4.5%.

Table 4. Public school teachers' salaries (in USD) for 1999-00 and 2008-09 with percent change.

| | 1999-2000 | 2008-2009 | Percent Change |
|------------|-----------|-----------|----------------|
| Illinois | 58,132 | 61,922 | 6.5% |
| Nevada | 49,258 | 49,378 | 0.2% |
| New Jersey | 65,046 | 62,150 | -4.5% |

After analyzing the tabular information, the data were added to ArcMap and joined to a U.S. shapefile on the state name field. It was then symbolized using a simple, shaded color map based on Percent Change from 1999-00 to 2008-09. As done with the

data for public school enrollment, the layer was then duplicated leaving a copy semi-transparent for further visual analysis. As shown in Figure 6, the percent change of public school teacher salaries for this time period ranged from -7.8% to 28.7%.

Figure 6 also shows how the top three states compare against the entire U.S. There are areas in the southeast that show little or no change as well as areas in the northwest and northeast that suggest a positive increase in salary. An initial analysis of this data suggests that there is no distinct grouping that the states fall into.

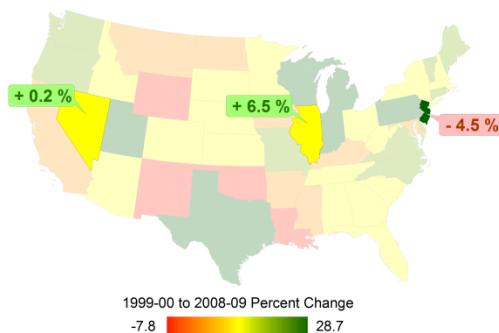


Figure 6. 1999-00 to 2008-09 percent change of salaries for public school teachers.

Results/Discussion

Based on current research, states with budget gaps will have difficulty finding the revenue needed to support critical public services (Johnson and McNichol, 2010). From looking at the top three states with the largest projected budget gap for FY 2011, these states will have difficulties keeping money flowing into public services including public education. These top three states have budget gaps that exceed 30% and will need to find ways to cut spending with the objective in mind of balancing the budget for the next fiscal year. Without a balanced budget, public education will face financial strain and will be in

continual crisis to find avenues of funding.

Research also shows that federal funding for public education is decreasing. In the top three states with budget gaps, funding is decreasing from 6% to 8% per year. The states with the largest budget deficit are seeing decreases in the amount of Federal assistance that can be applied to public education. With a balanced budget, these states will be able to decrease their dependency on Federal funding. Once their dependency on these funds are lessened, the states will be able to have more control over what departments receive funding and will not be forced to make sharp cuts in any one department.

One factor that could, perhaps, alleviate some financial burden on the lessening Federal public education funds is a declining number of students enrolled in public education. For the top three states, this situation is evident in Illinois and New Jersey which both show a decrease in enrollment from 2007-08 to 2019-20. Should enrollment continue to decline in these states, the impact of reduced Federal funding might have a diminishing impact.

The contrasting case, as seen in Nevada, is where enrollment is increasing. A state here is caught in an ever tightening squeeze.

Finally, the data shows that for two of the top three states facing a budget gap, public school teacher salaries are increasing. Illinois has seen a 6.5% increase from 1999-00 to 2008-09. Although projected enrollment is apparently declining in Illinois, the state still faces a budget gap that represents 36% of their FY 2010 budget and an almost 9% decrease in Federal funding for public education. The squeeze on resources is evident here too.

Considerations for future research could include incorporating data regarding cost per student. Developing a model to accommodate for how much money is being spent per student in a state and recording trends in this area could yield other factors for consideration in the analysis. Also, further research could parse the state level and then to the school district level for finer detailed understandings. As state budgets fail to supply funding, the burden is then placed on the local government. All information possible can then help school district leaders with wise decision-making.

Conclusion

This research project analyzed the top three U.S. states facing the largest budget gap and focused on the resulting impact on public education. An analysis of federal funding and public school enrollment numbers was used in conjunction with budget gap information to visualize and evaluate current trends in these areas.

Based on the findings of this research, not only the top three, but all states will need to focus on budget balancing and cost management. The central theme must be a conservative approach to allocating funds while actively monitoring the significant factors that have a cause and effect relationship with public education.

Acknowledgements

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