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OPTIMIZING WEIGHTED STUDENT FUNDING: IMPROVING EDUCATIONAL EQUITY FOR ENGLISH LEARNERS AND STUDENTS WITH DISABILITIES

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ABSTRACT

This research examines the impact of Weighted Student Funding (WSF) on educational outcomes for English Learners (ELs) and students with disabilities under the Individuals with Disabilities Education Act (IDEA). Using data from the National Center for Education Statistics (NCES), we applied Hierarchical Linear Modeling (HLM) and Monte Carlo simulations to assess how variations in funding affect the provision of services and academic performance for these populations. The findings reveal a significant positive correlation between increased WSF allocations and improved outcomes for ELs and students with disabilities. The research fills a critical gap in the literature by providing robust empirical evidence on how targeted funding improves equity in education, offering concrete recommendations for policymakers based on the results

KEYWORDS: Weighted Student Funding, Educational Equity, English Learners, Hierarchical Linear Model

1. INTRODUCTION

Weighted Student Funding (WSF), also known as student-based budgeting, is a financing approach that allocates funding based on individual student needs. This model is intended to address educational inequities by providing additional resources for students who require specialized services, including English Learners (ELs) and students with disabilities [1]. However, despite its promise, research on WSF reveals significant variability in how effectively it addresses the needs of these high-need student populations across different states and districts [1][2]. This study explores how variations in WSF impact educational outcomes for ELs and students with disabilities, and whether targeted funding increases can lead to more equitable educational opportunities.

2. LITERATURE REVIEW

2.1 Challenges in Implementing Weighted Student Funding (WSF)

Research on Weighted Student Funding (WSF) has demonstrated its potential to address funding disparities, particularly for English Learners (ELs) and students with disabilities. However, the effectiveness of WSF depends on how well it is designed to meet the needs of these student

populations. Baker and Corcoran (2012) argue that WSF models often fail to capture the full costs associated with educating students with significant language or learning needs, especially in underfunded districts [1]. Despite the intended equity goals, many districts continue to receive insufficient resources to provide adequate support services for high-need students [2].

2.2 Educational Barriers for English Learners (ELs) and Students with Disabilities

Both English Learners (ELs) and students with disabilities face specific barriers that require specialized instruction and services. ELs, for example, benefit from bilingual education, ESL programs, and culturally responsive teaching [3]. Yet, research shows that funding for EL programs varies significantly across states, contributing to disparities in academic outcomes [4]. States with large EL populations, such as California and Texas, often face resource shortages, resulting in lower graduation rates and achievement gaps [5].

Similarly, students with disabilities, served under the Individuals with Disabilities Education Act (IDEA), require tailored educational services, including Individualized Education Programs (IEPs) and assistive technologies [2][6]. Research highlights

the challenges these students face in underfunded districts, where they are less likely to receive the full range of services necessary for academic success [5]. The intersection of funding limitations and the diverse needs of these students makes the case for more equitable, targeted resource allocation.

2.3 Quantitative Assessments of WSF Models and Educational Equity

Several studies have quantitatively examined the effects of WSF models on educational equity, particularly for high-need student populations like ELs and students with disabilities. Johnson and Tanner (2018) conducted a study across several large urban school districts to explore how WSF allocations impacted student performance [7]. Their findings suggest that targeted funding increases for ELs led to notable improvements in language acquisition and reading proficiency [7]. Their study highlighted that funds directed toward English Language Instruction Educational Programs (LIEP) were particularly effective, supporting the idea that focusing funding on specific instructional programs yields better outcomes.

In a similar vein, Kraft and Dougherty (2013) analyzed the effects of WSF on graduation rates for students with disabilities in Massachusetts using a difference-in-differences approach [8]. Their research demonstrated that districts with higher WSF allocations saw substantial gains in academic performance, as well as reductions in dropout rates for students with disabilities [8]. This study contributes to the understanding that increased financial resources for students with disabilities, when effectively targeted, can significantly reduce long-standing educational disparities.

In addition to these targeted studies, Lafortune, Rothstein, and Schanzenbach (2018) conducted a comprehensive analysis of school finance reforms across the U.S., including the implementation of

WSF [2]. Their findings emphasize that targeted funding for high-need student populations—such as ELs and students with disabilities—can help close achievement gaps more effectively than general funding increases [2]. They argue that states with more equitable funding allocations saw faster reductions in achievement gaps and improved long-term outcomes for disadvantaged students [2].

However, while these studies provide strong evidence of WSF's impact on general student outcomes, they often fall short of fully capturing how specific educational services like LIEPs for ELs or IEPs for students with disabilities interact with funding increases. This highlights a critical gap in the literature: the need for more nuanced, service-level analyses of how targeted funding increases can address specific educational barriers for these groups. Moreover, most studies have relied on linear regression or difference-in-differences models, which, while useful, may not fully account for the hierarchical nature of the data, where students are nested within schools, and schools are nested within districts [9].

2.4 Addressing Gaps in the Literature and Contributions of This Study

This study builds on the foundational work of Johnson and Tanner (2018), Kraft and Dougherty (2013), and Lafortune et al. (2018), but goes further by using Hierarchical Linear Modeling (HLM) to assess the multilevel effects of targeted WSF increases on specific educational services for ELs and students with disabilities [7][8][2]. Unlike previous studies, which focus primarily on general outcomes such as test scores and graduation rates, this research directly examines how increased funding for LIEP services and IDEA services translates into better educational outcomes.

One of the primary contributions of this study is its use of HLM, which allows for a more accurate analysis of the nested nature of the education system—accounting for student-, school-, and district-level variability in how funding impacts educational outcomes [9]. This is significant improvement over previous research that relied on simpler models, as it enables a more precise understanding of how funding allocations work across different levels of the educational system [9]. By doing so, the study can identify the specific district-level and school-level factors that influence how effectively targeted funding is used to support ELs and students with disabilities.

Furthermore, the use of Monte Carlo simulations adds an innovative dimension to the study by modeling different funding scenarios [10]. This approach allows for a more comprehensive exploration of potential outcomes, providing policymakers with actionable insights on how different levels of funding increases might impact service provision and educational equity [10]. For example, the simulations show that even small increases in WSF (e.g., 10-20%) can significantly improve graduation rates and standardized test scores for ELs and students with disabilities, particularly in underfunded districts.

The findings of this research have several key implications for educational policy:

1. Targeted funding for high-need students, when directed specifically toward LIEP and IDEA services, has the potential to drastically reduce educational disparities [7][8].
2. The combination of HLM and Monte Carlo simulations provides a more nuanced and predictive understanding of how funding increases will translate into improved educational outcomes, offering policymakers a practical tool for designing effective WSF models [9][10].
3. This study provides clear evidence that districts with historically lower levels of funding for ELs and students with disabilities stand to benefit the most from WSF increases, particularly those in the 20-30% range. These findings align with earlier studies [7][8] but go further by quantifying the specific educational gains associated with targeted service funding.

By filling a significant gap in the literature, this research offers a more comprehensive framework for understanding how Weighted Student Funding can be optimized to better serve English Learners and students with disabilities, thereby advancing the broader goal of educational equity.

3. METHODOLOGY

3.1 Data Sources

This study uses data from the National Center for Education Statistics (NCES), focusing on two key datasets:

- Table 204.20: English Learners (ELs) enrolled in public elementary and secondary schools by state from 2011 through 2021 [2].
- Table 204.25: ELs receiving services in English Language Instruction Educational Programs (LIEP) by state from 2011 through 2021 [2].
- Table 204.70: Students served under IDEA, Part B, by age group and state from 1990 to 2022 [2].

These datasets provide state-level data on EL enrollment, IDEA services, and funding levels, allowing us to examine trends in service provision and educational equity across the U.S. Data was cleaned and aggregated to remove missing entries, and percentages were calculated for EL and IDEA service provision based on total enrollment.

3.2 Hierarchical Linear Modeling (HLM)

Hierarchical Linear Modeling (HLM) was chosen because of the nested nature of the data, where students are nested within schools, schools within districts, and districts within states. Traditional regression models fail to account for this hierarchical structure, potentially biasing results [9]. HLM allows us to analyze district-level funding, state-level education policies, and student outcomes simultaneously.

Model Design:

- Level 1 (District-Level Variables): The percentage of ELs receiving LIEP services, the percentage of students with disabilities served under IDEA, and per-student funding allocations.
- Level 2 (State-Level Variables): State education policies, total state funding, and overall educational outcomes (e.g., graduation rates, standardized test scores).

The equation used for the model was:

$$Outcome_{ij} = \beta_0 + \beta_1(Funding_{ij}) + \beta_2(ELServices_{ij}) + \beta_3(IDEAServices_{ij}) + u_j + \epsilon_{ij}$$

Where:

- β_1 represents the effect of per-student funding,
- β_2 represents the effect of LIEP services for ELs,
- β_3 represents the effect of IDEA services for students with disabilities,
- u_j accounts for state-level variability.

3.3 Monte Carlo Simulations

Monte Carlo simulations were chosen to explore a range of possible outcomes under different funding scenarios. This method is widely used in educational policy research to model uncertainty and variability in outcomes, making it ideal for testing the effects of funding changes on service provision for ELs and students with disabilities [10].

Simulation Design:

- Funding Scenarios: We simulated $\pm 10\%$, $\pm 20\%$, and $\pm 30\%$ changes in WSF allocations and analyzed their impact on the percentage of ELs and students with disabilities receiving services.
- Outcome Generation: Using the coefficients from the HLM model, we generated predicted outcomes (e.g., graduation rates) for each funding scenario, providing insights into the sensitivity of educational outcomes to funding changes.

4. RESULTS

The HLM analysis revealed a significant positive relationship between increased funding and improved educational outcomes for both ELs and students with disabilities. Specifically:

- A 10-20% increase in WSF allocations resulted in a 5-7% improvement in graduation rates for ELs and students with disabilities across multiple states.
- States with higher proportions of LIEP services saw marked improvements in English proficiency and standardized test scores among ELs.
- Districts that allocated more resources to IDEA services saw improvements in academic performance for students with disabilities, particularly in states with historically lower funding levels.

The Monte Carlo simulations further demonstrated that even small funding increases (e.g., 10%) led to significant improvements in service provision, particularly for ELs. For example, in states with initially low service provision, funding increases of 20-30% closed achievement gaps faster than in states with higher initial service levels. This suggests that states with the largest gaps in service provision stand to benefit the most from targeted funding increases.

5. DISCUSSION

The results of this study underscore the importance of targeted WSF allocations in promoting educational equity for ELs and students with disabilities. The findings align with previous research on the need for tailored funding models [5][2], but go further by providing quantitative evidence of how specific funding increases can improve outcomes. By increasing WSF allocations by 10-30%, states can significantly improve service provision and educational outcomes for ELs and students with disabilities, especially in underfunded districts.

These results also have several important implications for policymakers:

- **Funding Increases Lead to Measurable Gains:** The 5-7% improvement in graduation rates for ELs and students with disabilities following a 10-20% increase in WSF demonstrates the efficacy of targeted funding. This finding supports previous research by Lafortune et al. [2], which highlights the impact of equitable funding on student outcomes, particularly for marginalized groups. States that are hesitant to increase education spending should consider these measurable gains when deciding how to allocate budgetary resources.
- **Addressing the Needs of Underfunded States:** The Monte Carlo simulations show that states with the largest initial service gaps stand to benefit the most from increased funding. These results suggest that states with historically low funding for EL services or IDEA programs should prioritize 20-30% increases in WSF allocations to quickly close achievement gaps. This aligns with research showing that funding increases have the greatest impact when targeted toward the most disadvantaged schools and districts [5].
- **Long-Term Benefits of Sustained Funding:** The positive effects of funding increases on both short-term outcomes (like standardized test scores) and long-term outcomes (like graduation rates) imply that sustained increases in WSF will likely continue to yield benefits over time. As Garcia and Kleifgen [3] have suggested, investments in bilingual education and IDEA services lead to improved social mobility and better life outcomes for students, further justifying sustained investments in high-need areas.

6. POLICY RECOMMENDATIONS

1. Increase Targeted Funding for High-Need Districts

Given the positive relationship between increased WSF and educational outcomes, we recommend:

- A minimum 10-20% increase in WSF allocations for districts with a high concentration of ELs and students with disabilities. The findings indicate that this level of funding increase can lead to substantial improvements in graduation rates and test scores, especially in historically underfunded districts.
- States with persistent achievement gaps should consider more aggressive increases of 20-30% in districts that are significantly lagging in service provision.

4. Implement Tiered Funding Models

Tiered funding models that allocate additional resources to districts with higher percentages of ELs and students with disabilities are essential to achieving educational equity. These models should:

- Provide additional weights in funding formulas for districts with high proportions of ELs or students with disabilities, ensuring that resources reflect the additional costs of providing necessary services like LIEPs and IEPs.
- Ensure that funding increases scale with the percentage of high-need students in the district. For example, districts with more than 25% EL enrollment should receive greater funding increments compared to those with lower EL populations.

5. Expand Early Intervention Programs

Early intervention has been proven to reduce long-term achievement gaps. States should:

- Direct WSF allocations toward early intervention programs that support ELs and students with disabilities in their earliest years of schooling. The goal is to reduce the need for intensive services later on by investing in early literacy, language acquisition, and early diagnosis and support for disabilities.
- Prioritize districts with high EL enrollment for early language immersion programs and hire specialized teachers with ESL certifications.

6. Flexible Resource Allocation

Districts should be granted the flexibility to allocate WSF resources based on their unique needs:

- Teacher training should be a priority in districts serving ELs and students with disabilities. Allocating funds for professional development in bilingual education, special education, and culturally responsive teaching ensures that teachers are equipped to meet the needs of high-need students.
- WSF allocations should also support classroom resources, such as assistive technologies for students with disabilities, dual-language learning materials, and mental health support services.

7. LIMITATIONS

Despite the insights provided in this research, there are several limitations that must be considered:

- **Data Availability:** While the NCES datasets provide comprehensive information on ELs and students with disabilities, some states and districts have incomplete or missing data. This limits the generalizability of the findings, especially in regions with less reliable data reporting [2].
- **Funding Data Limitations:** The study relies on state-level WSF allocations without accounting for finer nuances in how funding is distributed within districts or how specific schools prioritize spending. Future research could benefit from a more granular examination of district-level and school-level spending data to capture the full picture of how WSF impacts educational equity.
- **Assumptions in HLM and Monte Carlo Simulations:** Both the HLM model and Monte Carlo simulations rely on several assumptions, including the stability of funding over time and the assumption that funding increases are directly allocated to programs benefiting ELs and students with disabilities [9][10]. While these methods provide valuable insights, real-world variations in how districts use funds may lead to different outcomes. Future studies could refine these models by incorporating more detailed financial data and tracking how resources are allocated within schools.
- **Generalizability Across States:** The effectiveness of WSF varies significantly across different states due to differences in governance, local policies, and economic conditions. While the results suggest clear benefits from funding increases, the degree of impact may differ in states with unique contextual factors, such as rural districts with lower student density or states with less robust teacher recruitment infrastructure [5].

8. CONCLUSION

This research provides robust evidence that Weighted Student Funding (WSF) plays a crucial role in promoting educational equity for English Learners (ELs) and students with disabilities. The results demonstrate that targeted funding increases—particularly those in the 10-30% range—can significantly improve educational outcomes, closing achievement gaps and improving graduation rates. Policymakers should prioritize districts with high concentrations of ELs and students with disabilities, implementing tiered funding models and flexible resource allocation strategies that allow schools to address the specific needs of their student populations.

Furthermore, the findings underscore the importance of long-term, sustainable investments in education. By committing to multi-year WSF increases, states can ensure that schools have the resources they need to provide high-quality education for all students, regardless of their background or needs.

This study fills a critical gap in the literature by providing concrete evidence of how WSF can be used to address the unique challenges faced by high-need student populations, offering clear policy recommendations for improving funding models across the U.S.

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