

## **Opportunity by Design: A Database on Special Education Services in Texas Schools**

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## Abstract

### Opportunity by Design: A Database on Special Education Services in Texas Schools

Even though the Individuals with Disabilities Education Act (IDEA) mandates that all public schools provide appropriate accommodations, the funding of school districts depending on property taxes changes the availability of specialized services across schools and districts. This paper discusses a created database of ten elementary schools in the Plano, Texas Independent School District also including additional services for dual language learners and gifted students. Using PostgreSQL, Supabase, and R's Shiny framework, the project demonstrates how collated data on schools can inform parent decision-making.

## **Introduction**

Individuals with disabilities tend to have lower rates of employment and college education compared to their counterparts without disabilities. For instance, 22.7 of the population of individuals with disabilities has access to employment compared to 65.5% of the population without disabilities (Bureau of Labor Statistics 2025). 21% of college students in the United States are reported to have disabilities (US Government Accountability Office 2024). Yet, of the 40.5 million individuals in the United States who were 25 or older and reported having a disability in 2023, only 21.2% held a bachelor's degree compared to 38.7% of the population that did not report having a disability (PNPI 2023).

Where this often begins is at school. In order to improve the outcomes of students with disabilities, the Individuals with Disabilities Education Act (IDEA) was implemented nearly 40 years ago requiring all public schools to provide free and appropriate education for students with disabilities. The onus here is on the public school to find and identify students with disabilities. In Texas, an Individualized Education Plan (IEP) is developed by a committee—of which the child's parent is also a part. In particular, special education should be a pivotal part of elementary school design as most learning, speech, and other disabilities tend to be diagnosed at younger ages. This is also the age where parents are more involved in their children's education and are better able to identify signs.

However, despite the Individuals with Disabilities Education (IDEA) act implemented nearly 40 years ago, the performance of students with disabilities is quite low with the 2017 National Assessment of Educational Progress (NAEP, 2023) reporting that

only 16 percent of students with disabilities were proficient in math and 12 percent were proficient in reading as of grade 4, compared to 44 and 40 percent of general education students (Schwartz et al. 2021). Only 75% of students with disabilities graduate high school, with 10% of the remainder receiving alternative certifications. This disparity could lie in the socio-economic conditions associated with school choice, the funding model of elementary schools is largely dependent on property tax revenue, meaning that schools in areas where the value of homes is higher likely leads to better funded programs and better paid staff.

Given the importance of individualized support and the benefits associated with certain schools, it is essential for parents to be informed about the specific services offered at their child's school or programs available for specific needs beyond an Individualized Education Program (IEP) and for policymakers to identify schools where there may be disparities. The types of disabilities commonly supported at a school can indicate areas where special education services have been refined and where staff may have specialized expertise. To assist with this, I have developed a database that highlights the types of accommodations available at 10 elementary schools in Plano, Texas. For example, some schools offer targeted programs for students with dyslexia or speech impairments, while others provide support for dual language learners or gifted and talented students—those who demonstrate above-average intellectual ability. While all schools are legally required under the Individuals with Disabilities Education Act (IDEA) to provide accommodations, the depth of services as well as the expertise at each school may vary by school depending on funding and local demand. This database may be especially helpful for parents of elementary school children with multiple support needs—such as those with a disability

and limited English proficiency—by offering a clearer view of which schools can best meet their child’s needs.

## **Literature Review**

Where a student goes to school matters. This is best illustrated by one study, focusing on Houston, that conducted a social experiment calling “Moving to Opportunity” which provided vouchers for families from housing projects in lower income neighborhoods to move to higher income neighborhoods (Chetty et.al 2018). This paper found that when students moved to higher income neighborhoods when they were young had significantly more college attendance, earnings, and a lower likelihood of single parenthood. In a world where federal aid for schools is diminishing, neighborhood effects may especially be prevalent given that a large part of school resources are drawn from property taxes (Reschovsky 2017). In fact, special education, in particular, holds long run implications for students. One study exploiting a change in policy in Texas that limited schools to having only 8.5% of students in special education showed long term negative outcomes in educational attainment- a potential 37% decrease in future college enrollment (Ballis & Heath 2021).

These disparities in access to school-based resources are particularly consequential for students from historically underserved backgrounds. Research shows that students from low-income families on a reduced lunch program and those learning English as a second language (ELLs or English Language Learners) are more likely to be identified as needing special education services (Yamasaki and Luk 2018). Therefore, it is possible that how students are identified are sometimes shaped by biases of special educators noting the

need for specialization and training among educators on students with disabilities and how to best assist them.

Moreover, the entry into special education can have implications on a student's outcomes. While Ballis and Heath (2021) indicate the plethora of positive impacts that special education can have, other studies show that students in special education classes may face issues with inclusion in the larger school environment (Gee & Gerdin 2018). What especially helps students in special education with both social and academic requirements is trained personnel. Teachers, especially in their first year, face issues with low pay, lack of experience in dealing with a classroom environment, red tapism, and other institutional stressors (Kini & Podolsky 2016). This is especially true for first year teachers in special education classrooms, who while taking a personal interest in students with moderate to severe disability's well being, also dislike an environment where these students are segregated from their peers (Gee & Gerdin 2018). The ability of teachers that have a passion and care for students to advocate for their needs is more likely in better funded districts. These districts have the ability to invest in training and inclusive school environments, without which even well-intentioned educators may struggle to meet the complex needs of students in special education. These challenges in special education highlight findings in Chetty et al. (2018): a child's environment—including their school and the adults who support them—plays a critical role in shaping long-term outcomes.

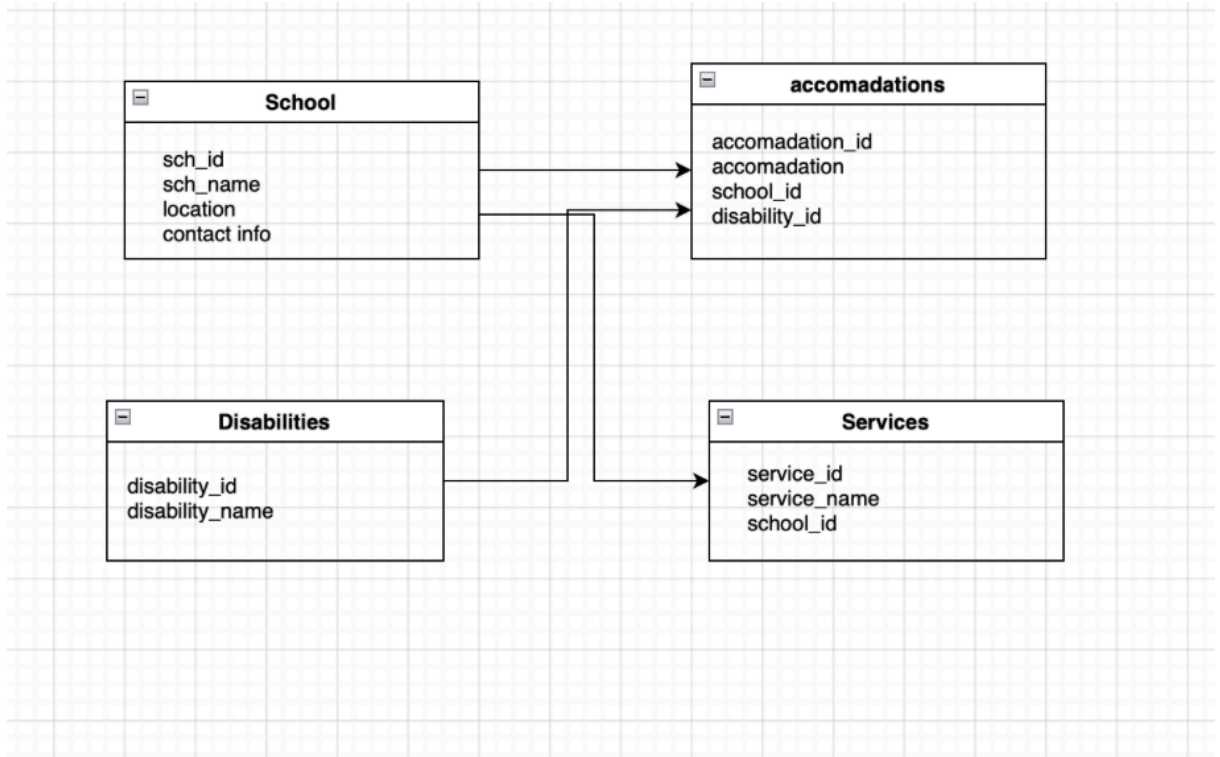
### **Database design**

To this end, I develop a database through collecting publicly available data from the websites of 10 elementary schools in Plano, Texas. My focus was to identify information on

special education services offered beyond the standard provisions outlined in Individualized Education Plans (IEPs). Specifically, I documented the availability of targeted support services for students with specific learning needs, such as dyslexia programs and speech therapy.

This database aims to help parents of children with disabilities pick a school that has specialized programs which will benefit their child. There are two reasons that this database focuses on elementary school children. First, because it is during elementary school that many learning disabilities, speech disabilities and so on are identified. Secondly, most students, particularly in Texas, take a STAAR Test to assess math and reading achievement before the end of elementary school, identifying if such interventions are effective in improving learning for students with disabilities.

I also included data on programs for gifted and talented students, as well as accommodations and instructional support available for English language learners (ELLs), as this may also overlap with the need for an individualized education plan (IEP). This approach allowed me to capture a more comprehensive picture of the diverse educational services each school provides, which may assist parents in making informed decisions based on their child's unique needs.



[Figure 1: Schema of Database]

Using pgAdmin, I designed and implemented a normalized schema consisting of four interrelated tables: I used CREATE and INSERT statements in SQL to create the tables and populate them. The tables include schools which store general information about each school; disability which stores the types of disabilities that for which the school offers a specialized program in addition to the required Individualized Education Plans; accommodations which associates schools with disability types along with these specific and specialized programs. The services table captures additional services provided by the school such as Art, Music or Physical Education. Most schools offer all of these.

A critical component of this design is the use of primary and foreign keys to maintain data integrity and define relationships between tables. Each table includes a



primary key, which serves as a unique identifier for every record within that table. The primary key in the schools table is the `sch_id` which uniquely identifies each school entry and is referenced by other tables; for the disability table this is `disability_id` which uniquely identifies each type of disability (e.g., speech impairment, dyslexia); for accommodations table this is `accommodation_id` which uniquely identifies each accommodation entry linking a school to a disability; for the service table this is `service_id` which uniquely identifies each service offered by a school, such as ESL support or gifted programs.

Foreign Keys link records across tables. In the accommodations table, `sch_id` is a foreign key referencing `schools(sch_id)`, establishing which school provides the accommodation; `dis_id` is a foreign key referencing `disability(disability_id)`, indicating which type of disability the accommodation supports. In the service table, `sch_id` is also a foreign key referencing `schools(sch_id)`, connecting each service to a specific school. These foreign key relationships ensure that accommodations cannot be added unless the corresponding school and disability already exist in the database and services are only associated with schools that are already defined in the system.

This key structure helps enforce referential integrity, prevents duplication, and ensures that all relational data is valid and logically connected.

Once the data was inserted, I connected the PostgreSQL database to a Shiny app using the `RPostgres` and `DBI` packages.

An important step here was to make the database I had locally hosted on PgAdmin global. I achieved this using Supabase- an alternative to SQLite. Supabase is an open source

alternative that allows me to insert my SQL Code and create a globally accessible database. I then used this to build my shiny app that could be deployed globally on Posit.

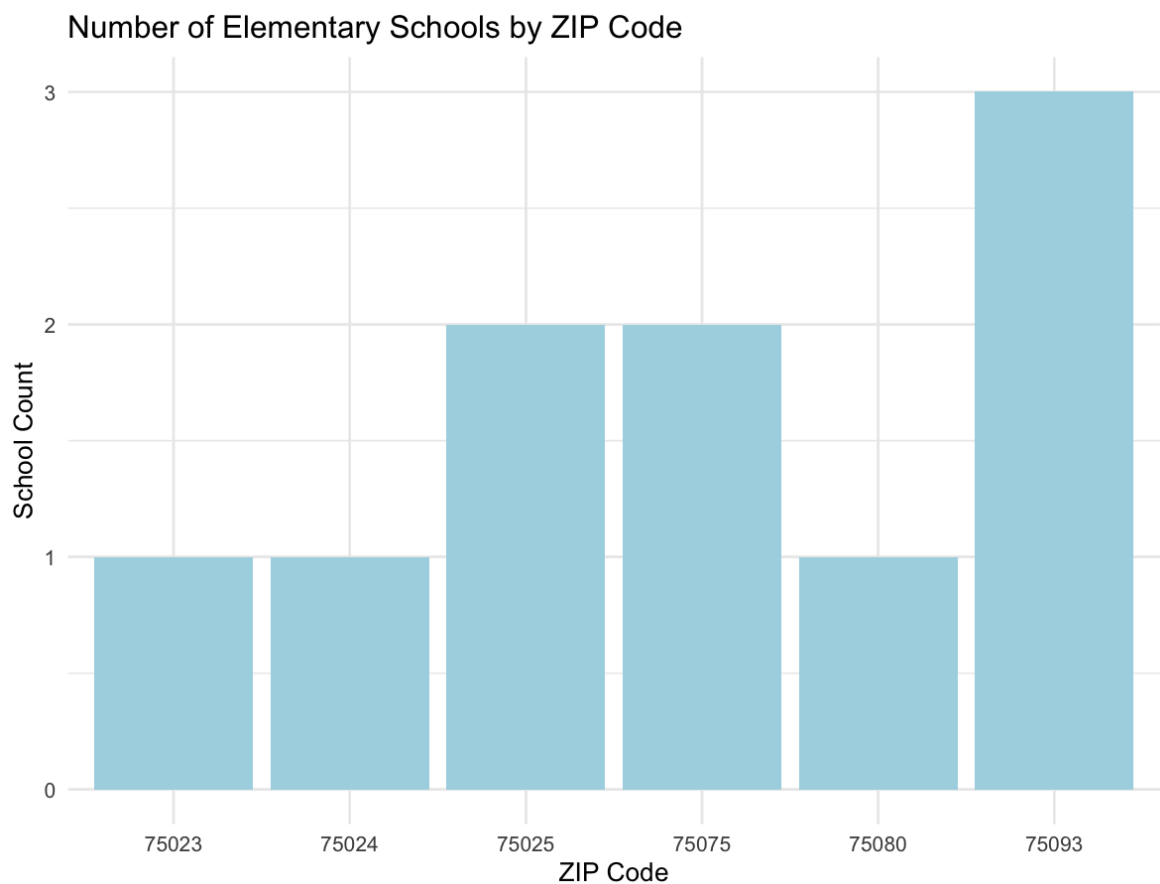
Shiny is a useful tool provided by R to enable an interactive interface for users to filter and explore accommodations by disability type or school location. The code I used is in the Appendix of this paper. The shiny app was deployed globally using Posit and can be found at this link: <https://ahanasamat1.shinyapps.io/shinyapp/>

### **User Interface of Shiny App**

The Shiny app titled "School Accommodations Viewer" provides an interactive interface that allows users to explore the types of disability accommodations available at elementary schools in Plano, Texas. The layout follows a sidebar structure, with a dropdown menu on the left allowing users to select a specific disability type or need of the student—such as dyslexia, speech impairments, esl requirements, or a student who needs extra support as they are gifted or talented. This dropdown is dynamically populated from the connected PostgreSQL database, ensuring it reflects the most current list of services. Once a disability is selected, the main panel on the right displays a data table showing all schools that provide accommodations for that need. The table includes relevant school details and supports sorting and filtering for ease of use. This responsive and streamlined interface is designed to help parents and educators quickly identify schools that meet specific educational support needs.

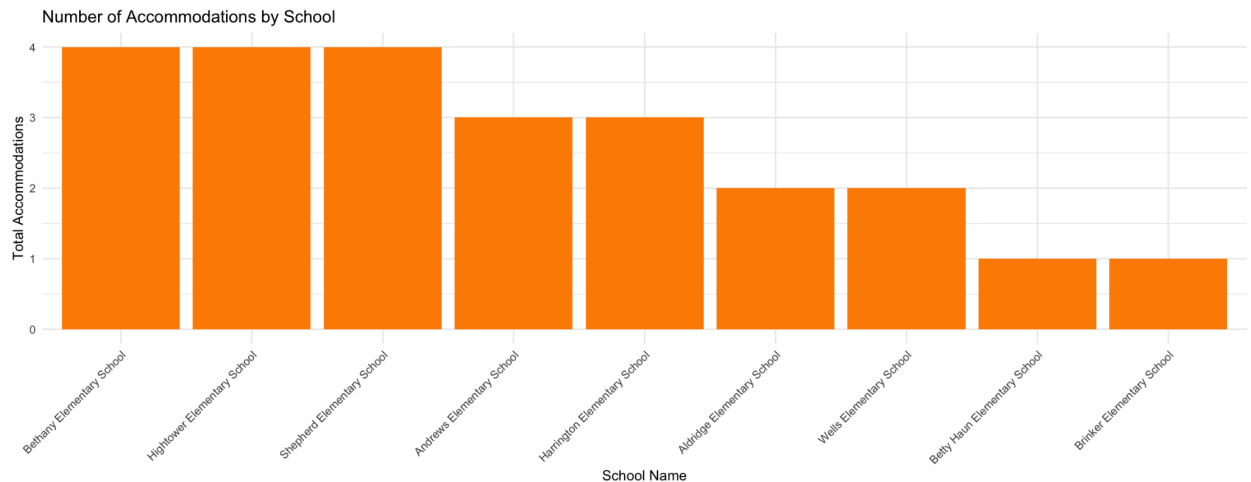
### **Data Analysis**

The dataset includes the following elementary schools in Plano, Texas: Aldridge Elementary School, Andrews Elementary School, Bethany Elementary School, Barksdale Elementary School, Betty Haun Elementary School, Shepherd Elementary School, Harrington Elementary School, Brinker Elementary School, Wells Elementary School, Hightower Elementary School. Of the 49 elementary schools in Plano, TX, I randomly selected 10 schools. The following graph explains how even randomly selected elementary schools are distributed in the county.



*Graph 1: Elementary Schools by Zipcode*

However, in another table in the dataset- accommodations, we see that some schools mention more programs for students who need accommodations than others.



*Graph 2: Accommodations By School*

In particular, Bethany Elementary School, Hightower Elementary School, and Shepherd Elementary school have additional programs in the most number of spheres- including gifted and talented programs (PACE), speech therapy, support for ESL students, and support for students with dyslexia.

Given that schools are funded by property taxes and well-funded schools tend to have better developed programs, I was curious to see the average house value of the zipcodes that Bethany, Hightower, and Shepherd High Schools were in. Plano ISD is generally considered a well-funded district with over \$640 million in revenue (PlanoISD.com, 2023). However, neighborhood effects of wealthier neighborhoods may have an impact on the quality of education received in public schools by students who need special education services. For instance, the zipcode that Hightower Elementary School is in

has an average home value of \$445,000. Meanwhile, Bethany Elementary School has an average home value of over \$575,000. On the other hand, Brinker elementary school is in a zipcode 75093 where the average home value crosses \$700,000 indicating that as income goes up, there is perhaps less onus on public schools to provide services when parents of children with special needs can instead place their children in private tutoring, therapy, or education at large, increasing social and educational inequity for those individuals who cannot afford to live in those districts. Additionally, it is possible that individuals living in these districts may not need services like English Language Assistance or Dual Language Learning reducing the demands of these services. At the same time, however, access to these services is limited for the few individuals in these districts who might need them.

### **Policy Recommendations**

Two approaches may help address the distribution of additional and specialized accommodations by schools even in the same school district.

In order to improve equity across school districts, Plano ISD can adopt a centralized service delivery model to ensure greater equity in service availability. Instead of relying solely on individual schools to offer both Individualized Education Plans (IEP's) as well as develop programs for students with specific disabilities, there can be a main office or specialized staff hired at the district level who can rotate between schools and offer oversight and support. This would allow smaller or under-resourced schools to access high-quality support services without duplicating costly programs at each site.

Second, the district should provide education and information to parents of all children- those with and without special needs. Many parents are not aware of the breadth of services available for students with disabilities and may not be able to identify signs that their child may need extra support. They may also need education on the provisions of the IDEA act, programs that all Plano ISD schools offer, and maybe even how to select a school for their child. Given the large number of Spanish speakers in Texas, this programming should also be held in different languages.

### **Future Expansion and Conclusion**

Using PostgreSQL, Supabase, Shiny, and RStudio, the next step is to scale this database to include all elementary schools in Texas. This expansion will allow for a comprehensive analysis of disparities in the availability of special education services across districts, counties, and geographic regions. By integrating this data with demographic and funding indicators, researchers and policymakers can identify systemic gaps and inequities in service provision. Furthermore, the expanded database can power interactive Shiny dashboards that visualize service “deserts”—areas where students lack access to critical support services like ESL programs, dyslexia interventions, or speech therapy. This tool can ultimately inform targeted resource allocation, legislative advocacy, and improved transparency for parents and educators statewide. The ultimate hope is to provide a source for parents of students with disabilities to gain access to resources to best set their child up for success, empowering them to view their abilities as a strength rather than a disadvantage.

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