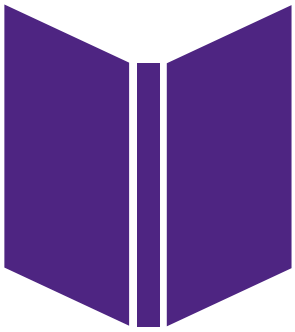
educational considerations



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Transitioning to Performance-Based State Funding: Concerns, Commitment, and Cautious Optimism

Lindsay K. Wayt and Barbara Y. LaCost

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Barbara Y. LaCost, a National Education Finance Academy Fellow, is Associate Professor of Educational Administration at the University of Nebraska-Lincoln. Her teaching and research focus on P-20 education finance issues.

"It [performance-based funding] kind of causes innovative thought. I think that's important. So, in a way, it's good. I think people see it as bad sometimes because it's change. And it's pushing the envelope of accountability."

Comment of a study participant

Introduction

The introduction of performance-based state funding of higher education can be traced to the the late 1970s (Bogue and Hall 2003; Dougherty and Natow 2015; Dougherty, Natow, Hare, and Vega 2010; Dougherty and Reddy 2013; Long 2010; McKeown-Moak 2013). Early forms, referred to as Performance Funding 1.0, provided higher education institutions with bonuses, in addition to regular state funding, when they met certain state-defined outcomes.[1] More recent forms, referred to as Performance Funding 2.0, have eliminated bonuses, and regular state funding has been replaced, in part or completely, with funding tied to achievement of state-defined performance goals, which often include student outcomes, like graduation and retention rates.[2]

Since the use of performance-funding, beginning in Tennessee in 1979, 38 states have used some type of performance-funding policy (Dougherty and Natow 2015). Of those, 23 states have used or are using a type of Performance Funding 2.0 (Dougherty and Natow 2015). The rationale for the shift from bonus-based programs to policies that require explicit outcomes in exchange for state funding may lie with state policymaker beliefs that the latter are more effective in improving student success rates. At the same time, some recent studies have questioned whether outcomes-based state funding delivers significant increases in results (Bogue and Johnson 2010; Rutherford and Rabovsky 2014; Sanford and Hunter 2011; Shin 2010).[3, 4]

Clearly, additional research is needed on how higher education institutions implement state performance policies that incorporate student outcomes accountability Previous historical, survey, and qualitative literature on performance-based funding has focused on processes and relationships

associated with policymakers, coordinating boards, institutional leadership, and senior administration (Banta, Rudolph, Van Dyke, and Fisher 1996; Bogue and Johnson 2010; Dougherty et al. 2010), with one notable exception by Dougherty and Natow (2015). Although performance funding policy development and initial implementation are likely best understood by considering the perspectives of individuals at the state and system levels, as well as those in institutional senior university leadership positions, these perspectives alone may not provide a complete view of the relationship between performance-based funding policies and student success outcomes.

Kadlec and Shelton (2015) posited the importance of stakeholder engagement throughout the development and implementation of outcomes-based funding and further asserted the importance of the engagement of institutional stakeholders from various levels, including midlevel leadership, faculty, and and student-facing staff to ensure effective policy implementation. To add to that research literature, the study described in this article explored the perceptions of midlevel administrators, faculty, and student-facing staff in a sample of small to midsized four-year regional higher education institutions with a teaching focus as they transitioned to state performance-based funding.

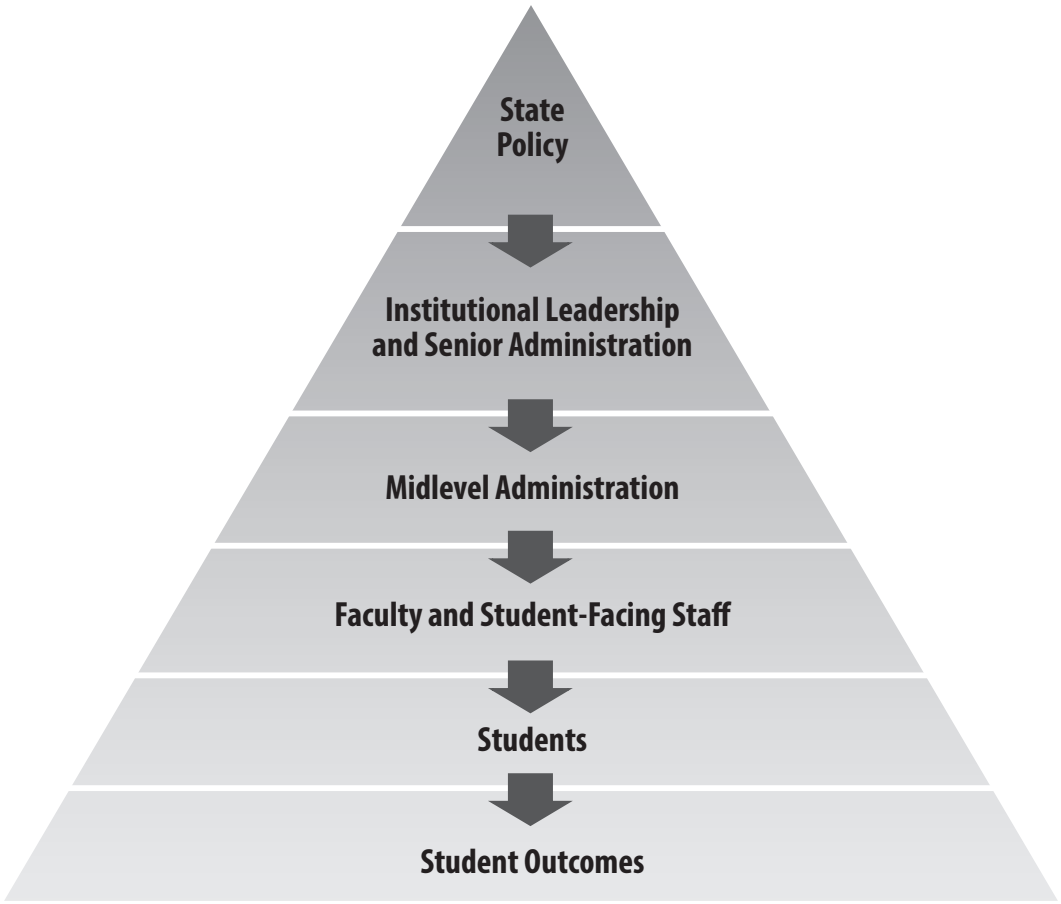
Research Methodology

To begin, the authors developed a visual model of inquiry to guide the study, one that drew upon Kezar's (2012, 2014) framework on organizational change, which allows for the consideration of various organization members throughout the change/transition process. Our model depicts the hierarchical relationship between state performance-based funding policy; decisions by institutional leadership and senior administration, midlevel administration, and faculty and student-facing staff; and the impact on student outcomes. (See Figure.)

A qualitative, multiple case study approach was used. To be considered for the study, four-year public higher education institutions with a teaching focus, hereafter referred to as universities, had to be located in states that used Performance Funding 1.0 or 2.0, as defined earlier, with at least 20% of state higher education funding tied to performance at the time of the study in 2015, or within the one to three years thereafter.

Five universities were selected: two from Maine, one from Mississippi. and two from Virginia. The states of Maine and Mississippi used Performance Funding 2.0 while Virginia was using Performance Funding 1.0. Student enrollments at the five universities ranged from 2,500 to 10,000 students, with a median enrollment of 5,000 students. Included in the

Figure | **Proposed Model of Inquiry**



sample were one historically black university, one historically women's university, and two universities with a history of serving underrepresented student populations. The fifth university had a recent history of serving a large population of adult learners.

Interviews and focus groups represented the primary data sources for the study. A total of 26 participants were selected. Participants represented midlevel administration, faculty, and student-facing staff across the five universities. For the purposes of the study, an example of a midlevel administrator would be a student success coordinator. For student-facing staff, examples included academic affairs staff who worked in the office of a student success coordinator and played key roles in student success efforts. Interview and focus group questions were designed to focus on the university's transition to performance funding through the lens of organizational change as experienced by participants. (See Appendix.) Upon completion of interviews and focus groups, transcript data were organized and coded. Transcripts were read multiple time in search of emerging themes. In addition, all transcripts were uploaded to MaxQDA, a software program, for further analysis.

Findings

Findings echoed the complexity found in the opening quotation. All in all, participants expressed a cautious optimism and a renewed commitment to student success, but these were tempered by concerns, sometimes bordering upon ambivalence, about the fiscal implications of state-based performance funding in general and specifically with regard to their particular institutions.

Fiscal and Budgetary Concerns

At the time of this study, some of the universities were facing not only the transition to performance-based state funding, but also state budget cuts. One participant remarked:

> We're feeling budget cuts from the state in regards to higher education… It's hard to put energy and money into student initiatives to get the higher attention at the state level when we're not getting state funding.

Another referenced the current reality of institutional budget shortfalls:

> It would be very hard for me to provide any specific examples of how [efforts for student success as a result of the new state funding policy] are being implemented because of the issues around the budget shortfall and this institution. The change in senior leadership added significant levels [of uncertainty] and, frankly, I think the level of organizational distraction around the budget deficit has essentially taken everything off the table.

And, a third stated bluntly:

> I think the state… doesn't fund equitably. They do not understand the different mission of a school such as our institution compared to other larger, well-endowed institutions.

Others worried that performance-based state funding was a zero sum proposition, as follows:

> If everyone else does it [improve student outcomes] even better than we do…then individual improvement doesn't necessarily guarantee anything in outcomes based funding.

On the other hand, at least one participant noted a positive fiscal result for faculty:

> There's also a lot more – it seems to me anyway – a lot more investment in providing resources for faculty in terms of professional development, workshops and so forth.

In addition, some participants took a more nuanced, long-term view couched in a cost/benefit perspective. For example, one stated:

> Some of the retention initiatives that we've been talking about are not – do not – come without cost, but you have to talk about it . . .as an investment that'll pay dividends, you know somewhere down the line.

Fears of Disparate Institutional Impact

The universities in this study represent a particular type of higher education institution. As small to midsize regional teaching-focused institutions, their enrollments generally reflected a disproportionate percentage of first generation students, nontraditional students, and students from moderate to low income families in comparison to their states' public research universities.

Participants in the study expressed a number of concerns related to state performance-based funding. For example, there was concern that state policies might be one-size-fits-all, failing to consider their particular institutional context and students. One participant captured these concerns, as follows:

> I think that our governing body [the state] has to understand the missions of institutions. We are one of the regionals [with] a very specific mission . . . I mean, quite frankly, some of our students would never succeed at some of the tier one institutions because they would not get the personal help they get here.

Another participant reinforced the needs of their students, stating:

> We have an overwhelming majority of our students that are first-generation college students [with no] support structure to [advise] them.

A third participant honed in on the issue of student outcomes to be measured in relationship to state performance funding:

> You know, the state sort of defines success differently than how we may.

A more specific comment pointed out the following:

> When they [state policymakers] base funding on graduation rates or retention rates, initially one would think that that's a really fair way to do it, but [we are] disadvantaged… Our retention rates can't be

> the same as some of the [other institutions]…because [some other institutions] have so many students applying that they're turning students away.

Expanding upon this perspective, another stated:

> These performance funding measures that look at four- to six-year graduation rates just don't properly account for an institution where a student might take seven years or eight years [to complete].

The concerns expressed above led one participant to lament:

> We get compared electronically to every other school in the system, and we don't fare well in some of those things.

At the same time, participants were proud of their institutional mission and defended it. As one participant remarked:

> We fill sort of a unique role in the [region], in my opinion. And there's been a push in the past to get higher academic standards for the new students, but I love that we're a place for that student who maybe didn't do as great because they will learn their potential here. It's a great place.

What Transition Means and Looks Like to Participants

The extent of participant concerns expressed in the previous two subsections might lead one to the conclusion that there would be considerable resistance to the transition to performance-based state funding, but the results of the study did not indicate this. Instead, participants reasserted their commitment to student success, embraced an emerging data culture to enable them to better meet state standards, and overall expressed a cautious optimism.

A Continuing Commitment to Student Success. Participants in the study were proud of their respective institution's history of commitment to students' academic success, as typified by this participant's comment:

> Our intention again, in the 35 or so years that I've been here, is we want to help; we want to facilitate success.

Reinforcing this longstanding commitment, another stated:

> I would like to believe that we're doing what we're doing, not because somebody is going cut our funding if we don't, but because it's the right thing to do.

Moreover, participants viewed the transition to performance-based funding as an opportunity to recommit themselves to student success as an inclusive endeavor, as follows:

> There seems to be a better understanding from campus now that it's not just the faculty, it's not just the [name of student success office], it's all of us. We all have to work together to make these students successful.

Summing it up, another participant observed:

> This renewed interest [in student success] has helped sort of refocus and restaff internally.

An emerging data culture. Participants appreciated the central importance of collecting, analyzing, and using data to enable them to not only meet state performance standards but also to become more effective in supporting their students and improving educational outcomes.

Referring to this emerging culture positively, one participant noted:

> I think it [the transition to performance funding] has also caused us all to be more data-driven and to ask questions – and to look at something and wonder, *why*. So, we've been making more informed decisions.

Another excitedly remarked that with the use of student data an outside consultant had recently helped them assemble, "We pretty much know exactly what places students at risk."

Participants also described the experience of using data as a proactive process, as follows:

> Once you get your data, I know that we have to continuously use our data to make informed decisions. And we have to continuously put strategy towards it. And we have to continuously have inclusive processes to understand all those barriers to why students don't persist.

When prompted to provide predictions about which programs or strategies that they had mentioned may prove more successful, participants at multiple institutions expressed confidence in the emerging data culture, stating that "only the data would tell."

A final example provides further context for participants' renewed commitment to student success and cautious optimism about the use of data:

> I do a lot of data reporting for anyone who needs it, and I've noticed not only more requests on how students do in certain classes or midterm grades or final grades, but even individual instructors are like actually closely looking at their own courses and weighing in different factors about their students who are taking it and how they're doing.

Conclusions and Implications

Approximately three-fourths of states now use some form of performance-based funding for higher education. A number of these states tie funding directly to student outcomes like retention and graduation. While previous research has focused on policymakers, coordinating boards, institutional leadership, and senior administration, this study explored the perceptions of midlevel administrators, faculty, and student-facing staff in a sample of small to midsized four-year regional higher education institutions with a teaching focus as they transitioned to state performance-based funding.

The authors developed a visual model of inquiry to guide the study, one based upon organizational change, inclusive of the roles various organizational members play throughout the change/transition process. In the findings, participants expressed a cautious optimism and a renewed commitment to student success, tempered by real concerns, about the

fiscal implications of state-based performance funding in general and specifically with regard to their particular institutions.

Although it is not possible to draw broad conclusions from a single study drawn from a small sample of a particular type of higher education institution, the findings here call attention to the need for further study of the perceptions of midlevel administrators, faculty, and student-facing staff as they implement performance-based state funding, particularly at times when these institutions face across-the-board state budget cuts. It is also imperative to diversify studies to include all types of higher education institutions reflective of their differing missions so as to have a complete picture of the impact of these state policies.

Endnotes

[1] McKeown-Moak (2013, 4) refers to Performance Funding 1.0 as the "old wave" of performance-based state funding.

[2] McKeown-Moak (2013, 4) explained that Performance Funding 2.0 constituted a "new wave" of performance-based state funding funding with a shift to a stronger focus on "increased accountability and increased efficiency of operations." According to D'Amico et al. (2013, 232-233), Performance Funding 2.0 is "output-based funding, which includes performance in funding formulas, and performance contracts, which represent agreements to provide a certain number of funding should an institution meet expected outcomes." Funding is given for certain levels of performance but could also be reduced if other expectations are not met.

[3] Rutherford and Rabovsky (2014) compared Performance Funding 1.0 to Performance Funding 2.0 policies. They found some positive effects on student outcomes under Performance Funding 2.0 policies.

[4] There are several potential reasons why recent studies have not demonstrated a definitive link between performance-funding policies and increased student outcomes. For example, over time, performance-funding policies change, for example, with changes in state political leadership. When performance-funding policies are used for short periods of time, results may not be seen (Dougherty and Natow 2015).

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Appendix

Focus Group Questions

Topic 1: Student Success Goals

1. What do you see as the main purpose/mission for your institution? How does this relate to the state performance funding policies?

Topic 2: Communication

2. How has information regarding performance funding metrics and/or student success efforts been communicated on your campus?
3. What efforts have institutional leaders made to have a campus-wide focus on performance metrics and/or student success?

Topic 3: Commitment and/or Buy-in

4. Who is involved in campus efforts related to the performance metrics and/or student success? Have any changes been made in duty functions for administrators, faculty, or staff?
5. Do you think all campus faculty and staff are committed to institutional performance and student success? Explain.

Topic 4: Changes/Policy Effects

6. How long do you think your state will have performance funding? What success initiatives will last whether or not the policy remains?
7. What initiatives are not likely to work and/or are likely to not still be around within a few years?

Interview Questions

1. Describe what you see as the purposes, goals, and/or mission of your institution.
2. Have state performance funding policies influenced these (Q1 purposes, goals, and/or mission)? If so, to what extent?
3. Since the introduction of state accountability measures through performance funding have been initiated, what changes have you seen on your campus? Who has initiated these changes? Who is involved in the planning? How are the changes made?
4. How would you categorize the initiatives/changes/student success measures on your campus? For example, are the changes directives from administration? Are the changes coming from student affairs professionals? Campus faculty? Multiple initiatives? Which initiatives and individuals involved are likely to have the most impact? Explain.
5. Tell me about student success on your campus. Who is involved? What programs, policies, and/or procedures exist that influence student success initiatives?
6. How are student success initiatives developed? Who is involved in the planning? How are initiatives communicated throughout the campus? How is buy-in and/or compliance with initiatives achieved?
7. What do you think will be the long-term effects of performance funding on your institution? Who is affected the most in regards to job function? Which new functions will still be visible in 5 years? 10 years? Why will these be the longest lasting? Who will ensure they last?
8. What else would you like to tell me about performance funding and/or student success efforts on your campus?

Reconceptualizing Educational Productivity for New South Wales Public Schools: An Empirical Application of Modified Quadriform Analytics

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Introduction

Little is known about the educational productivity of public schooling organizations when examined outside of market-based, cost-minimization frameworks (Hickrod et al. 1990; Anderson 1996; Rolle 2003, 2004a,b; Houck, Rolle, and He 2010). Consequently, the purpose of this research was to extend the literature that supports the appropriateness of measuring levels of the economic efficiency of public schools via an alternative approach, utilizing modified quadriform analytics (MQA) to assess the educational productivity of New South Wales public elementary and secondary schools in Australia over three school years, 2008-2010.[1] To that end, this study identified and compared the economic efficiency of New South Wales schools in terms of level of fiscal resources and national, mandated academic test scores while taking into account sociodemographic factors over which a school has no control.

In the following sections, this article: (1) presents historical background and alternative perspectives on educational productivity and its measurement; (2) describes the history of primary and secondary school funding in Australia and New South Wales; (3) reviews recent efficiency research on Australian schools; (4) explicates MQA, research methods, and data sources; and (5) presents analytical results. Analytical results include those for New South Wales schools using the school as the unit of analysis followed by a comparison of New South Wales schools by region. The concluding section summarizes findings and discusses implications of the study for educational efficiency theory, research, and policy within the Australian context, and makes recommendations for future research.

Historical Background on Educational Productivity and Its Measurement

Debate surrounding educational efficiency has endured more than half a century after the release of Coleman et al.'s 1966 research in *Equality of Educational Opportunity* which challenged conventional wisdom that factors, like

level of educational expenditure, had an effect on student achievement. In sharp contrast, Coons, Clune, and Sugarman (1970, 30) dissented, stating:

> Whatever it is that money may be thought to contribute to the education of children, that commodity is something highly prized by those who enjoy the greatest measure of it. If money is inadequate to improve education, the residents of poor districts should at least have an equal opportunity to be disappointed by its failure (1970, 30).

Subsequently, a large cadre of researchers turned to the use of an economic model and multivariate analytic approach referred to as "production function" to determine what, if any, statistically significant relationship existed between educational inputs, such as, but not limited to, expenditures, and academic outcomes (See, for example, Hanushek 1986; Murphy and Hallinger 1986; Odden 1986; Rossmiller 1987; Murnane 1991; Hedges, Laine, and Greenwald 1994; Laine, Greenwald, and Hedges 1996).

The net result of decades of production function research, as well as more recent studies using difference-in-difference, discontinuity, and value-added regression methodologies (Jacob and Lefgran 2004; Donald and Lang 2007; Rothstein 2009; Ou 2010; Corcoran and Goldhaber 2013; Goldhaber, Cowan, and Walch 2013), is inconclusive, giving rise to the need to consider alternative economic theories and methodologies, such as those embodied in collective choice theory.

Collective choice theory challenges the assumption of traditional economic analyses that public schools, like private sector businesses, act as cost-minimizing agencies (Buchanon and Tollison 1984; Stevens 1993; Peacock 1997; Downs 1998). Rather, extant research on public school administrator behavior challenge that notion (Kirst 1983; Hentschke 1988; Bennett 1992; Hughes, Moon, and Barnett 1993; Sowell 1993; Barnett 1994; Hanushek 1996; Rolle 2003), with findings that school administrators are more likely to be budget-maximizers.

In that regard, collective choice theory emphasizes two central features of public sector organizations that support budget-maximizing behavior (Michaelsen 1977, 1981, cited in Boyd and Hartman 1988, 293). First, unlike private sector managers and executives, public school administrators lack property rights (e.g., corporate stock accumulation) or profit motives that would support cost-minimizing behavior. Second, public schools receive annual allocations of tax-based revenues independent of levels of "consumer satisfaction." Hence, individual goals of public school administrators may take precedence over stated educational performance goals, generating economically inefficient outcomes.[2, 3] In support of this theoretical assertion, several studies have found that public sector managers systematically requested larger budgets regardless of the level of organizational output generated (Bush and Denzau 1977; Blais and Dion 1991; Campbell and Naulls 1991; Lynn 1991; Rolle 2004b).

This theoretical assertion and body of research remained relatively unchallenged until recently.[4] Eventually, both challenging and extending the work of proponents of collective choice theorists, Rolle (2003, 2004a) and Houck, Rolle, and He (2010) found, using MQA, statistically significant relationships between expenditures and outputs in Indiana and Georgia public school districts, respectively. The study reported in this article builds upon those findings.

History of Australia and New South Wales Primary and Secondary School Funding

Prior to 1964, the Australian government provided no direct funding to primary and secondary schools. Beginning in 1964, capital funding was made available to public and private secondary schools for science laboratories and equipment. The scope of capital funding was expanded to public and private secondary school libraries in 1969. In 1972, general purpose capital funding became available to public primary and secondary schools, with private primary and secondary schools included beginning in 1973 (Harrington 2013).[5]

The 1973 "Karmel Commission Report,"[6] which recommended funding to both public and private schools on a needs basis, was a watershed moment in Australian primary and secondary school finance policy (Blackburn 1983; Hinz 2010). The Commission recommended seven main education finance support programs: (1) general resources; (2) general buildings; (3) libraries; (4) disadvantaged schools; (5) special education; (6) teacher development; and (7) innovation (140-141).

In the report's final chapter, "Summary and Recommendation," the Commission noted serious deficiencies in Australia's schools in three broad areas:

- Most schools lack sufficient resources, both human and material, to provide educational experiences appropriate to the young in a modern democratic industrial society.
- Among schools there are gross inequalities, not only in the provision of resources but also in the opportunities that they offer to boys and girls from varied backgrounds. In particular there are many inner-city schools which draw their pupils from populations that suffer grave socioeconomic disadvantage, and there are handicapped children for whom quite inadequate opportunities for schooling exist.
- The quality of education leaves much to be desired. Many teachers have been inadequately trained and the provision for their professional development is frequently meager. Curricula and teaching methods tend to be unresponsive to differences between pupils and to address themselves to the development of a range of attributes which is narrow in relation to the possibilities of life in a complex technological society. In some schools and school systems, the authoritarian and hierarchical atmosphere inhibits the human relationships that should prepare young people for their place in the adult world (139).

The Commission recognized these vertical inequities and recommended the following:

> Differences in deficiencies require differences in treatment. Accordingly, the Committee is recommending relatively larger grants for some schools and school systems. Its long-term aim is that, by the end of the present decade, Australian schools should all have reached minimum acceptable standards; and its detailed recommendations have been determined on the principle that help should be given to all schools below these standards to approach them by that time. It follows that those schools which are presently nearer the standards will receive somewhat less help. It should be apparent that this approach to need implies that schools with fewer real resources have greater needs than those with more (140).

In light of the report, the Australian government established a "Schools Commission" in 1974 to distribute funding to schools on an annual basis. From 1985 to 2008, most Australian government funding for schools was provided on a quadrennial basis.[7] Over that time period, there were also some changes in funding formulas and resource standards that determined levels per-pupil funding across different funding programs.[8]

In 2009, the Australian government restructured public school funding based on a new framework for federal-state financial relations: The "National Schools Specific Purpose Payment" (ACARA 2011). Other Australian government funding for schools is provided through national partnerships and the Australian government's own school education programs, known as Commonwealth Own-Purpose Expenses, administered primarily by the Department of Education, Employment and Workplace Relations (Harrington 2013, 4).

The state of New South Wales uses a centralized system to allocate funding to elementary and secondary schools.[9] State allocations comprise approximately 82.5% of schools' annual revenue. Commonwealth (federal) allocations are approximately 13%, and school derived-revenues make up about 5%. Provided through two basic methods, centralized allocations and direct central payments of school-based costs, state funding categories are: (1) salaries for school-based teachers and school administrators; (2) global funding;[10] (3) "tied" and "untied" grants;[11] (4) capital outlay and maintenance; and (5) cleaning (Keating et.al 2011, 49).

Personnel costs constitute approximately 81% of New South Wales public school budgets. School administrative support staff and specialists, as well as nonteaching staff, positions are allocated on the basis of student enrollments. Staffing formulas, faculty appointments, and faculty transfer systems are subject to collective bargaining between the New South Wales Department of Education and Communities and individual schools (Keating et.al 2011).

Additional funding programs are dedicated to equity. The Priority Schools Funding Program, which targets schools with relatively high percentages of low socioeconomic students, provides resources to improve literacy and numeracy achievement and engagement of students. Other equity allocations take into account student and school characteristics. The former include those with disabilities, English language learners (ELLs), new arrivals, and indigenous and isolated students. School circumstances include location, enrollment size (e.g., diseconomies of scale), and complexity.[12] Equity allocations are made mainly through the staffing formulas (Keating et al. 2011, 56).

Over the last decade, increasing attention has been paid to the fiscal performance and academic accountability of Australian schools. In particular, in 2010, the commonwealth introduced the "My School" website (www.myschool.edu.au) hosted by the Australian Curriculum Assessment and Reporting Authority. Open to the public, the site posts student performance by school on national standardized tests, specifically, the National Assessment Program: Literacy and Numeracy (NAPLAN), administered in grades three, five, seven, and nine. Not surprisingly, the resulting publication of school rankings and "league tables," the latter made possible by test score data on the web site, have been controversial, particularly when used by the media to "name and shame" individual schools. In spite of the commonwealth's stated goals of public accountability and transparency, a number of concerns have been raised that: (1) the site's focus leads to public perception that test scores are the single most important piece of information in judging a school's success; (2) under pressure to improve student test scores, teachers will move away from a broad commitment to student learning to a focus on "teaching to the test"; and (3) students will experience increasing stress around national testing that damage their wellbeing and have a negative effect on test results (Cook 2014, 22). Nonetheless, the commonwealth maintains that the transparency and accountability for education results and efficient use of resources the site provides are essential. The study results reported in this article on school efficiency represent a natural outgrowth of the commonwealth's ongoing commitment to these goals.

Recent Efficiency Research on Australian Primary and Secondary Schools

This section describes several recent studies that provide a snapshot of educational performance and productivity research on Australian schools. For the most part, this group of studies used traditional research methods, like the production function, although more recent approaches like data envelopment and multilevel multivariate models are also found. Together, their results are mixed, and, in that sense, represent the larger body of research in this domain.

In 2002, Mante and O'Brien assessed the technical efficiency of 27 Victorian secondary schools using the basic data envelopment analysis model of Charnes, Cooper, and Rhodes (1978). They found that a majority of the 27 schools examined were in a position to increase their outputs through more efficient use of available resources.

Bradley, Draca, and Green (2004) discussed the role of "league tables" (school rankings based upon academic performance) in providing signals and incentives using a quasi-market model. They compared a range of unadjusted

and model-based league tables for primary school performance in Queensland public schools. Results indicated that model-based tables which took into account student socioeconomic status and student intake quality varied significantly from unadjusted tables.

In a 2004 report for the Victorian Department of Premier and Cabinet, Lamb, Rumberger, Jesson, and Teese examined the effects of core funding, locally raised funds, and a number of special sources of funding, e.g., English as a second language (ESL) funding, together with variables measuring teachers' background using multilevel multivariate models. Though effects generally were found to be small or statistically insignificant, overall research conclusions supported the notion that the level and utilization of school resource variables had positive effects on student outcomes.

Miller and Voon (2011) examined Australia's National Assessment Program for Literacy and Numeracy (NAPLAN) results for 2008 and 2009 using production function analysis. Test score data for students in grades three, five, seven, and nine were regressed on socioeconomic characteristics, type of school, percent of female students, student attendance, school size, and state and region. No information on school financial resources was used in their analysis. They found large differences in educational outcomes by state and school type. Preliminary findings indicated that some schools had academic achievement both better and worse than their characteristics would suggest.

Leigh and Ryan (2011) also used a production function framework. Combining data from two nationally representative tests, they analyzed long-run student achievement for Australian adolescents, ages 13-14, and found a small but statistically significant fall in mathematics achievement between 1964 and 2003, and in both literacy and mathematics 1975-1998, even after controlling for student demographics. At the same time, real per-pupil expenditure increased substantially over this period, which the authors concluded implied a fall in school productivity.

Methodology

This study used modified quadriform analytics (MQA), a relative measure of economic efficiency, to assess the educational productivity of New South Wales (NSW) public elementary and secondary schools in Australia over three school years, 2008-2010. A quadriform is an abstract tool devised to allow a hypothesized relationship to be viewed both graphically and quantitatively. (See Figure.)

The MQA examines expenditure and output variations of schools relative to others and places each into one of four quadrants, as described below:

Quadrant 1: Efficient Schools. Efficient schools are those that generate higher than expected outcomes using lower than expected expenditures.

Quadrant 2: Effective Schools. Effective schools are those that generate higher than expected outcomes using higher than expected expenditures.

Quadrant 3: Ineffective Schools. Ineffective schools are those that generate lower than expected outcomes using lower than expected expenditures.

Figure | **Basic Quadriform Diagram**

Quadrant 1: Inefficient High Input – Low Output	**Quadrant 2:** Effective High Input – High Output
Quadrant 3: Ineffective Low Input – Low Output	**Quadrant 4:** Efficient Low Input – High Output

Quadrant 4: Inefficient Schools. Inefficient schools are those that generate lower than expected outcomes with higher than expected expenditures.

Quantitatively, the modified quadriform is constructed as a two-stage model that: (1) captures the input-output relationship as two separate regressions; and (2) uses discriminant analysis to identify alterable characteristics[13] that distinguish efficient from inefficient schools.[14] The model can be represented by the following regression equation:

$$Z_i = \alpha + \Sigma B_i W_{t\text{-}i} + u_t$$

where

Z_i = the expected values (expenditure or outcome) for each school

W_i = the unalterable values for each school.

The values for Z_i create the axes of the quadriform, and the regression residuals determine the assignment of a school to a particular quadrant.[15] In this study, school expenditures were measured across the horizontal axis, and academic outcomes were measured along the vertical axis.

The MQA shows only annual efficiency categorizations. In order to determine the longitudinal nature of efficiency among New South Wales public schools, an additional layer of analysis was added, which enabled classification of schools that were "perennially" (i.e., consistently) efficient, effective, inefficient, or ineffective over the three year period.[16]

Data Sources and Variables

The data source for this study was departmental annual financial statements for the state of New South Wales, Australia. School level data elements used in the study are listed below:[17]

School resource data. School resource data represented financial resources, such as teacher salary per student, and school structures such as student-teacher ratio.

School and Student characteristics. Student characteristics included percentages of students with disabilities, English language learners (ELL), and indigenous students by school. In addition, values for schools, based upon the Index of Community-Socio Educational Advantage (ICSEA), were used. Developed by the Australian Curriculum Assessment and

Reporting Authority (ACARA), the index was designed as a scale to enable fair comparisons of NAPLAN test achievement by students in schools across Australia. The scope of the index is broader than socioeconomic status. According to ACARA (2015):

> A value on the index corresponds to the average level of educational advantage of the school's student population relative to those of other schools. Research shows that key factors in students' family backgrounds (parents' occupation, their school education and non-school education) have an influence on students' educational outcomes at school. Research has also shown that school- level factors (a school's geographical location and the proportion of Indigenous students a school caters for) need to be considered when summarising educational advantage or disadvantage at the school level. ICSEA provides a numeric scale that represents the magnitude of this influence, or level of educational advantage, and takes into account both student and school level factors.

Student academic outcomes. Academic outcomes were represented by student scores on National Assessment Program - Literacy and Numeracy (NAPLAN). These are standardized tests administered at grades three, five, seven and nine in reading, writing, language conventions (spelling, grammar and punctuation) and numeracy (mathematics) (ACARA 2010). This study used a combined average score on these tests, referred to as a "multi-examination" average.[18]

MQA Results

This section is divided into two parts. The first presents MQA results for schools in the Australian state of New South Wales based upon NAPLAN multi-examination average scores, 2008-2010, for students in grades three, five, seven, and nine. Here the school is the unit of analysis. The second part of this section presents MQA results by region in the state of New South Wales, with the region as the unit of analysis. The first part allows for comparison of individual schools across the state of New South Wales, while the second section allows comparisons of student achievement across regions.

MQA Results for New South Wales Schools

Table 1 presents MQA results for third grade multi-examination average scores from 2008 to 2010. Specifically, Table 1 shows that the percentage of schools designated as efficient ranged from 30.5% to 33.1%, while the percentage of schools identified as inefficient varied from 19.1% to 20.4%. Table 1 also contains MQA results for schools with a perennial categorization. Just over 41% of schools were designated perennially efficient over this three year period, while 18.4% were perennially inefficient. It is also important to note that almost one-third (32.1%) of schools were found to be perennially ineffective; that is, they generated lower than expected academic outcomes with lower than expected expenditures.

Table 2 contains MQA results for fifth grade multi-examination average scores. It shows that the percentage of schools designated as efficient ranged from 32.6% and 33.3%, while the percentage of schools classified as inefficient varied from 20.5% and 21.3%. Just over 40% of schools were found to be perennially efficient, while 18.5% were perennially inefficient. As with third grade results, it is important to point out that almost one-third (32.1%) of schools were perennially ineffective.

MQA results for seventh grade multi-examination average scores are found in Table 3. The percentage of schools designated as efficient ranged from 26.7% to 32.1%, while the percentage of schools identified as inefficient varied from 22.6% to 24.5%. Just over 30% of schools were perennially efficient, while one quarter (25.3%) were deemed perennially inefficient. However, the largest proportion of schools, 35.9%, were identified as ineffective.

MQA results for ninth grade multi-examination average scores are presented in Table 4. Between 28.8% and 30.2% of schools were found to be efficient compared to 21.6% and

Table 1 | **MQA Results for Grade Three Student Achievement: 2008-2010**

Year	N	Percent/ Number	Ineffective Schools	Efficient Schools	Effective Schools	Inefficient Schools	Non-Labeled
2008	1342	Percent	34.2%	30.8%	15.3%	19.8%	
		Number	408	448	184	278	24
2009	1342	Percent	32.5%	33.1%	14.1%	20.4%	
		Number	404	456	174	277	31
2010	1342	Percent	34.0%	30.5%	16.4%	19.1%	
		Number	417	429	203	262	31
Perennial Results		Percent	32.3%	41.1%	8.2%	18.4%	
		Number	186	237	47	106	766

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Table 2 | **MQA Results for Grade Five Student Achievement: 2008-2010**

Year	N	Percent/ Number	Ineffective Schools	Efficient Schools	Effective Schools	Inefficient Schools	Non-Labeled
2008	1342	Percent	32.5%	32.6%	14.3%	20.5%	
		Number	425	426	187	268	36
2009	1342	Percent	32.2%	33.1%	13.4%	21.3%	
		Number	422	433	176	279	32
2010	1342	Percent	31.1%	33.3%	14.4%	21.2%	
		Number	409	437	189	279	28
Perennial Results		Percent	32.3%	40.3%	8.8%	18.5%	
		Number	190	237	52	109	754

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Table 3 | **MQA Results for Grade Seven Student Achievement: 2008-2010**

Year	N	Percent/ Number	Ineffective Schools	Efficient Schools	Effective Schools	Inefficient Schools	Non-Labeled
2008	371	Percent	34.5%	26.7%	16.2%	22.6%	
		Number	128	99	60	84	0
2009	371	Percent	32.3%	30.5%	13.5%	23.7%	
		Number	120	113	50	88	0
2010	371	Percent	32.1%	32.1%	11.3%	24.5%	
		Number	119	119	42	91	0
Perennial Results		Percent	35.9%	30.3%	8.6%	25.3%	
		Number	71	60	17	50	173

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

25.3% deemed inefficient. With regard to MQA results for schools with a perennial categorization, 31.5% of schools were classified as perennially efficient, while 27% were perennially inefficient. In addition, almost 31% of schools were classified as perennially ineffective.

MQA Results by Region in the State of New South Wales

The Commonwealth of Australia is comprised of six states and two territories. States include New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania. The two territories are the Australian Capital Territory and the Northern Territory. Nearly one-third of the commonwealth's 24 million people reside in New South Wales, making it the most populous state (Australian Bureau of Statistics 2015).[19] New South Wales, located along Australia's southeast coast, is divided into ten distinct school regions: Hunter/Central Coast, Illawarra-South East New South Wales, New England, North Coast, Northern Sydney, Riverina, South Western Sydney, Sydney, Western New South Wales, and Western Sydney.[20] The number of schools by region ranges from 13 in New England to 95 in South Western Sydney.

Table 5 presents MQA perennial results by region for third grade NAPLAN multi-examination average scores over the course of three academic years, 2008-2010.[21] Overall, 41% of schools across the state were perennially efficient while 18.4% were perennially inefficient. The percentage of perennially efficient schools by region varied from 11.1% in Riverina to 92.5% in Northern Sydney, while the percentage of perennially inefficient schools varied from 1.3% in Northern Sydney to 44.4% in Riverina. In addition, it is noteworthy that almost one-third (32.3%) of the state's schools were classified as perennially ineffective, including almost half of schools in the Hunter/Central Coast, North Coast, and Illawarra and South East, and Western Sydney regions.

Table 4 | **MQA Results for Grade Nine Student Achievement: 2008-2010**

Year	N	Percent/ Number	Ineffective Schools	Efficient Schools	Effective Schools	Inefficient Schools	Non-Labeled
2008	371	Percent	31.0%	30.2%	17.3%	21.6%	
		Number	115	112	64	80	0
2009	371	Percent	33.2%	29.6%	11.9%	25.3%	
		Number	123	110	44	94	0
2010	371	Percent	35.3%	28.8%	12.7%	23.2%	
		Number	131	107	47	86	0
Perennial Results		Percent	30.9%	31.5%	10.7%	27.0%	
		Number	55	56	19	48	193

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

MQA perennial results by region for fifth grade NAPLAN multi-examination average scores are found in Table 6. In total, 40.3% of schools across the state were perennially efficient while 18.5% were perennially inefficient, a result similar to that for third grade student achievement. The percentage of perennially efficient schools by region ranged from 12.9% in Riverina to 92.3% in Northern Sydney. Almost two-thirds of Sydney schools were designated perennially efficient as well. The percentage of perennially inefficient schools by region ranged from zero in Northern Sydney to 48.4% in Riverina. As with third grade achievement, approximately one third of the state's schools were classified as perennially ineffective, including over half (51.9%) of Western Sydney schools, half (50%) of schools in Illawarra and South East, and nearly half (48.9%) in Hunter/Central Coast.

Table 7 contains MQA perennial results by region for seventh grade NAPLAN multi-examination average scores. In comparison to third and fifth grade findings, the percentage of perennially efficient schools in the state decreased to 30.3% while the percentage of perennially inefficient school increased to 25.3%. The percentage of perennially efficient schools by region ranged from zero in New England to 56% in Northern Sydney. Over half (53.8%) of Western South Wales schools were designated perennially efficient as well, along with 50% of Sydney schools, and 45% of Hunter/Central Coast schools. The percentage of perennially inefficient schools by region varied from 4.0% in Northern Sydney to 50% in Riverina. In addition, one third of schools were found perennially inefficient in three regions: Illawara and Southeast; New England; and North Coast. With regard to perennially ineffective schools statewide, the percentage rose in comparison to third and fifth grade results to 35.9% for seventh grade achievement. By region, perennially ineffective schools ranged from zero in Northern Sydney to 66.7% in New England. Over half of schools were classified as perennially ineffective in North Coast (58.3%) and Illawara and South East (55.6%). In addition, nearly half of schools in South Western Sydney (48.9%) and Western Sydney (47.8%) were designated perennially ineffective.

MQA perennial results by region for ninth grade NAPLAN multi-examination average scores are found in Table 8. In total, the percentage of perennially efficient schools in the state was 30.9% while the percentage of perennially inefficient was 27%. The percentage of perennially efficient schools by region varied from 10% in South Western Sydney to 60% in Northern Sydney. Half (50%) of Hunter/Central Coast schools were classified perennially efficient as well. The percentage of perennially inefficient schools by region varied from 5.0% in Northern Sydney to 42.5% in South Western Sydney. In addition, 40% of Riverina schools were designated perennially inefficient. Statewide, 30.9% of schools were deemed ineffective. Perennially ineffective schools by region ranged from zero in Northern Sydney to 47.5% in South Western Sydney. Illawara and South East followed closely with 43.8% of schools designated perennially ineffective. For three additional regions, the percentage of perennially ineffective schools was one-third or higher: Hunter/North Coast (33.3%), New England (33.3%), North Coast (36.4%), and Western Sydney (37.5%).

In summary, using the school as the unit of analysis, a higher percentage of New South Wales schools were designated perennially efficient at the third and fifth grade levels than those at the seventh and ninth grades; that is, approximately 40% of schools were identified as perennially efficient at the lower grade levels in contrast to around 30% at the upper grades. At the same time, a lower percentage of schools, approximately 18%, at the third and fifth grade levels were classified as perennially inefficient compared to over one-quarter of at the upper grade levels. However, the percentage of schools regarded as perennially ineffective was fairly consistent across all grade levels, ranging from 30.9% to 35.9%.

Table 5 | **MQA Perennial Results for Grade Three Student Achievement by Region: 2008-2010**

Region		Ineffective	Efficient	Effective	Inefficient	Total
Hunter/Central Coast	N (schools)	41	30	7	10	88
	Region %	46.6%	34.1%	8.0%	11.4%	100.0%
	Category %	22.0%	12.7%	14.9%	9.4%	15.3%
Illawara and South East	N (schools)	22	9	2	12	45
	Region %	48.9%	20.0%	4.4%	26.7%	100.0%
	Category %	11.8%	3.8%	4.3%	11.3%	7.8%
New England	N (schools)	1	7	5	5	18
	Region %	5.6%	38.9%	27.8%	27.8%	100.0%
	Category %	.5%	3.0%	10.6%	4.7%	3.1%
North Coast	N (schools)	24	13	6	7	50
	Region %	48.0%	26.0%	12.0%	14.0%	100.0%
	Category %	12.9%	5.5%	12.8%	6.6%	8.7%
Northern Sydney	N (schools)	0	74	5	1	80
	Region %	0.0%	92.5%	6.3%	1.3%	100.0%
	Category %	0.0%	31.2%	10.6%	.9%	13.9%
Riverina	N (schools)	9	3	3	12	27
	Region %	33.3%	11.1%	11.1%	44.4%	100.0%
	Category %	4.8%	1.3%	6.4%	11.3%	4.7%
South Western Sydney	N (schools)	39	18	2	36	95
	Region %	41.1%	18.9%	2.1%	37.9%	100.0%
	Category %	21.0%	7.6%	4.3%	34.0%	16.5%
Sydney	N (schools)	4	45	12	5	66
	Region %	6.1%	68.2%	18.2%	7.6%	100.0%
	Category %	2.2%	19.0%	25.5%	4.7%	11.5%
Western New South Wales	N (schools)	10	9	3	8	30
	Region %	33.3%	30.0%	10.0%	26.7%	100.0%
	Category %	5.4%	3.8%	6.4%	7.5%	5.2%
Western Sydney	N (schools)	36	29	2	10	77
	Region %	46.8%	37.7%	2.6%	13.0%	100.0%
	Category %	19.4%	12.2%	4.3%	9.4%	13.4%
Total	N (schools)	186	237	47	106	576
	Region %	32.3%	41.1%	8.2%	18.4%	100.0%

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Turning to the inter-regional MQA results, it was possible to identify patterns where some regions consistently had higher–and lower–percentages of perennially efficient schools across grade levels. For example, in the Northern Sydney region, the percentage of perennially efficient schools, by grade level, ranged from 50% to 92.5%. In contrast, in Riverina, the percentage of perennially efficient schools was only 10.0% to 12.9%. It follows that only a small fraction of Northern Sydney schools were found perennially inefficient (zero to 5%) whereas 40% to 50% of Riverina schools fell into this category. A similar pattern was found with regard to the percentages of perennially ineffective schools. Clearly, these results, including school and regional units of analysis, are of interest to school, regional, state, and commonwealth educators and policymakers as they seek to maximize educational efficiency and productivity.

Conclusion

The goal of this study was to contribute to the body of research literature on alternative approaches to the the measurement of the economic efficiency of public schools using modified quadriform analytics (MQA) to assess the educational productivity of New South Wales public elementary and secondary schools in Australia over a three year period. To do so, the study identified and compared the economic efficiency of schools in terms of level of fiscal resources and national, mandated academic test scores for third, five, seventh, and ninth grade students, while taking

Table 6 | **MQA Perennial Results for Grade Five Student Achievement by Region: 2008-2010**

Region		Ineffective	Efficient	Effective	Inefficient	Total
Hunter/Central Coast	N (schools)	43	31	5	10	89
	Region %	48.3%	34.8%	5.6%	11.2%	100.0%
	Category %	22.6%	13.1%	9.6%	9.2%	15.1%
Illawara and South East	N (schools)	27	10	3	14	54
	Region %	50.0%	18.5%	5.6%	25.9%	100.0%
	Category %	14.2%	4.2%	5.8%	12.8%	9.2%
New England	N (schools)	2	5	4	2	13
	Region %	15.4%	38.5%	30.8%	15.4%	100.0%
	Category %	1.1%	2.1%	7.7%	1.8%	2.2%
North Coast	N (schools)	19	16	6	10	51
	Region %	37.3%	31.4%	11.8%	19.6%	100.0%
	Category %	10.0%	6.8%	11.5%	9.2%	8.7%
Northern Sydney	N (schools)	0	72	6	0	78
	Region %	0.0%	92.3%	7.7%	0.0%	100.0%
	Category %	0.0%	30.4%	11.5%	0.0%	13.3%
Riverina	N (schools)	5	4	7	15	31
	Region %	16.1%	12.9%	22.6%	48.4%	100.0%
	Category %	2.6%	1.7%	13.5%	13.8%	5.3%
South Western Sydney	N (schools)	39	19	0	37	95
	Region %	41.1%	20.0%	0.0%	38.9%	100.0%
	Category %	20.5%	8.0%	0.0%	33.9%	16.2%
Sydney	N (schools)	6	46	13	6	71
	Region %	8.5%	64.8%	18.3%	8.5%	100.0%
	Category %	3.2%	19.4%	25.0%	5.5%	12.1%
Western New South Wales	N (schools)	7	8	5	5	25
	Region %	28.0%	32.0%	20.0%	20.0%	100.0%
	Category %	3.7%	3.4%	9.6%	4.6%	4.3%
Western Sydney	N (schools)	42	26	3	10	81
	Region %	51.9%	32.1%	3.7%	12.3%	100.0%
	Category %	22.1%	11.0%	5.8%	9.2%	13.8%
Total	N (schools)	190	237	52	109	588
	Region %	32.3%	40.3%	8.8%	18.5%	100.0%

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

into account sociodemographic factors over which schools have no control. Analytical results included those for New South Wales schools using the school as the unit of analysis as well as a comparison of New South Wales schools by region. Result were further divided into cross-sectional, by year, and "perennial," the latter referring to consistency in results over a three year period.

Although MQA identified schools as falling into four distinct categories–efficient, inefficient, effective, ineffective–the primary focus of the study was on efficient and inefficient schools where efficient schools were defined as those that generated higher than expected academic outcomes with lower than expected expenditures, and inefficient schools were those that generated lower than expected outcomes with higher than expected expenditures. In addition, the analysis considered the relatively high incidence of ineffective schools, defined as those that generated lower than expected academic outcomes using lower than expected expenditures.

Accountability for academic outcomes in elementary and secondary education continues to be an important policy objective in the Commonwealth of Australia (Senate Standing Committee on Education, Employment, and Workplace Relations 2013). At the same time, as the results of this study indicated, it is a complex challenge. Further, the MQA results in this study represented only one state, New South Wales, out of the six that comprise the commonwealth, along with two territories. As such, there is ample opportunity and need for similar research in other states along with localized,

Table 7 | **MQA Perennial Results for Grade Seven Student Achievement by Region: 2008-2010**

Region		Ineffective	Efficient	Effective	Inefficient	Total
Hunter/Central Coast	N (schools)	8	9	0	3	20
	Region %	40.0%	45.0%	0.0%	15.0%	100.0%
	Category %	11.3%	15.0%	0.0%	6.0%	10.1%
Illawara and South East	N (schools)	10	1	1	6	18
	Region %	55.6%	5.6%	5.6%	33.3%	100.0%
	Category %	14.1%	1.7%	5.9%	12.0%	9.1%
New England	N (schools)	4	0	0	2	6
	Region %	66.7%	0.0%	0.0%	33.3%	100.0%
	Category %	5.6%	0.0%	0.0%	4.0%	3.0%
North Coast	N (schools)	7	1	0	4	12
	Region %	58.3%	8.3%	0.0%	33.3%	100.0%
	Category %	9.9%	1.7%	0.0%	4.0%	6.1%
Northern Sydney	N (schools)	0	14	10	1	25
	Region %	0.0%	56.0%	40.0%	4.0%	100.0%
	Category %	0.0%	23.3%	58.8%	2.0%	12.6%
Riverina	N (schools)	2	1	2	5	10
	Region %	20.0%	10.0%	20.0%	50.0%	100.0%
	Category %	2.8%	1.7%	11.8%	10.0%	5.1%
South Western Sydney	N (schools)	22	5	0	18	45
	Region %	48.9%	11.1%	0.0%	40.0%	100.0%
	Category %	31.0%	8.3%	0.0%	36.0%	22.7%
Sydney	N (schools)	5	13	1	7	26
	Region %	19.2%	50.0%	3.8%	26.9%	100.0%
	Category %	7.0%	21.7%	5.9%	14.0%	13.1%
Western New South Wales	N (schools)	2	7	2	2	13
	Region %	15.4%	53.8%	15.4%	15.4%	100.0%
	Category %	2.8%	11.7%	11.8%	4.0%	6.6%
Western Sydney	N (schools)	11	9	1	2	23
	Region %	47.8%	39.1%	4.3%	8.7%	100.0%
	Category %	15.5%	15.0%	5.9%	4.0%	11.6%
Total	N (schools)	71	60	17	50	198
	Region %	35.9%	30.3%	8.6%	25.3%	100.0%

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

school-based case studies to determine which factors, policies, and practices contribute to or impede improvements in efficiency and productivity.

Endnotes

[1] Note that public schools are referred to as "government" schools in Australia.

[2] Individual goals might include maximizing "...the size of their budget, the scope of their activities, the ease of their work, and their power and prestige" (Michaelsen 1977, 1981, cited in Boyd and Hartman 1988, 293).

[3] See also, Niskanen (1971). Working within the larger context of collective choice economic theory and building on the seminal works of von Mises (1944), Tullock (1965), and Downs (1998), Niskanen challenged traditional normative economic analytical assumptions for public bureaus. He developed a

Table 8 | **MQA Perennial Results for Grade Nine Student Achievement by Region: 2008-2010**

Region		Ineffective	Efficient	Effective	Inefficient	Total
Hunter/Central Coast	N (schools) Region % Category %	6 33.3% 10.9%	9 50.0% 16.1%	0 0.0% 0.0%	3 16.7% 6.3%	18 100.0% 10.1%
Illawara and South East	N (schools) Region % Category %	7 43.8% 12.7%	2 12.5% 3.6%	2 12.5% 10.5%	5 31.3% 10.4%	16 100.0% 9.0%
New England	N (schools) Region % Category %	2 33.3% 3.6%	2 33.3% 3.6%	1 16.7% 5.3%	1 16.7% 2.1%	6 100.0% 3.4%
North Coast	N (schools) Region % Category %	4 36.4% 7.3%	2 18.2% 3.6%	2 18.2% 10.5%	3 27.3% 6.3%	11 100.0% 6.2%
Northern Sydney	N (schools) Region % Category %	0 0.0% 0.0%	12 60.0% 21.4%	7 35.0% 36.8%	1 5.0% 2.1%	20 100.0% 11.2%
Riverina	N (schools) Region % Category %	2 20.0% 3.6%	1 10.0% 1.8%	3 30.0% 15.8%	4 40.0% 8.3%	10 100.0% 5.6%
South Western Sydney	N (schools) Region % Category %	19 47.5% 34.5%	4 10.0% 7.1%	0 0.0% 0.0%	17 42.5% 35.4%	40 100.0% 22.5%
Sydney	N (schools) Region % Category %	5 20.8% 9.1%	11 45.8% 19.6%	1 4.2% 5.3%	7 29.2 14.6%	24 100.0% 13.5%
Western New South Wales	N (schools) Region % Category %	1 11.1% 1.8%	3 33.3% 5.4%	2 22.2% 10.5%	3 33.3% 6.3%	9 100.0% 5.1%
Western Sydney	N (schools) Region % Category %	9 37.5% 16.4%	10 41.7% 17.9%	1 4.2% 5.3%	4 16.7% 8.3%	24 100.0% 13.5%
Total	N (schools) Region %	55 30.9%	56 31.5%	19 10.7%	48 27.0%	178 100.0%

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

theory of budget-maximizing bureaucratic behavior which asserted that subject to a budget constraint greater than or equal to the costs of supplying the output expected by a public bureau's sponsors, bureaucrats attempt to maximize the agency's total budget during their tenure. As a result of this budget-maximizing behavior, Niskanen's theory asserts that public bureaus generate budgets that are larger than optimal; outputs that are too low relative to expenditure levels; and outputs that are produced inefficiently.

[4] An early dissenter was Wildavsky (1964) who claimed that bureaucrats request moderate annual budget increases in order to maximize long-term budget goals.

[5] The Australian government first provided recurring funding for operational costs to private schools, in the form of modest flat grants in 1970 (Harrington 2013).

[6] The "Karmel Commission Report" is an informal name for the publication, "Schools in Australia," a report of the Australian government's Interim Committee for the Australian Schools Commission.

[7] The Schools Commission was abolished in 1988.

[8] See Harrington (2013) for a fuller explanation of these.

[9] This section provides only an overview of state funding for New South Wales Schools. For a detailed explanation, see the Keating et al. (2011, 49-62) chapter on New South Wales.

[10] "Global" denotes that every school receives this type of funding.

[11] "Tied" grants are specific purpose payments to schools while "untied" grants are general purpose payments.

[12] "Complexity" here refers to multi-site schools.

[13] Alterable characteristics represent those over which a school has control.

[14] Because this study was concerned primarily with determining the efficiency levels of public schools, only the first stage of modified quadriform method was utilized.

[15] More specifically, the expenditure regression residual values are plotted on the x-axis and the outcome regression residual values are plotted on the y-axis. Each corresponding (x,y) pairings of residuals represents the quadrant to which a specific school is assigned.

[16] After the initial modified quadriform analysis was completed, each school was given an annual value of one for the category in which it fell and annual values of zero for the remaining three categories. Then, an arithmetic mean was calculated. As a result, a school was defined as a perennially efficient, effective, ineffective, or inefficient if its school average was equal to one in any category. Schools with averages below one were excluded from further analyses. Finally, perennially categorized schools were re-analyzed within a new set of quadriforms.

[17] Univariate and multivariate statistical analyses were conducted. Univariate statistics (e.g., means, medians, and standard deviations) were calculated to provide general and comparative descriptions of individual variables. Multivariate statistical analyses examined variables underlying regression relationships necessary for modified quadriform analyses, which, in turn, were used to make inferences about levels of efficiency.

[18] For those interested specifically in reading and numeracy (mathematics) MQA results, these are available in the Appendix.

[19] Sydney is the capital of New South Wales. The metropolitan area, referred to as "Greater Sydney," represents 64% of the state's population (Australian Bureau of Statistics 2014).

[20] For a description of each region, see New South Wales government website (https://www.nsw.gov.au) and the New South Wales Department of Education website (http://www.dec.nsw.gov.au/home).

[21] Analyses of numeracy and reading by region also were conducted. For more information, please contact the author.

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Appendix
MQA Results for Reading and Numeracy Achievement: 2008-2010

Table A-1 | **MQA Results for Grade Three Reading and Numeracy Achievement: 2008-2010**

Grade Three Numeracy							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	1342	Percent	34.2%	30.8%	15.3%	19.8%	
		Number	450	405	201	261	25
2009	1342	Percent	32.3%	32.9%	14.0%	20.3%	
		Number	425	433	184	267	33
2010	1342	Percent	33.9%	30.4%	16.3%	19.0%	
		Number	446	400	215	250	31
Perennial Results		Percent	36.9%	37.1%	9.7%	16.4%	
		Number	205	206	54	91	788
Grade Three Reading							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	1342	Percent	32.0%	32.9%	14.2%	20.9%	
		Number	421	432	187	274	28
2009	1342	Percent	32.5%	33.2%	14.2%	20.1%	
		Number	424	434	185	263	36
2010	1342	Percent	33.5%	31.0%	15.3%	20.2%	
		Number	439	407	200	265	31
Perennial Results		Percent	33.8%	39.4%	9.6%	17.3%	
		Number	187	218	53	96	788

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Appendix (continued)
MQA Results for Reading and Numeracy Achievement: 2008-2010

Table A-2 | **MQA Results for Grade Five Reading and Numeracy Achievement: 2008-2010**

Grade Five Numeracy							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	1342	Percent	35.4%	29.9%	14.1%	20.9%	
		Number	460	389	183	272	38
2009	1342	Percent	35.1%	30.3%	13.6%	21.2%	
		Number	459	396	177	277	33
2010	1342	Percent	32.9%	31.5%	14.4%	21.2%	
		Number	432	414	189	278	29
Perennial Results		Percent	37.6%	37.6%	7.0%	18.3%	
		Number	214	211	40	104	773
Grade Five Reading							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	1342	Percent	33.4%	31.9%	14.7%	20.0%	
		Number	434	415	191	260	42
2009	1342	Percent	33.0%	32.4%	15.4%	19.2%	
		Number	431	423	201	251	36
2010	1342	Percent	32.3%	32.0%	14.8%	20.9%	
		Number	425	421	194	274	28
Perennial Results		Percent	34.6%	39.7%	8.7%	17.0%	
		Number	195	224	49	96	778

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Appendix (continued)
MQA Results for Reading and Numeracy Achievement: 2008-2010

Table A-3 | **MQA Results for Grade Seven Reading and Numeracy Achievement: 2008-2010**

Grade Seven Numeracy							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	371	Percent	35.0%	26.1%	17.0%	21.8%	
		Number	130	97	63	81	0
2009	371	Percent	32.9%	29.9%	14.0%	23.2%	
		Number	122	111	52	86	0
2010	371	Percent	31.8%	32.3%	12.9%	22.9%	
		Number	118	120	48	85	0
Perennial Results		Percent	35.9%	28.7%	9.9%	25.4%	
		Number	65	52	18	46	190
Grade Seven Reading							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	371	Percent	35.6%	25.6%	16.2%	22.6%	
		Number	132	95	60	84	0
2009	371	Percent	32.3%	30.5%	13.5%	23.7%	
		Number	120	113	50	88	0
2010	371	Percent	33.4%	30.7%	12.9%	22.9%	
		Number	124	114	48	85	0
Perennial Results		Percent	38.1%	28.0%	10.1%	23.8%	
		Number	72	53	19	45	182

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Appendix (continued)
MQA Results for Reading and Numeracy Achievement: 2008-2010

Table A-4 | **MQA Results for Grade Nine Reading and Numeracy Achievement: 2008-2010**

Grade Nine Numeracy							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	371	Percent	33.7%	27.5%	17.3%	21.6%	
		Number	125	102	64	80	0
2009	371	Percent	31.3%	31.5%	13.7%	23.5%	
		Number	116	117	51	87	0
2010	371	Percent	34.2%	29.9%	13.7%	22.1%	
		Number	127	111	51	82	0
Perennial Results		Percent	36.0%	30.7%	10.6%	22.8%	
		Number	68	58	20	43	182
Grade Nine Reading							
Year	**N**	**Percent/ Number**	**Ineffective Schools**	**Efficient Schools**	**Effective Schools**	**Inefficient Schools**	**Non-Labeled**
2008	371	Percent	33.2%	28.0%	18.3%	20.5%	
		Number	123	104	68	76	0
2009	371	Percent	31.5%	31.3%	13.7%	23.5%	
		Number	117	116	51	87	0
2010	371	Percent	37.2%	27.0%	12.7%	23.2%	
		Number	138	100	47	86	0
Perennial Results		Percent	34.6%	29.7%	12.1%	23.6%	
		Number	63	54	22	43	189

Note: These represent multi-examination average scores on the NAPLAN. The unit of analysis is the school. Results control for unalterable sociodemographic characteristics.

Policy Perspectives on State Elementary and Secondary Public Education Finance Systems in the United States

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Introduction

The purpose of this article is to describe and compare individual state funding systems for public elementary and secondary education in the United States. States' major education funding systems are described as well as funding mechanisms for students with disabilities; English language learners (ELL); gifted and talented students; and low income or "at-risk" students, the latter more broadly defined as those who are at risk of dropping out of school. Third is a description of state funding for vocational, career, and technical education programs, an area that is of particular importance to students who do not plan to pursue postsecondary education. Fourth are funding programs that are generally, but not always, outside the state's major funding system that are district-based. These include state funding related to sparsity and density factors; transportation costs; and infrastructure-related expenses for capital outlay and associated debt.

Methodology

Information on state elementary and secondary education funding systems for the 2014-2015 school year presented in this article was gathered by means of a 50-state survey sent to a state's chief education officer, superintendent of public instruction, or designee.[1] Follow-up reminders were sent via email and ground mail. Forty-eight states responded. For the remaining two states, survey responses were submitted by a recognized authority on that state's education funding system selected by the author. After survey results were collated, they were returned to each state contact for review and verification of their accuracy.

Major Funding Systems

For the 2014-2015 school year, states provided major funding to public elementary and secondary education using one of four types of formulas, or a combination thereof:

- Foundation program. Foundations formulas provide school districts with a uniform state guarantee for

per-pupil expenditure through a combination state and local school district funding;
- District power equalization. District power equalization formulas provide school districts with state funding that varies based on tax rates.
- Full state funding. With full state funding, all school district funding is provided by the state.
- Flat Grants. State-funded flat grants provide school districts with a uniform amount of funding per unit, such as per pupil, teacher, or classroom.

Table 1 lists those states using each type of funding system or a combination/tiered system.

Foundation Programs

Thirty-seven states use the foundation program as their major funding system. When states that employ a foundation program as part of a combination/tiered funding approach are included, the total number of states using the foundation program is 46. Foundation formulas, originally intended to fund a basic education program, support the concept of student equity through a state guarantee of funding per pupil. School districts contribute to the state guarantee through a uniform tax rate or the revenues that rate yields. The school district contribution is generally drawn from the local property tax, although some states, like Nevada, use sales tax revenues for a portion of the local funding component.[2] Using the uniform tax rate, property-poor school districts generate less revenue than property-wealthy school districts. To compensate, the state funds the difference up to the state guarantee per pupil. The level of the state guarantee per pupil, uniform tax rate, and required local contribution varies across states. In addition, some states allow school districts to exceed the foundation level by levying additional local property taxes.

District Power Equalization

Only two states use district power equalization as their major funding system: Vermont and Wisconsin. In contrast to the foundation program whose focus is student equity, the goal of district power equalization is taxpayer equity, defined as providing school districts with equal yields in revenues for equal tax rates. Types of district power equalization formulas include guaranteed tax base, guaranteed yield, and percentage equalizing systems. Historically, district power equalization has not been widely used by states in large part because of its complexity.

Full State Funding, Flat Grants, and Two-Tiered Funding Systems

With regard to the use of full state funding and flat grants as major funding systems, each is used in only one state, Hawaii and North Carolina, respectively. Flat grants represent an early form of state funding, and are rarely used today due to their disequalizing potential. Also, it should be noted that Hawaii uses full state funding in the sense that the state has only one school district; that is, the state and school district are coterminous.[3] Nine states use a two-tiered system, or combination approach to distribute funding to school districts: Georgia, Illinois, Kentucky, Louisiana, Montana, Maryland, Oklahoma, Texas, and Utah.

Student-Based Funding

States provide student-based funding either through pupil-weighting of the state's major funding system or through free-standing categorical aid programs. The most common types of student-based funding include aid to students with disabilities; English language learners; low income/at-risk students; and gifted and talented students. However, not all states choose to provide funding to all of these categories.

Table 1 | **Major School Finance Funding Systems by State**

Major Funding System	Number of States	State
Foundation Program	37	Alabama, Alaska, Arizona, Arkansas, California, Connecticut, Colorado, Delaware, Florida, Idaho, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Virginia, Washington, West Virginia, Wyoming
Full State Funding	1	Hawaii
Flat Grant	1	North Carolina
District Power Equalization	2	Vermont, Wisconsin
Combination/Tiered System	9	Georgia, Illinois, Kentucky, Louisiana, Montana, Maryland, Oklahoma, Texas, Utah

Table 2 | **State Funding Mechanisms for Special Education**

Funding Mechanism	Number of States (Total =49)	State
Per Pupil/Weighting	21	Arizona, Florida, Georgia, Hawaii, Iowa, Kansas, Kentucky, Louisiana, Maryland, Missouri, New Mexico, New York, Ohio, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Utah, Washington, West Virginia
Cost Reimbursement	9	Arkansas, Indiana, Maine, Michigan, Minnesota, Nebraska, Vermont, Wisconsin, Wyoming
Unit-Based	6	Alabama, Delaware, Idaho, Mississippi, Nevada, Virginia
Census-Based	8	California, Idaho, Illinois, Massachusetts, New Jersey, North Carolina, North Dakota, Pennsylvania
Other	16	Alabama, Arkansas, California, Colorado, Connecticut, Idaho, Illinois, Maryland, Minnesota, Montana, New Hampshire, New York, North Dakota, Oregon, South Dakota, Washington

Note: Multiple funding mechanisms are used in some states.

State Funding for Special Education

All states except Rhode Island provide some level of funding for services for students with disabilities, commonly referred to as special education funding. There is a strong rationale for states to do so, based upon federal law that protects the educational rights of students with disabilities. Table 2 lists mechanisms states use to fund special education: per-pupil/weighted funding; cost reimbursement; unit-based funding; and census-based funding. Each of these is described in more detail below.

Per-pupil/weighted funding. As the most widely used approach, 21 states provide special education funding through their major funding system with the addition of pupil weights. Weights vary across states. For example, Maryland, Oregon, and Utah use a single weight to calculate special education aid, while other states, such as Arizona, Delaware, Kentucky, and Oklahoma, use multiple weights, based upon a student's disability.

Cost reimbursement funding. With cost reimbursement funding, school districts must first use their own fiscal resources to provide special education services and then seek reimbursement from the state for all or some portion of the cost. Nine states currently use this approach: Arkansas, Indiana, Maine, Michigan, Minnesota, Nebraska, Vermont, Wisconsin, and Wyoming.

Unit-based funding. Unit-based funding mechanisms are usually classroom-based, instructional unit-based, or teacher-based. This is the least common approach, and is used by six states: Alabama, Delaware, Idaho, Mississippi, Nevada, and Virginia. Unit-based funding was more common in the past when students with disabilities were often placed in self-contained classrooms rather than mainstreamed.

Census-based funding. With census-based funding, the state provides every school district with aid based upon a fixed percentage of the school district's total enrollment. Eight states use census-based funding: California, Idaho, Illinois, Massachusetts, New Jersey, North Carolina, North Dakota, and Pennsylvania.

Other approaches to funding special education. Sixteen states use other funding approaches. These may be singular approaches, like the use of block grants by Alaska,[4] or combinations of one or more of the previously mentioned special education funding mechanisms. For example, Texas uses both unit-based weights and weighted per-pupil funding, the latter for mainstreamed students. In addition, other approaches include state funding for special education students whose educational needs may present a school district with an extraordinary financial burden. States, such as Alabama, Connecticut, and Alabama, provide this type of aid.

State Funding for Low-Income/At-Risk Students and English Language Learners

A large number of states also provide student-based funding for low income and at-risk students in addition to English language learners (ELL). (See Table 3.) Here, federal law may not exert as strong an influence on states as it does for students with disabilities, but many of the same concerns for equity and equality of educational opportunity exist. To that end, 42 states provide funding for services to English language learners, while 37 states target funding to students in poverty and more broadly to at-risk students. State funding to support ELL services takes several forms: weighting, per-pupil aid, unit funding, and lump-sum appropriations, similar to flat grants. With regard to aid for low-income/at-risk students, a number of states use weighted approaches, although eligibility requirements and distribution mechanisms may vary by state. A common approach for identifying low income students for state funding is through ascertaining their eligibility for or participation in federally funded free and reduced-price school meals.

Table 3 | **State Funding for Low-Income/At-Risk Students, English Language Learners, and Gifted and Talented Students**

Low-Income/At-Risk (Total States = 37)	English Language Learners (Total States = 42)	Gifted and Talented (Total States = 33)
Alaska, Alabama, California, Colorado, Connecticut, Delaware, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, Wisconsin	Alabama, Alaska, Arizona, Arkansas, California, Connecticut, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Georgia, Kentucky, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Ohio, Oregon, Rhode Island, Tennessee, Texas, Utah, Virginia, Vermont, Washington, Wisconsin, West Virginia, Wyoming	Alaska, Arkansas, California, Colorado, Florida, Georgia, Hawaii, Idaho, Iowa, Indiana, Kentucky, Louisiana, Maine, Maryland, Minnesota, Mississippi, Missouri, Montana, New Jersey, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, Wyoming

Note: Multiple funding mechanisms are used in some states.

State Funding for Gifted and Talented Students

There is no standard definition for "gifted and talented." Further, existing definitions offered by the U.S. Department of Education and national advocacy groups have changed over time. The same can be said for state definitions. Some definitions tend to focus on high academic achievement, in part because there exist standard definitions that can be used to determine eligibility. Broader definitions include creative and artistic potential which admittedly is more difficult to define. At present, 33 states provide some level of funding for gifted and talented students. (See Table 3.) Funding mechanisms include per-pupil weights and unit funding. Also, some states cap the percentage of students that a district may define as gifted and talented for the purposes of state funding. For example, Arkansas places a cap of five percent of school district enrollment while Hawaii imposes a three percent cap.

State Funding for Vocational, Career, and Technical Education

Although no standard definition exists for K-12 vocational, career, and technical education, the education programs and offerings in this area share a common goal of providing students with the knowledge and skills in order to be "college and career ready."[5] Historically, such programs have been targeted to students who did not plan to pursue postsecondary education. Although this focus has expanded over time to include all students, regardless of their post-graduation plans, vocational, career, and technical education remains vitally important for those students who would prefer to enter the workforce directly after high school graduation. In all, a little more than half of states provide some level of funding to school districts or intermediate units. (See Table 4.) Areas of study in this category vary widely, including, for example in Pennsylvania: agriculture education; health occupations; business education; and trade and industrial education. State funding approaches also vary and include per-pupil/weighting, unit-based funding, and cost reimbursement.

Table 4 | **State Funding for Vocational, Career, and Technical Education, and for Sparsity and Density Factors**

Vocational, Career, and Technical Education (Total States = 28)	Sparsity and Density Factors (Total States = 32)
Alaska, Arizona, Arkansas, Connecticut, Delaware, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, North Carolina, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Virginia, West Virginia, Wyoming	Alaska, Arizona, Arkansas, California, Florida, Hawaii, Idaho, Indiana, Iowa, Kansas, Louisiana, Maine, Michigan, Minnesota, Missouri, Nevada, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming

State Funding for Other District-Based Costs

The focus of this section is state funding programs that are generally, but not always, outside the state's major funding system, and represent other district-based costs. These costs are associated with sparsity and density factors; transportation; and infrastructure-related expenses for capital outlay and associated debt.

State Funding for Sparsity and Density Factors

Sparsity factors are often associated with the concept of diseconomies of scale; that is, sparsely populated areas, such rural and remote regions within a state, generally contain school districts with lower than average student enrollments, and, in turn, individual schools with small enrollments. Yet these school districts must offer a full curriculum in compliance with state standards. In addition, small districts can face challenges in recruiting and retaining teachers, administrators, and other staff due to salaries and wages which may be lower than those of larger school districts.

Conversely, urban school districts may face challenges associated with densely populated areas, referred to as municipal overburden. The concept of municipal overburden recognizes higher costs associated with urban areas, inclusive of expense categories from personnel to classroom supplies and equipment. Like their rural counterparts, urban school districts may face challenges in recruiting and retaining qualified employees, but for different reasons. For example, employees generally face higher housing costs in urban areas. Teachers and support staff in urban schools may face overcrowded classrooms that make teaching and learning difficult. Third, issues of security and safety within and outside schools in some urban neighborhoods may also be a cause for concern for teachers, administrators, and staff.

In all, 32 states provide some level of funding to school districts for sparsity and/or density factors. (See Table 4.) In general, states use pupil weights and unit-based funding along with "supplemental aid," which is similar to a flat grant. These funding mechanisms are often narrowly tailored to the specifics of the state. For example, Oklahoma adds per-pupil weights to its major funding system for "small" school districts, defined as those with fewer than 529 students. Wyoming uses unit-based funding for additional teachers for small schools in sparsely populated rural districts. Even a state like New York, which is generally considered densely populated, has small rural school districts. There, sparsity is a factor in the state's foundation funding program. As we shall see in the next subsection, density can also be a factor in state funding for transportation.

State Funding for Transportation

Table 5 shows state funding mechanisms for transportation. In all, 46 states provide some level of state funding for student transportation. The most common method, used in 17 states, is referred to as an "allowable reimbursement," where the state sets guidelines for what school district transportation costs it will reimburse and a specific dollar amount or percentage. This form of cost reimbursement may or may not include an equalization component. In contrast, nine states include transportation as a component of their major funding system: Florida, Iowa, Michigan, Minnesota, New Hampshire, Oregon, South Dakota, Tennessee, and West Virginia.

Less common state funding mechanisms for transportation are density formulas, per-pupil allocations, equalized reimbursement, and full cost reimbursement. Eight states fund transportation using a density formula: Arizona, Colorado, Kansas, Kentucky, Maine, Mississippi, Texas, and Virginia. Density formulas often use a per-pupil allocation based upon bus route miles, pupils per bus route mile, and/or square miles in the school district. Five states use a straightforward per-pupil allocation, which is a uniform amount for each transported student: Alaska, New Jersey, Vermont, Washington, and Wisconsin. The least common state funding method, full cost reimbursement, is found in three states: Delaware, Hawaii, and Wyoming.

Table 5 | **State Funding Methods for School Transportation**

Funding Methods	Number of States (Total = 46)	States
Included in State's Major Funding System	9	Florida, Iowa, Michigan, Minnesota, New Hampshire, Oregon, South Dakota, Tennessee, West Virginia
Density Formula	8	Arizona, Colorado, Kansas, Kentucky, Maine, Mississippi, Texas, Virginia
Equalized Reimbursement	4	Connecticut, New York, Oregon, Pennsylvania
Full Cost Reimbursement	3	Delaware, Hawaii, Wyoming
Allowable Reimbursement	17	Alabama, California, Georgia, Idaho, Illinois, Maryland, Massachusetts, Missouri, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Nevada, Ohio, South Carolina, Utah
Per Pupil	5	Alaska, New Jersey, Vermont, Washington, Wisconsin

Note: Multiple funding mechanisms are used in some states.

State Funding Methods for School Infrastructure

Thirty-seven states provide one or more funding mechanisms for school infrastructure, defined as school district expenditures for capital outlay and associated debt. (See Table 6.) The most common method is a state-funded project grant which is used in almost half of states. These grants are approved on a case-by-case basis and may or may not be equalized. Thirteen states use equalized grants: Connecticut, Delaware, Kansas, Minnesota, New Hampshire, New Jersey, New Mexico, Ohio, Oregon, Rhode Island, Tennessee, Vermont, and Washington. Almost an equal number use nonequalized project grants: Alaska, Georgia, Hawaii, Kentucky, Massachusetts, Maine, Minnesota, Pennsylvania, South Carolina, South Dakota, and Wyoming.

Less common state funding methods include: debt service grants (equalized and nonequalized); inclusion in the major funding system; state loans and bond guarantees; and targeted funding for aging facilities. A total of eight states provide debt service grants to school districts to defray costs associated with capital outlay. Of these, only Massachusetts and New York provide equalized debt service grants, while the grants in the remaining six states are nonequalized: Alaska, Arkansas, Kentucky, Montana, New Jersey, and Texas. In six states, capital outlay and associated debt are considered part of the major funding system: Alabama, Florida, Minnesota, Mississippi, Virginia, and Wisconsin.

State loans and state guarantees (against default) of locally issued bonds can be helpful in reducing school districts' interest costs on capital projects. Five states–California, Massachusetts, Maryland, Texas, Utah–provide bond guarantees, but only three provide state loans: Minnesota, North Carolina, and Virginia. In six states funding for modernizing aging school facilities is available: California, Maryland, Montana, New York, Virginia, and Wyoming.

Finally, it is important to point out that twelve states use multiple methods to fund school infrastructure, as follows:

- Alaska: Debt service grants and approved project grants
- California: Bond guarantees and approved project grants
- Kentucky: Debt service grants and approved project grants
- Massachusetts: Bond guarantees, equalized debt service grants, and approved project grants
- Maryland: Bond guarantees and funding for modernization of aging school facilities
- Montana: Debt service grants and funding for modernization of aging school facilities
- Minnesota: Part of state's major funding system, state loans, approved project grants, and equalized project grants

Table 6 | **State Funding Methods for School Infrastructure: Capital Outlay and Associated Debt**

Funding Methods	Number of States (Total = 37)	States
Equalized Project Grants	13	Connecticut, Delaware, Kansas, Minnesota, New Hampshire, New Jersey, New Mexico, Ohio, Oregon, Rhode Island, Tennessee, Vermont, Washington
Approved Project Grants	11	Alaska, Georgia, Hawaii, Kentucky, Massachusetts, Maine, Minnesota, Pennsylvania, South Carolina, South Dakota, Wyoming
Debt Service Grants	6	Alaska, Arkansas, Kentucky, Montana, New Jersey, Texas
Equalized Debt Service Grants	2	Massachusetts, New York
Part of Major Funding System	6	Alabama, Florida, Minnesota, Mississippi, Virginia, Wisconsin
Aging School Facilities	6	California, Maryland, Montana, New York, Virginia, Wyoming
State Bond Guarantee	5	California, Massachusetts, Maryland, Texas, Utah
State Loans	3	Minnesota, North Carolina, Virginia

Note: Multiple funding mechanisms are used in some states.

- New Jersey: Debt service grants and equalized project grants
- New York: Equalized debt service grants and funding for modernization of aging school facilities
- Texas: Debt service grants and bond guarantees
- Virginia: Part of state's major funding system, state loans, and funding for modernization of aging school facilities
- Wyoming: Approved project grants and funding for modernization of aging school facilities

While the use of multiple funding methods does not necessarily mean that this group of states provides a higher dollar amount of funding, it does indicate that school districts in these states have more than one state funding option available.

Summary and Conclusions

The research reported in this article was based upon a 50-state survey of chief education officers with regard to their respective state's funding system for public elementary and secondary education for the 2014-2015 academic year. As a result, this article presents a comprehensive view of formulas and other mechanisms states employ to fund PK-12 education at present.

The article begins with a description and comparison of state's major funding systems and related aid distribution formulas. These are designed primarily to provide support for school districts' day-to day-operating costs. The goal of the most widely used formula, the foundation program, is student equity, and more recently, adequacy. Here, the state seeks to provide sufficient funding so that all students, regardless of a school district's wealth (or poverty), receive, at least, a basic education. At the same time, the formula is built upon a state-local partnership that requires a uniform local school district tax effort. Although this approach has much to recommend it, it behooves state policymakers to question whether funding a basic education is sufficient in today's global and highly competitive economy.

Many states go beyond the general support of major funding systems to fund students who may require additional funding to ensure equality of opportunity and academic success. These state funding programs commonly include students with disabilities; English language learners (ELL); gifted and talented students; and low income or "at-risk" students. Overall, state funding mechanisms include per-pupil allocations, weighted formulas, unit-based formulas, and cost reimbursement. Some level of funding for special education is nearly universal across states, followed closely by state funding mechanisms for English language learners, while approximately two-thirds of states provide funding for students identified as low income, at-risk, or gifted and talented.

Chief state education officers were also asked to describe state funding mechanisms to support vocational, career, and technical education programs. Although the goals of these programs have expanded over time to include all students under the banner of "college and career ready,"[6] vocational, career, and technical education remains critically important for students who plan to enter the workforce immediately after high school education. In that respect, the finding that only slightly more than half of states provide aid is disappointing.

Fourth, the survey sought information on funding programs that are generally, but not always, outside the state's major funding system that are district-based. These include state funding related to sparsity and density factors; transportation costs; and school infrastructure. The impact of sparsity and density factors on school districts represents, at one end of the continuum, diseconomies of scale in rural, remote, sparsely populated areas and municipal overburden in large cities and urban areas at the other. Approximately, 60% of states have funding mechanisms to address these factors.

The long tradition of state funding for student transportation in the United States continues with 46 states providing aid to school districts. The most common funding mechanism, used by approximately half of states, provides cost reimbursement, up to and including 100% district-based transportation costs, in some cases. Nine states include transportation as a component in their major funding system.

On the other hand, school infrastructure costs, also referred to as capital outlay and debt service, have a long history of being considered a local responsibility although school finance litigation, particularly in recent decades, has played a role in starting to change that mindset.[7] According to survey results, approximately three-fourths of states provide some level of support for capital outlay and associated debt. The most common state funding mechanism takes the form of a grant either for a project or debt service. It should be noted that eleven states use more than one infrastructure funding program, including not only grants, but also state loans, bond guarantees, and targeted funding to modernize older school facilities. A few states also include infrastructure as a component of their major funding system.

Endnotes

[1] Survey results were previously presented at the 2015 National Education Finance Conference, Jacksonville, Florida. This article also draws upon, "A Quick Glance at School Finance: A 50-State Survey of School Finance Policies (2015)," by Deborah A. Verstegen, http//www.schoolfinances.info.

[2] See, "Nevada," https://schoolfinancesdav.files.wordpress.com/2015/04/nevada.pdf.

[3] See, "Hawaii," https://schoolfinancesdav.files.wordpress.com/2015/04/hawaii.pdf.

[4] Alaska's block grant funds not only special education, but also gifted and talented, bicultural/bilingual, and vocational education programs. Illinois and several other states use additional types of funding for special education, such as personnel reimbursement, and preschool and private school placement funding allocations.

[5] See, for example, "Career and Technical Education," Office of Superintendent of Public Instruction, State of Washington, http://www.k12.wa.us/CareerTechEd.

[6] State of Washington, "Career and Technical Education," Office of Superintendent of Public Instruction.

[7] See, for example, the Arizona Supreme Court case, *Roosevelt Elementary School District No .66 v. Bishop*, 877 P.2d 806 (Ariz. 1994).

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