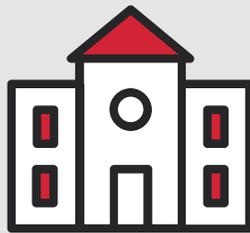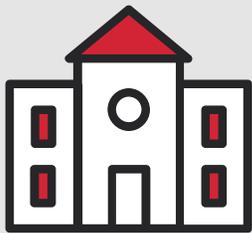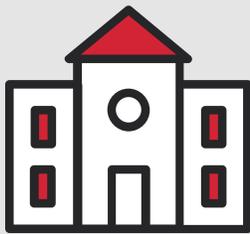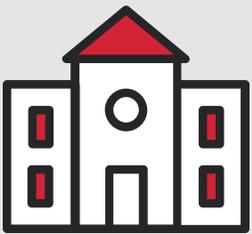# Weighted-Student Funding
2.0

Using school-level dynamic weighting for a more equitable funding allocation.

Weighted-Student Funding 2.0

Using school-level dynamic weighting for a more equitable funding allocation

More than ever, school districts are relying on weighted-student funding (WSF) formula to address school-finance equity concerns and distribute resources more directly to schools. But the findings are mixed related to the ability of WSF to advance fiscal equity.

On limitation of today's WSF models is that they do not accommodate between-school variation in student need. These models employ weights that are the same for all schools and therefore cannot account for variations in student need across schools. This is a problem because student groups are rarely homogeneous and localized needs vary across schools based on the concentrations of particular student types.

The lack of nuance in WSF formula can be addressed with a new method of formula design that uses dynamic weights. In this approach, each school has different weight values that correspond to student need and the concentration of need within the school. The model also uses dynamic base weights to account for inherent inequities in teacher salary distributions.

What follows is a review of traditional WSF models – what they are, how they are designed, and ways they are implemented. We consider the ability of the traditional WSF model to advance resource equity and detail a new approach. Not without its limitations, this new WSF model representations a next-level iteration of WSF that improves on the approach's ability to advance resource equity within a district.

WHAT IS SCHOOL FINANCE EQUITY?	There are three dimensions to school finance equity:

1. **Horizontal equity**
   The "equal treatment of equals"
2. **Vertical equity**
   The differential treatment of different groups
3. **Adequacy**
   Resource distribution that will be sufficient to achieve student outcomes

WHAT IS STUDENT NEED?	Student need refers to the amount of resources required to educate different types of students in different contexts.

What is WSF?

WSF formula are mathematical approaches to resource allocation that set per-pupil funding (or other resources) equal to a function of:

- The overall proportion of certain student subgroups or characteristics in the total school-age population, and
- 1) the resources required to educate students within each category, or 2) the amount of resources a district can afford to allocate to the student characteristics.[1]

These categories, traits, or subgroups are computed along with the amount of resource need for each group using design approaches such as true adequacy or relative need. The capacity of WSF formula to advance fiscal equity depends, in part, on the validity of the weights and that money is allocated according to the formula design.[2]

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How are traditional WSF models designed?

Typically, WSF formula are built to target district-perceived need without disrupting programmatic and operational allocations. Other factors play a role in the amount of resources that are allocated to the formula. These factors include technical, economic, and political considerations that subsequently drive total resource expenditure. Overall, most approaches to WSF formula design begin with an assessment of what resources a district can expend to advance equity at the time of implementation. [2]

Traditional WSF formula design typically involves three steps:

1. Identify the categories/types of students and areas of need
2. Assign weights to each that reflect differences in need
3. Determine a foundation or base cost and apply the formula

Today's WSF models establish a weight that corresponds to one group of students or student characteristic, apply that weight universally across a district, and then allocate funding according to the weight.

STEP 1. WSF formula are rooted in the idea that certain groups of students cost more to educate than others. Generic assumptions from the available literature or existing costing-out study data can guide the selection of weighted groups. Traditional WSF formula include a wide range of categories that receive weights, such as:

- High-achieving students
- Low-achieving students
- Students in circumstances of poverty
- Students with English-Language Learner status
- Students with disability/ability status
- Students in certain grade levels

STEP 2. Once the categories and subgroups are determined, a numeric weight is assigned that reflects district perceptions of the magnitude of category need. The weights correspond to a numeric value relative to 1.00 – the base amount of dollars required to provide an education to a student without any weighted characteristics. It is common for similar group categories to receive different weight values in different districts that implement WSF.

Example: A weight of 1.50 will allocate 1.5 times the per-pupil dollars to the weighted student subgroup

STEP 3. The last step in WSF formula design is to assign a dollar value to the base weight of 1.00 and multiple the weight by the number of eligible students in the category. WSF formula often derive formula foundation dollar amounts from the amount of resources already available, as opposed to the amount of resources required to advance particular student outcomes.

*Example: With a foundation amount of $1,000 and a low-performing student weight of 2.00, a school with 1,000 low performing students would receive an additional $2,000,000 total per-pupil dollars above and beyond the base amount (1,000 * 2.00 * $1,000 = $2,000,000).*

How are traditional WSF models implemented?

WSF models are implemented based primarily on district-perceived areas of need and the amount of resources a district can (or is willing to) afford to allocate to schools.

WSF formula implementation is not tied to educational costs as much as it is tied to district priorities, which may or may not conflict with programmatic or funding-related decisions that can advance equity. Implementation is primarily challenged by three factors.

1. Lack of technical expertise to identify characteristics and assign weights.
2. Political considerations that affect a district's willingness to fund the work to build precise models.
3. Economic variation in school budgets that can result in modifications to WSF implementation which undermine the original formula and its possible effects.

Importantly, WSF formula often do not include a mechanism to offset teacher distribution effects on school finance equity. For example, the use of average teacher salaries can offset intended equity effects in WSF implementation due to the uneven distribution of experienced teachers.

How well do traditional WSF models advance fiscal equity?

The ability of WSF formula to advance fiscal equity is mixed. Some studies suggest positive effects on equity as a result of WSF formula implementation, such as:

- Decreased variation in school funding by student subgroup across schools.[3]
- Reduced per-pupil variation between schools within a district.[2]
- Increased per-pupil dollars for schools with higher need students.[1, 4, 5, 6]

However, other research challenges the causal link between WSF implementation and advancing equity. Research has even shown that WSF implementation can result in the opposite of the intended equity outcome, with more average per-pupil funding directed to schools with above average amounts of academically proficient students.

Overall, WSF formula implementation and related challenges limit the ability of traditional WSF models to advance fiscal equity. In practice, the use of a WSF approach that is not tied to educational outcomes can lead to a potentially crippling consequence – formula weights that may not, ultimately, be based upon any empirical measure of student need, but rather a cursory examination of district goals or readily available data.

> *Traditional WSF design lacks a systematic approach to determining valid weights or allowing for nuanced allocations between schools with different student populations.*

Researchers who study the context around WSF model implementation have cast doubt on whether a district is truly capable of designing and implementing a WSF model that advances fiscal equity. The contextual factors that make formula implementation difficult are not easy to attend to systematically. However, attempts to enhance WSF design may be one avenue for a more systematic calculation of weights. Modifications to traditional WSF design could increase the capacity of these initiatives to advance fiscal equity.

A new, dynamic WSF model

A dynamic WSF model may be a better approach to achieve nuanced funding distributions. In this model, weights are calculated at the school-level (rather than the district-level) and weights vary across schools based on school-level need.

The functional form of a funding model of this nature is similar to traditional WSF models in that the

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model 1) uses weights as a multiple for particular student populations and 2) pre-determined dollar amounts as the foundation funding to set equal to 1.00. Key to the funding formula, foundation dollars are the dollar multiplier for the formula weights. They are the mechanism that transforms the formula from numerical data to dollars.

The fundamental difference between this dynamic WSF model and traditional WSF models is the components within the formula. Whereas traditional WSF models employ weights that are the same for each school, this model relies on weights that differ across schools.

The primary components of the dynamic WSF model include the base weight and equity weights.

The general funding model includes the following components:

BW	Base Weight
EW	Equity Weight
ESOLW	English for Speakers of Other Languages (ESOL) Weight, a sample common weight
EGW	Early Grade Weight, a sample common weight
FD	Foundation Dollars
TE	School-Level Total Enrollment
Students	Students eligible to receive respective weight

The general funding model expressed mathematically is:

$$Y_{SchoolAveragePer\text{-}PupilDollars} =$$

$$\left(\frac{\begin{array}{l}((BW * BW_{students}) \\ + (EW * EW_{students}) \\ + (ESOLW * ESOL_{students}) \\ + (EGW * EGW_{students})) \\ * FD \end{array}}{TE} \right) \quad (1)$$

BASE WEIGHT. The fundamental piece of a WSF formula is most often a base weight that drives the largest portion of resource allocation in the formula. The first step to calculating the base weight is to standardize the data that will be included in the school-specific base weights. The dynamic WSF model uses non-school based program costs (NSBP), which are central office dollars that flow to schools for programs outside the scope of the WSF model, for example, actual teacher salaries (ATS).

The base weight is calculated separately for each school within a district and is a function of the standardized values of the relevant data (specifically, the sum of the standardized values and one, multiplied by –1 to ensure that each school starts with a base value of one and that schools with less need have a negative value). The final base weight values drive an adjusted foundation dollar amount for each school. The values reflect systemic inequities resulting from dollar and staffing distributions outside the control of the schools.

BASE WEIGHT ADJUSTMENTS. The base weight can be adjusted depending upon 1) available resources and 2) the amount of resources the district wants to allocate as part of the base weights (rather than targeted weights). To make adjustments equitable and maintain the relative distance between each school's weight, the formula should employ a base-ten logarithmic transformation to the data. This transformation is useful because:

- The base weights are multiplicative.
- The resultant values will maintain their relative intervals between each other.
- The transformation will reduce variation in the base weight, mute base weight values, and bring down the cost of the base weight equitably across schools.

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EQUITY WEIGHT. The dynamic WSF model follows a similar approach to the equity weight as with the base weight. District officials should select the components of the equity weight based on district priorities and the types of need they most want to target.

> *Fiscal equity advancement is measured against the question of "equitable for whom?" Equity weight identifies "for whom" a school district is seeking greater fiscal equity.*

First, the standardized value for each equity weight is calculated and normalized. Since indicators are normalized individually, it is necessary to sum the normed indicators and calculate the mean by school. Next, the average proportion of students identified as "in need of support" is determined to identify the concentration of need. This value is multiplied by the total enrollment to arrive at the number of weight-eligible students. The "eligible students" value is the average proportion of students in a school scoring below a threshold across all measures. It is incorporated into the equity weight as a proportion of total enrollment.

In this way, the equity weight captures the value of relative need and the eligible students calculation captures the concentration of need.

ADDITIONAL WEIGHTS & ADJUSTMENTS. Additional district priorities can drive the implementation of other weights. For example, a district wishing to target programs for early learners may add an early grade weight. Similarly, districts may create weights for ESOL, Special Education, or other categories that correspond to federal monies.

Adjusting the dynamic WSF model to fit resource constraints and mute year-to-year school-level per-pupil dollar change may be necessary for districts with limited resources or fixed pots of money in their WSF school allocation budget. This allows districts to reduce unwanted skew and variation in per-pupil dollar distribution and maintain intervallic relationships within the data. The approach to setting a specific per-pupil dollar change between fiscal years is to:

- Standardize the initial per-pupil dollar change between the prior year and current year.
- Normalize the data.
- Scale the data to fit into the desired range.

Transparency and the dynamic WSF model

Districts often attach a range of goals to a WSF initiative beyond resource equity and efficiency. Transparency is chief among them. *The additional mathematical complexities inherent in a "WSF 2.0"approach need not mute a WSF initiative's transparency goals.*

Indeed, the fundamental communication tools for a WSF initiative remain the same and a district can still articulate each and every school's funding weights, the values of those weights, and the number of students who receive those weights. Public- or stakeholder-facing communications for base adjustments and equity weights, which are composite weights, can include mean or median values for each school-based data point. This communicates to stakeholders key information such as the actual formula weights employed and the rationale for a school's composite weights.

Conclusion

The dynamic WSF model described here is not without its limitations. The model relies on district-defined priorities rather than cost-study determined weights that are tied directly to student outcomes. As with traditional WSF models, this approach is also susceptible to the same technical, political, and economic factors that can pose challenges to WSF design and implementation.

However, districts continue to implement WSF formula in its many forms, despite mixed evidence as to the effectiveness of the approach and a host of challenges that impede implementation. As a result, researchers should continue to study WSF formula design and encourage districts to consider new approaches. These efforts can expose weaknesses in traditional methods and illuminate windows into potential pathways forward in WSF practice. WSF models are here to stay, but their design and implementation must evolve to meet their equity potential.

This paper was adapted from *School-Level Dynamic Weighting: A New Approach to Weighted-Student Funding,* by Justin Dayhoff. The work was introduced at the Annual Conference of the National Education Finance Academy in April 2018. Justin is a quantitative researcher and CEO at Equiday. His work focuses on school finance equity and weighted-student formula, data analysis, and program evaluation. He can be reached at justin@equiday.org.
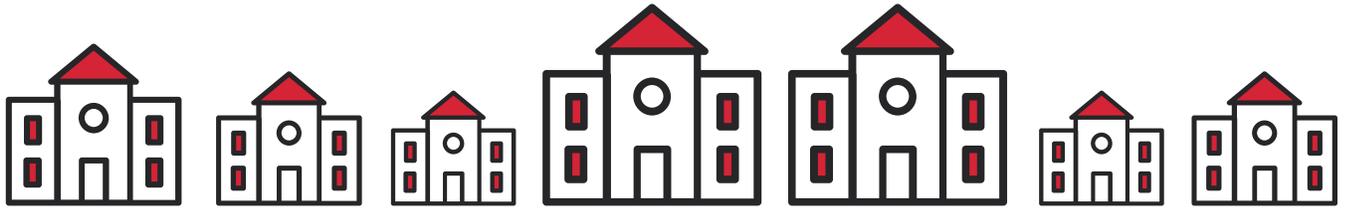
REFERENCES

1. Chambers, J. G., Levin, J. D., & Shambaugh, L. (2010). Exploring weighted student formulas as a policy for improving equity for distributing resources to schools: A case study of two California school districts. Economics of Education Review, 29(2), 283–300. https://doi.org/10.1016/j.econedurev.2009.09.005

2. Malen, B., Dayhoff, J., Egan, L., & Croninger, R. G. (2015). The Challenges of Advancing Fiscal Equity in a Resource-Strained Context. https://doi.org/10.1177/0895904815613445

3. Miles, K. H., & Roza, M. (2006). Understanding student-weighted allocation as a means to greater school resource equity. Peabody Journal of Education, 81(3), 39–62.

4. Baker, B. D. (2009). Within-district resource allocation and the marginal costs of providing equal educational opportunity: Evidence from Texas and Ohio. Education Policy Analysis Archives, 17(3), 1–31.

5. Doyle, D., Boast, L., Rosch, J., & Hassel, B. (2012). Funding a Better Education: Conclusions from the First Three Years of Student-Based Budgeting in Hartford. Public Impact.

6. Levin, J., Chambers, J., Epstein, D., Mills, N., Archer, M., Wang, A., & Lane, K. (2013). Evaluation of Hawaii's weighted student formula. San Mateo, CA: American Institutes for Research.

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