

FUNDING THE NEED NOT THE LABEL

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Abstract

This paper proposes a taxonomy of school funding formula elements which distinguishes between funding based on individual student needs and the needs of populations of students based on particular characteristics or labels.

This builds on the theoretical approach proposed by Caldwell, Levacic and Ross (1999) where school funding formulae can be categorized into one of four generations with first generation funding being simple pupil/teacher ratios supplemented by per pupil grants and fourth generation providing comprehensive support for students with differing needs and being related to student learning outcomes. The taxonomy proposed in this paper follows the generic funding model put forward by Odden and Busch (1998) and Fazekas (2012).

A suggested broadening of this taxonomy is proposed based on recent evidence in Australia which examined the efficacy of funding formulae based on individual student needs and those based on the average level of need for populations of students based on particular characteristics.

Introduction

The main focus of this paper is distinction between funding targeted to support individual students and that targeted to support sub-populations of students. This is important because there is converging evidence that funding allocated to sub-populations of students is not effective and in some cases very little of the targeted funding actually reaches the students that the funding is intended to support, because the statistical measure is inadequate. In the case of low-SES funding there is less specificity as to what the funding is for and how improvement should be measured than funding targeted at other sub-populations of targeted students such as those with low English language proficiency which has very specific aims, standard interventions and measures of improvement. By distinguishing between the individual and particular sub-populations of students there is an opportunity to measure the efficacy of the funding in achieving particular student outcomes with some precision. There is however debate and in some cases a lack of definition as to what student outcomes particular funding is intended to improve.

Caldwell, Levacic and Ross (1999) categorized school funding formulae into one of four generations with first generation funding being simple pupil/teacher ratios supplemented by per pupil grants and fourth generation providing comprehensive support for students with differing needs and being related to student learning outcomes. This paper examines the more modern funding formula, particularly those that are related to student learning outcomes. Odden and Busch (1998) and Fazekas (2012),

summarized the four main groups of variables used in school funding formula in OECD countries as:

- Basic, student number and grade level-based
- Needs-based
- Curriculum or educational programme based
- School characteristics-based.

Less common in Australia are variables that relate to the revenue raising capacity of schools. In the United States funding formulae will often include adjustments for the revenue raising capacity of a school district. More State or Federal funding is provided to those districts with less revenue raising capacity. In Australia Gonski¹ proposed a school funding formula that included a revenue raising adjustment, but only for non-Government schools (Department of Education, Employment and Workplace Relations, & Gonski, D. M. 2011). Gonski did not recommend funding based on differences in the curriculum or educational programs nor on characteristics of schools. Gonski proposed a model where funding was predominantly based on who is taught rather than what is taught and by doing so met a principle of equity such that a student with the same needs would receive the same level of funding irrespective of where they attended school.

This paper proposes a taxonomy of elements of school funding formulae as follows:

- Funding provided to a central educational authority to spend on behalf of schools
- Funding provided as a fixed base grant for each school and not directly related to an individual student
- Funding provided on a per-student basis
- Funding provided based on the year level of each student
- Funding based on the needs of individual students
- Funding based on the needs of sub-populations of students
- Funding based on curriculum offerings
- Funding based on school characteristics
- Transitional funding
- Funding to adjust for input prices
- Adjustments to funding based on revenue raising capacity of schools.

¹ Whilst David Gonski is widely credited as the person making this proposal it was in his position as chair of a committee that undertook the major review of school funding in Australia.

This proposed taxonomy is not an endorsement of any of the categories listed above. It is put forward to provide clarity around which aspects of a funding formula are being examined or referred to. Indeed there are sound reasons why for example Gonski did not recommend any funding that was related to curriculum offerings. The consideration of which elements are desirable or not will depend on the principles of funding that are determined in each jurisdiction. The principles may include equity, transparency, simplicity, subsidiarity, and efficiency with respect to educational outcomes. Further discussion of which categories should be included in a funding formula is beyond the scope of this paper.

For readers seeking a more detailed understanding of the categories in the taxonomy, Fazekas (2012) provides a comprehensive discussion of the majority of these elements and this paper will in the main examine only the needs based funding elements of the proposed taxonomy. Current taxonomies do not differentiate needs-based funding on whether it is targeted at individual students or on sub-populations of students. The distinction is put forward to compare the efficacy of each type of funding and also to examine the accountability requirements that follow from each.

Low SES Funding

There has been a trend in all Australian states to use student learning outcomes to fine tune different aspects of funding formula. One pervasive example is the steady conversion of low-SES funding from measures based on income to measures based on occupation and educational attainment.

Lamb and Teese (2012) examined a number of statistical indices in their review of the Western Australian Department of Education's school funding. They found that the measure of education and occupation of parents had greater correlation with NAPLAN² results than a measure that included income. Similar work has been undertaken by all Public Education authorities in Australia, most recently at a national level with the review of the Gonski loading on low socio-economic status (SES). Lamb and Teese (2012) also examined the correlation of various indices with student attendance.

² National Assessment Program – Literacy and Numeracy (NAPLAN) is an annual assessment for students in Years 3, 5, 7 and 9.

One manifestation of funding allocated based on family income is that students in some remote mining communities may live in high income households but have parents who are unskilled and who have no post school qualifications. Lamb and Teese (2012) reported that students from these families are less likely to successfully complete their secondary education. It is also conceivable that children with highly educated and skilled but unemployed or part-time professional parents will attract funding, when they are already likely to successfully complete their schooling.

The shift towards allocating funds based on parental occupation and education better targets the needs of students when need is measured using NAPLAN scores and perhaps rates of attendance. Remarkably the redefinition of low-SES to include the children of wealthy workers in remote mining communities has not been controversial. However the overall impact of this fine tuning of socio-economic funding is only marginal improvements in the allocation of funding to students who most need support with their learning.

The use of NAPLAN measure to assess the efficacy of particular funding formula has been undertaken for many years in all states and territories and nationally. There are obvious challenges in using NAPLAN data that are well known and documented. Disadvantage is much broader than by a very limited number of academic attainment measures at a point in time. It is likely that Lamb, Teese and Gonski would be well aware of these limitations, and used them because at a population level they are sufficient for determining which population measure best explains the variation in student learning outcomes. It is likely that other additional measures such as national well-being measures, or a broader range of academic attainment measures would be included in such a process if they were available. Notwithstanding this potential limitation, it is apparent that researchers are using NAPLAN as a proxy measure for the outcome that the low SES funding is intended to improve. As we shall see later in this paper disadvantaged language background other than English is used a proxy measure for the outcome of English language Proficiency that is intended to improve.

An analysis was undertaken of funding provided to South Australian government schools in 2011 (Witham 2015) for each of the 45,630 students who did the NAPLAN reading test in 2010. The unpublished SA study is consistent with the results found in NSW which is discussed below. In both cases there is evidence that existing broad population measures fail to accurately target significant number of students with specific learning needs.

The South Australian study involved a very detailed forensic matching of each item of funding in the resource entitlement statement (RES) with the individual students in each school. For each student a profile was developed that included their NAPLAN test results for reading, writing and numeracy as well as the following characteristics that are used in funding formulae:

- Year level (4 sub-categories)
- Disability (13 sub-categories)
- Low SES (17 sub-categories)
- English as a Second Language (ESL) (14 sub-categories)
- New Arrivals (1 Category)
- Aboriginal and Torres Strait Islanders (3 sub-categories: Anangu, Aboriginal and Mainstream Schools)
- Rural (1 Category)
- Small Schools (2 sub-categories)
- Targeted programs specific to year 3 early literacy

A multiple regression analysis was undertaken on this database of 45,630 students, their characteristics, their 2010 NAPLAN results and their base and targeted funding amounts in 2011 to examine the following:

- The degree to which the characteristics used in the funding formulae explained the variation in the level of funding provided to each student
- The degree to which those same characteristics explained the variation in the NAPLAN reading scores for each student
- The degree to which variation in the total and targeted funding for each student was explained by the NAPLAN reading scores for each student from the previous year. This was to assess how well the systemic resource allocation policy responded to the known learning needs of students.

This analysis found that:

- 83% of the variation in the funding allocated to individual students was related to the student characteristics used in the various funding formulae. This reduces slightly to 81% if only targeted funding is considered. The variation that is not explained by these characteristics

includes that which is attributable to a number of distortions created by additional funding provided based on the unique industrial and other circumstances of some schools, which are not directly related to the learning needs of the students and a number of needs based funding programs where the allocations are based on prior year enrolments.

- 40% of the variation in the reading outcomes for targeted groups of students was explained by the student characteristics used in the various funding formulae. This is not at all surprising given that the variables in the funding formula did not include other student characteristics such as the educational attainment of the student's mother, the number of siblings and order of birth of each child and gender or the actual teaching practices in each school and the number of high-need students within each class.
- There was zero correlation between the total funding amount for individual children and their learning outcomes. However if we only examine the targeted funding there is a correlation where 8% of the variation between learning outcomes can be explained by the level of targeted funding for individual children. Whilst this is a surprising finding, it is consistent with other similar research such as that by Carter (2014) who found that "funding is an insignificant variable in the equation for efficient student achievement".

Another possible conclusion could be that the resource allocation policy has been so successful that after the funding has been applied to support targeted groups of students only random variation in learning outcomes remains. However the methodology considered the resource allocation that occurred in the year following the year of the NAPLAN test. This was to test the resource allocation response to the known learning outcomes of students. The response overall is close to a random allocation of resources with respect to student learning outcomes.

The weak association between reading scores and funding for individual students is because the variation within particular targeted groups of children is far greater than the variation between groups. For example the variation in the average reading outcomes between Aboriginal and Non-Aboriginal groups of students is less than the variation in reading outcomes between individuals within the Aboriginal student cohort or between individuals within the non-Aboriginal student cohort. This reflects the binary nature of grouping children into groups such as Aboriginal/Non-Aboriginal or into a discrete category rather than a continuous measure of SES disadvantage.

To illustrate what this means students were categorised as being either targeted or non-targeted. Non-Targeted students are the minority who receive no additional funding based on needs of any kind. The Targeted students are all other students. The targeted students had an average reading score of 471

and the non-targeted a score of 528. This is intuitively what most would expect; that those needing targeted funding are the ones that receive it. However a different picture emerges when we look at the distribution reading scores for students within the targeted group and within the non-targeted groups as shown in Chart 1.

Chart 1: Comparison of Reading Outcomes for Targeted and Non-Targeted Groups of Students

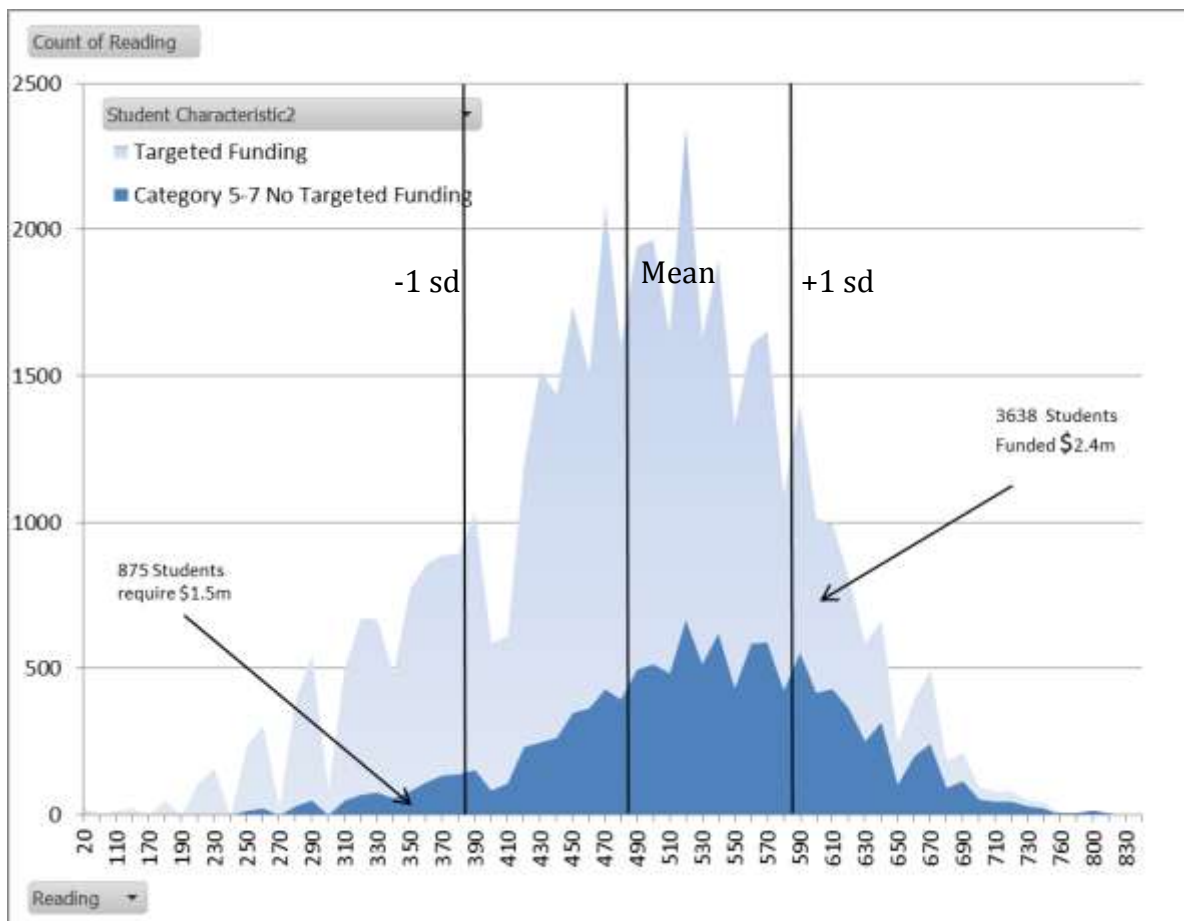


Chart 1 shows that the distribution of reading outcomes for targeted students is skewed towards higher achievement in reading than the non-targeted group of students. The vertical lines show the mean and +/- one standard deviation in reading scores for the total population of students. Table 1 compares the student achievement in reading in each group.

Table 1: Distribution of Reading Achievement by Funding Categories

Funding Category	Standardised 2010 NAPLAN Reading Scores		
	Less than 1 STD of Mean	Within 1 STD of Mean	More than 1 STD
Students attracting no Targeted Funding in 2011	7%	68%	25%
Students attracting Targeted Funding in 2011	21%	69%	11%
All Students	17%	68%	15%

This indicates that the targeted funding is diluted such that only 21% of students receiving targeted funding are achieving significantly below the mean (more than one standard deviation below) for all students in reading. 80% is allocated to students who are within 1 standard deviation above or below the mean (69%) or are achieving significantly higher (11%).

Conversely there are 7% of students who receive no targeted funding but who have reading scores less than 1 standard deviation below the mean. These students are “off the radar” using current measures of educational disadvantage. In financial terms 33% of the amount of targeted funding is currently allocated to students achieving less than 1 standard deviation below the mean in reading achievement. 67% is allocated to students who are within 1 standard deviation of the mean (61%) or are achieving significantly higher (6%).

Chart 1 also shows that there are 875 students who receive no targeted funding, but who have reading scores less than one standard deviation below the mean. There are 3638 students attracting \$2.4m in targeted funding who have reading scores more than one standard deviation below the mean. If the 875 targeted students were funded at the same average amount as targeted students this would cost an additional \$1.5m. These numbers are based on the subset of South Australian students who sat the NAPLAN reading test in 2010. It excludes students with high levels of need and funding who did not sit the test. A change of the measure of socio-economic disadvantage from income to parental occupation and education status is not likely to make significant improvement in the overall allocation of resources to students needing support. Another implication from chart 1 is that the potential shift in funding would only relate to 10% of students in the sample of 45,630.

English Language Proficiency Funding

In 2013 the NSW Department of Education and Communities were funded by the Australian Government to examine alternatives to the disadvantaged language background other than English

(LBOTE) for allocating funds to support students with English language proficiency (NSW Department of Education and Communities, 2013). This analysis provided convincing evidence that the disadvantaged LBOTE measure is an inadequate measure for limited English language proficiency because it:

- Underestimates the absolute size of the cohort needing support (low size equivalence)
- Fails to identify many of the students needing support (limited coverage)
- Includes too many students who do not require support (lack of accuracy).

The analysis that led to these conclusions compared students who were labelled as disadvantaged LBOTE to a directly assessed measure of the English language proficiency of each individual student by appropriate expert staff within the NSW Department of Education and Communities. This work also examined the following alternative statistics:

- Disadvantaged LBOTE
- LBOTE and not born in Aust
- Disadvantaged LBOTE, or LBOTE and less than or 1 year in an Australian school
- Disadvantaged LBOTE, or refugee students
- Disadvantaged LBOTE or NAP students
- LBOTE and ≤ 2 years in an Australian school
- LBOTE and ≤ 1 year in an Australian school
- LBOTE and ≤ 2 years in an Australian school and not born in Australia
- Refugee students
- NAP students
- Refugee or NAP students.

The purpose of the NSW research was to determine which nationally available measure would best target the 44,494 students in NSW who had been individually assessed as having limited English proficiency. Table 2 shows there were 21,626 students in NSW labelled as being disadvantaged LBOTE. Of these 25% had limited English Proficiency. Only 5,475 students (12.3%) of the students with limited English proficiency were identified as being disadvantaged LBOTE.

Table 2: Comparison of Different Measures of Low English Language Proficiency

Measured Group	Size of Measured Group	Measured Group size as % of target group	Size of Measured Group also in Target Group	% of Target Group Included in Measured Group	% of Measure Group in Target Group
Disadvantaged LBOTE	21,626	49%	5,475	12%	25%
LBOTE and not born in Australia	62,086	140%	17,064	38%	27%
Disadvantaged LBOTE, or LBOTE and <=1 year in Australian school	42,957	97%	18,400	41%	43%
Disadvantaged LBOTE, or refugee students	25,501	57%	7,115	16%	28%
Disadvantaged LBOTE or NAP students	25,948	58%	8,365	19%	32%
LBOTE and <=2 years in Australian school	47,311	106%	24,930	56%	53%
LBOTE and <=1 year in Australian school	23,916	54%	14,660	33%	61%
LBOTE and <=2 years in Australian school and not born in Australia	18,005	40%	10,355	23%	58%
Refugee students	6,409	14%	2,860	6%	45%
NAP students	5,904	13%	3,372	8%	57%
Refugee v NAP students	12,159	27%	6,015	14%	49%
Allocated based on Direct Measure of English Language Proficiency	44,494	100%	44,494	100%	100%

The implications of this analysis on school funding formula are very significant. For example if funding for students with low English language proficiency of \$100m per annum was allocated using the disadvantaged LBOTE measure we would see:

- \$25m provided to students with low English language proficiency (successfully reaching the target group)
- \$75m provided to students who are proficient in the English language. (These can be considered false positives)
- \$154m that would be required to provide students with low English language proficiency who receive nothing under the Disadvantaged LBOTE measure. (These can be considered false negatives).

A similar picture emerges for all of the measures except of course a direct measure where all of the \$100m is provided only to students individually assessed as having low English language proficiency. There is another potential misallocation of resources that occurs when disadvantaged LBOTE is used

to allocate funding. The amount per student based on actual number of individual students measured as having low English language proficiency is \$2,247. This would increase to \$4,624 if the disadvantaged LBOTE is used. The work undertaken by the New South Wales Department persuaded all jurisdictions not to use an indirect population measure to allocate government funding as the level of misallocation of public funds would be unacceptable. The NSW work noted that there is a strong relationship between the EAL/D and the NAPLAN reading and writing scores.

In South Australia a directly assessed measure of English language proficiency has been used for many years to allocate funding to individual students with low English language proficiency. It is an uncontroversial approach to meeting the needs of students. Whilst such an approach could be seen as inviting schools to game the system by falsely claiming students had greater need than they really did, this has not occurred in the last decade or more that such a system has been in operation.

Funding for Students with Disability

There is work underway nationally in Australia to develop a consistent national definition of students with a disability (PricewaterhouseCoopers Australia, 2012) and to use this definition for funding purposes (PricewaterhouseCoopers Australia, 2015). The basis for the definition is whether any adjustment is provided by the school to the student to address their disability to enable them to access the curriculum. There are four levels (no adjustment, supplementary, substantial or extensive). It is proposed that at some future date the latter three categories will attract national funding to be provided to schools. This would be another example of funding based on the direct individually assessed student need. It is seen as an improvement on disability funding allocated based on the type of disability. In South Australia a direct measure of disability based on individual assessment has been in place for many years.

Population Based Funding

It is evident that some needs based funding is not intended to support individual students, but rather a sub-population of students within an educational system. An example is funding provided to support students who are attending geographically isolated schools. This funding is used across an entire school to support all students. Such support could involve broadening formal and informal curriculum offerings. This could be used to pay for students to visit the museum, art gallery, zoo and other cultural centres located in capital cities or major centres. It could also be used to fund travel to enable sporting events with the nearest school. These would be examples where the funding is used to purchase greater quantities of activities or services (quantity differentials). Sometimes funding can be used to pay for the higher costs of services such as maintenance or staff location allowances which are

examples of price differentials.

Funding provided to support Aboriginal students is sometimes used to support entire school activities rather than to support individual students. For example Aboriginal cultural lessons could be taught to all students, and an Aboriginal flag could be purchased to symbolize reconciled Australia for Aboriginal and non-Aboriginal students.

Low-SES funding is in the main a population-based funding allocation. It is often used to fund more teachers so that all students in a school are taught in smaller classes. Other times it is used to provide breakfast programs for any student that needs it (most often those from low income families). Another form of low-SES funding is where funds are allocated to compensate the school for low revenue raising capacity of the parent population. In South Australia the school card allowance is provided to schools for each student with a parent that meets low-income criteria.

Accountability implications

Where funding is allocated to a particular individual student for a specific purpose, such as to improve English language proficiency from one assessed level to another, or to provide an adjustment that will allow a student with a disability to access the curriculum, it would be reasonable to expect a school to be accountable for using those funds for the benefit of the individual students being targeted. In the example of English language proficiency the purpose of the funding is very clear and can be and is measured. A student may in one year be a high need student and in the next year be a low need student and in the following year not require any funding. A number of commentators have cautioned against funding based on outcomes of specific individual students as it could lead to perverse incentives and gaming (Hood, 2006, 2007, Smith, 2003 reported in Fazekas, 2012). The independent moderated assessment process in South Australia allocates a fixed total budget allocation to students with low English language proficiency and has not led to schools overstating the needs of students. Schools are accountable for using their specialist English as a second language teachers to achieve a specific and measured level of English language proficiency outcome for individual students.

Where the purpose of the individual funding is not as clear and where the assessment of need is not independent there will be greater opportunity for gaming the funding system. The accountability in the English Language proficiency funding is twofold. First there is a requirement that funds are expended on the particular students and second there is a requirement that students improve their proficiency in English by a specified and measured amount.

Where the funding is allocated for less specific purposes such as the disability funding there is

potential that these funds will be used for other than the intended recipient student. In some cases disability funding may be pooled to create additional leadership positions with a focus on disability, without any clear plan as to how outcomes will be improved and without any accountability to show such improvement.

Where the funding is allocated to populations of students the accountability is even more problematic. If we consider the low-SES funding, some schools will use those funds to feed students, others may use the funding to manage attendance and in both of these examples the recipients of the funds may be broader than the targeted low-SES students. Accountability for population based allocations does not include a requirement that each student in the targeted population receive a specific allocation. Accountability is focused on an improvement in the overall population and it may be an improvement in attendance, wellbeing or test results.

When a student is the intended recipient of multiple targeted funding allocations such as Aboriginal, and disability, each of these will require a school to acquit those allocations in a coherent manner for the overall benefit of each individual child. This leads to the concept of a single learning plan for each child that takes all targeted support into account. Funding based on specific learning plans for individual students would be a significant future step forward in the evolution of needs-based funding. The distinction between population and individual student funding allocations for disadvantaged students is summarised in Table 3.

Table 3: Comparison of Individual and Population-based Targeted Funding

	Individual	Population
Degree to which funding is directed to the targeted students	As high as 100% for English as a second language.	As low as 8% for low-SES and 25% for Disadvantaged LBOTE
Accountability	A requirement to acquit funds for individual students and to improve outcomes for those students	A requirement to improve outcomes for a population of students.

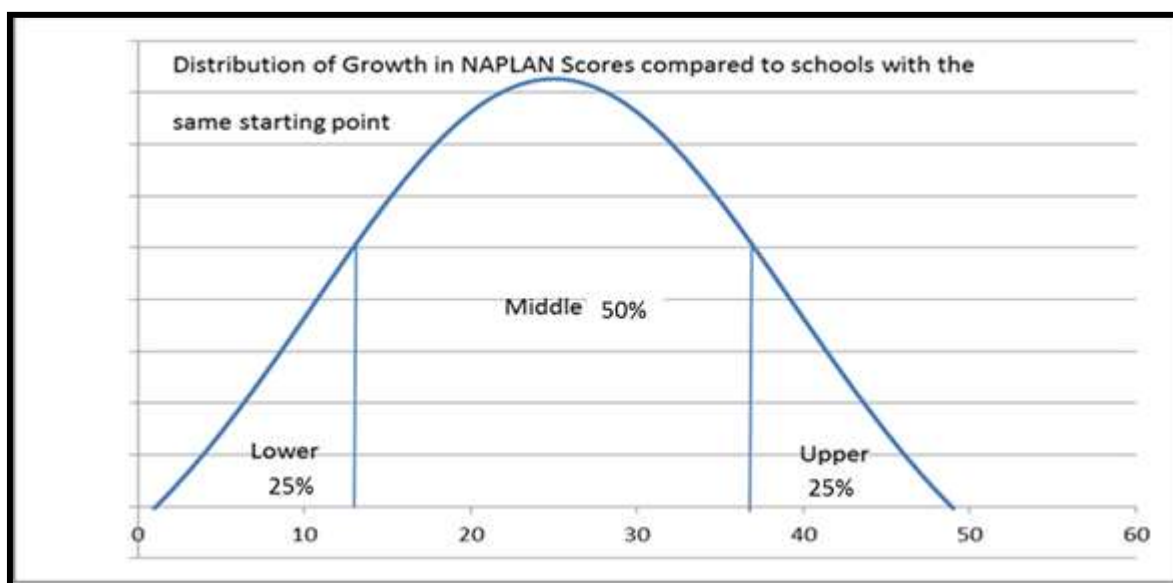
Shifting Learning Outcomes for Populations of Students

All of the discussion so far has been about targeted funding aimed at a minority of students who need support to move from the lowest levels of achievement. This assumes a policy objective of lifting the bottom percentages of learners towards an average level of attainment. It does nothing to improve the learning outcomes of students who are doing okay but could do better, and it ignores students who are at the top end of achievement. Whilst some funding formulae explicitly recognise gifted and talented students, it is unusual for a systemic approach being taken to lift performance of all students. An

alternative policy position would be to aim for all students to reach their full potential. In 2008 education ministers from all Australian governments met in Melbourne and signed a declaration that all young Australians must be motivated to reach their full potential (MCEETYA, 2008). The approach in Australia has not supported all students to reach their full potential, as the prevalent policy objective is to address only the bottom percentage of students. To make large shifts at a population level it would be necessary to have specific measures that identify individual children or cohorts of children who have not learned as much as could be expected.

If we consider progression in learning for students between years 3, 5, 7 and 9 we can measure the relative growth in learning over two years for all students with the same starting point. We can then categorise the students who are in the bottom 25% of growth in learning irrespective of their absolute test score. Chart 2 is an illustration where all students have been categorized as being in the bottom 25%, middle 50% and upper 25% of growth in learning outcomes as measured by the NAPLAN test scores matched for the same students across 2 years.

Chart 2: Illustration of Distribution in Growth in NAPLAN Scores



If we funded schools based on the lower quartile of growth it would redirect a small amount of funding away from some well-known disadvantaged communities and into a few schools in middle and higher SES areas. This would be anathema to those who seek to improve outcomes for the most disadvantaged, but it would address disadvantaged students who are not receiving any targeted support and would match the objective set out in the Melbourne declaration of assisting *all* students to reach their *full* potential. It would also have greater prospects of moving the entire distribution of outcomes shown in the chart 2 to the right.

Whilst such an approach would appear to be a radical move from current approaches to school funding, the outcome in terms of the distribution of funding is not far removed from the outcome of current funding models. This is consistent with the redistribution of funding shown earlier in Chart 1. One benefit of such an approach would be the recognition and understanding that every school has an obligation to support all students to reach their full potential.

One should of course treat such an approach with caution by minimizing opportunity for schools to game the system resulting in perverse outcomes. This has been a common reason why funding should not be directly aligned to student need. Given that the statistic is based on growth in learning it is somewhat harder to manipulate, however clear accountability requirements would need to be in place to manage such an approach. As noted earlier such accountability requirements are already in place in South Australia where funding is allocated for students with low levels of English language proficiency and gaming and perverse outcomes have not eventuated.

This paper has described an existing taxonomy of funding and proposed a relatively minor distinction by splitting the needs-based targeted funding category into direct allocations to individual students and allocations to sub-populations of students. By itself this is a small step forward in the evolution of our understanding of the theoretical basis for school funding formulae. “Funding the need” refers to funding the individually assessed needs of students. “Funding the label” refers to funding a population statistic. As we saw in the New South Wales work the move from funding based on a label (Disadvantaged LBOTE) to an individually assessed need (English language proficiency) increases the accuracy of targeting funds from 12% to 100%.

This and other recent work undertaken across Australia to use measures of student learning outcomes to assess indices used for allocating funds to targeted sub-populations of students provides opportunity has not been recognized as a formal methodology for assessing the efficacy of particular statistics or labels to target the learning needs of students. This approach provides a basis for assessing all funding formula. For example it is now possible to compare the formula in different jurisdictions and determine which most effectively targets students based on particular specified needs. It is also now possible to use this approach to prospectively assess proposed changes to a funding formula to determine if the change would increase or decrease the accuracy of targeting student need.

The potential to target funding so that all students can reach their full potential in line with the Melbourne declaration is a challenge that still awaits, however the possibility of such an approach can perhaps be seen with low-SES funding now being targeted to support children in high income families in remote mining communities.

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