Teacher Workforce Planning Tool

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Intended Use

This tool is designed to support long-term enrollment and Teacher workforce planning as part of a broader strategic effort. It offers a foundation for examining historical trends and projecting future scenarios, helping stakeholders begin to understand potential Teacher staffing trajectories.

However, it is not intended to capture the full complexity of the Teacher workforce landscape. Users are encouraged to interpret the results in conjunction with local knowledge, contextual insights, and additional data sources to inform well-rounded, data-informed planning decisions.

You can access the current version of the model at:

- mattfaiello.shinyapps.io/TWPT/

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Teacher Workforce Planning Tool

The Teacher Workforce Planning Tool (TWPT) is an interactive web-based application designed to support Delaware's Local Education Agencies (LEA) in making informed, data-driven staffing decisions. By forecasting county-level population trends, school enrollment, educational service needs, and Teacher workforce demand, the TWPT provides a transparent and consistent platform for workforce planning. It draws from trusted, state-managed data sources, including the Delaware Population Consortium's (DPC) population projections and the Delaware Department of Education's (DDOE) Student Unit Count and Educator Employment Snapshot.

Through a customizable forecasting process, LEAs can test a range of planning assumptions – such as shifts in Student matriculation, changes in Individualized Education Plan (IEP) identification rates, adjustments to Student–Teacher ratios, and variations in Teacher retention. This scenario-based approach enables proactive, strategic planning by helping LEAs anticipate staffing needs, optimize resource allocation, and align recruitment and retention efforts with evolving Student needs and policy goals.

Background & Purpose

Effective Teacher staffing is essential for ensuring educational quality and equity, yet LEAs nationwide continue to struggle with persistent staffing challenges (Tan, Arellano, & Patrick, 2024). These challenges stem from dynamic Student populations, shifting educational demands, and high Teacher attrition rates (Carver-Thomas & Darling-Hammond, 2017). Foundational studies by Ingersoll et al. (2012) and Guarino, Santibañez, and Daley (2006) highlight how poor workforce planning exacerbates mismatches in Teacher supply and demand, disrupting educational continuity and outcomes.

Recent research has emphasized the importance of localized, data-driven approaches to address these issues. Edwards et al. (2023) demonstrate that Teacher shortages often appear in specific certification areas, schools, or regions and are driven by localized factors like compensation, working conditions, and geography. Their findings support the need for tools that enable targeted forecasting and strategic workforce planning. Locally, Delaware's Title 14 (2025) codifies the legal obligation of school systems to align staffing with Student enrollment and educational needs, including mandates for certification and special education services.

Background & Purpose

The TWPT bridges research, policy, and practice by providing Delaware's LEAs with a research-based, policy-aligned forecasting model. Grounded in both foundational (Jaffe, 1969) and modern forecasting approaches (Lindsay et al., 2016; Reichardt et al., 2020), the TWPT supports adaptive, data-informed decision-making that aligns with state statutes. It also builds on the important enrollment forecasting efforts led by the University of Delaware's Center for Applied Demography and Survey Research (2004, 2016, 2020), emphasizing the value of regularly updated projections that incorporate local variation and contextual factors.

Built on an interactive user-centered platform, the TWPT integrates key data sources from the DDOE and the DPC to enable robust, localized, and scenario-based Teacher workforce planning. This approach is designed not only to reduce the technical burden of complex data analysis, but also to enhance the capacity of LEAs to make timely, informed decisions in response to shifting enrollment patterns, policy changes, and community needs.

Significance & Implications

The adoption of the TWPT presents a transformative opportunity to modernize and streamline Teacher workforce planning across Delaware's LEAs. By reducing the administrative burden of manual data processing and enhancing transparency, the TWPT promotes equitable access to robust and consistent staffing projections. Built on systematically integrated data and responsive to user-defined inputs, the tool ensures that staffing decisions are locally informed and aligned with demographic and educational trends, helping to foster sustainable workforce practices across the state.

Data-driven forecasting is essential for maintaining high-quality educational outcomes in a dynamic policy and demographic environment. The TWPT represents a significant advancement in this area, equipping LEAs with a powerful tool to enhance the precision, efficiency, and adaptability of their workforce planning efforts. Continued adoption and refinement of the TWPT will help ensure that Delaware's education system remains responsive to changing staffing needs, ultimately supporting greater stability for LEAs and consistent access to qualified Teachers for Students throughout the state.

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Appendix I:
Data Sources & Relationships
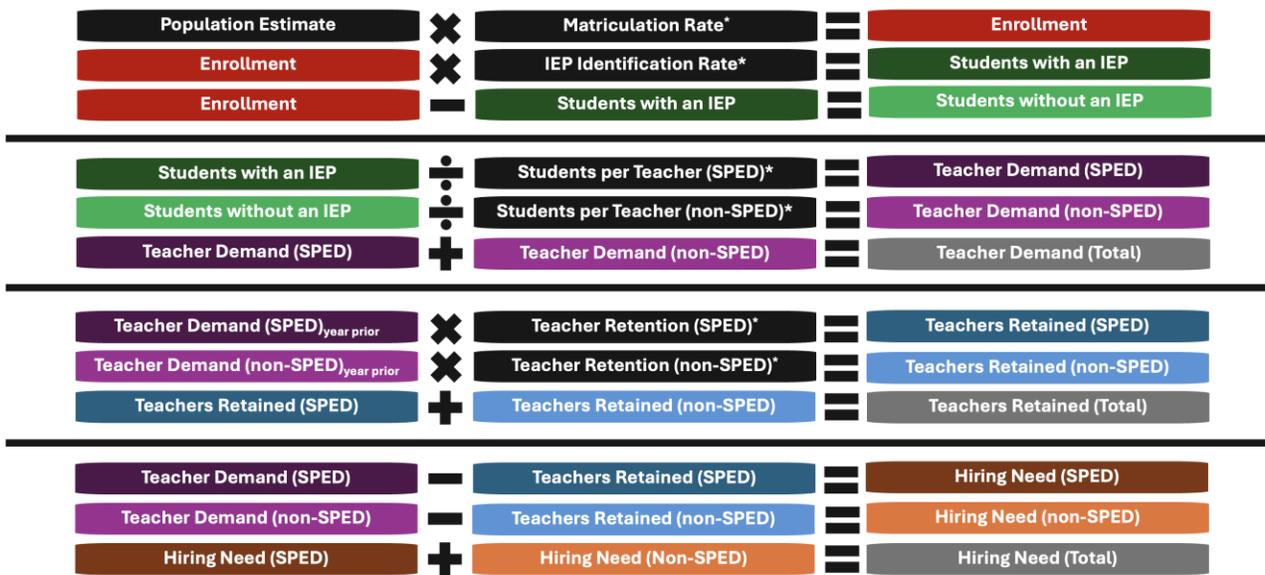
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Data Sources

Population Estimates: provided by the Delaware Population Consortium (DPC; January 2024). The DPC's projections incorporate data from the U.S. Census Bureau, migration trends from the IRS, and statewide birth & death rates.

Student Enrollment Unit Count: obtained from the DDOE, it includes Students enrolled and in attendance in public schools for the last 10 school days of September each year. It is the primary foundation for school funding, with allocations broken down by educational need as outlined in Delaware Code - Title 14.

Educator Employment Snapshot: obtained from the DDOE, it provides data on Educator staffing across the state and is taken every November to allow for adjustments in unit count funding – only full-time classroom Teachers were included in the model.

Variable Relationships

This diagram below illustrates the logical flow and interconnected relationships among key variables used in the forecasting model. It shows how input data and customizable planning targets are systematically combined through a series of calculations to generate projections for Student enrollment, Teacher demand, Teacher retention, and hiring needs across special education and non-special education categories.

Population Estimate ✖	Matriculation Rate* =	Enrollment
Enrollment ✖	IEP Identification Rate* =	Students with an IEP
Enrollment ➖	Students with an IEP =	Students without an IEP
Students with an IEP ➗	Students per Teacher (SPED)* =	Teacher Demand (SPED)
Students without an IEP ➗	Students per Teacher (non-SPED)* =	Teacher Demand (non-SPED)
Teacher Demand (SPED) ➕	Teacher Demand (non-SPED) =	Teacher Demand (Total)
Teacher Demand (SPED)$_{year prior}$ ✖	Teacher Retention (SPED)* =	Teachers Retained (SPED)
Teacher Demand (non-SPED)$_{year prior}$ ✖	Teacher Retention (non-SPED)* =	Teachers Retained (non-SPED)
Teachers Retained (SPED) ➕	Teachers Retained (non-SPED) =	Teachers Retained (Total)
Teacher Demand (SPED) ➖	Teachers Retained (SPED) =	Hiring Need (SPED)
Teacher Demand (non-SPED) ➖	Teachers Retained (non-SPED) =	Hiring Need (non-SPED)
Hiring Need (SPED) ➕	Hiring Need (Non-SPED) =	Hiring Need (Total)

Model Inputs
Model Outputs
*Customizable Planning Targets

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Appendix II: Planning Targets

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Matriculation

Takeaway: Delaware shows very strong correlations between population and enrollment trends, suggesting responsive public school participation. County-level differences – especially New Castle's lower correlation – indicate that local factors, such as private school attendance (see [private school map](#)) or cross-LEA enrollment, may be influencing where Students enroll.

Matriculation Rate is the percentage of the school-age population enrolled in Delaware public schools.

2024-25 rates:
- **Statewide**: 86.0%
    - **New Castle**: 81.2%
    - **Kent**: 99.3%
    - **Sussex**: 84.0%

Correlations between school-age population and public school enrollment:
- **Statewide**: 0.97
    - **New Castle**: 0.88
    - **Kent**: 0.91
    - **Sussex**: 0.94

IEP Identification

Takeaway: The IEP identification rate has steadily increased across all counties, with New Castle showing the largest rise – highlighting a growing need for special education services statewide.

IEP Identification Rate is the percentage of enrolled Students with Individualized Education Programs (IEP).

6-year trends (2019-20 to 2024-25):
- **Statewide**: 15.3% → 17.3%
  - **New Castle**: 15.5% → 17.9%
  - **Kent**: 15.7% → 17.1%
  - **Sussex**: 14.5% → 16.1%

Students per Teacher (SPED)

Takeaway: While Student-to-Teacher ratios in SPED are relatively consistent across counties, Sussex has a noticeably lower ratio, suggesting smaller SPED caseloads. Strong correlations statewide imply staffing generally responds to Student IEP demand, though Kent shows slightly weaker alignment.

Students per Teacher (SPED) is the number of Students with an IEP per full-time SPED Teacher.

2024-25 ratios:
- **Statewide**: 9.1
  - **New Castle**: 9.6
  - **Kent**: 9.9
  - **Sussex**: 7.3

Correlations between Students with an IEP and full-time SPED Teachers:
- **Statewide**: 0.83
  - **New Castle**: 0.84
  - **Kent**: 0.77
  - **Sussex**: 0.82

Students per Teacher (non-SPED)

Takeaway: Non-SPED Student-to-Teacher ratios vary slightly across counties, with Kent having the highest. Extremely high correlations across all regions suggest that non-SPED Teacher staffing closely tracks with the enrollment of Students without additional needs.

Students per Teacher (non-SPED) is the number of Students without an IEP per full-time non-SPED Teacher.

2024-25 ratios:
- **Statewide**: 16.2
  - **New Castle**: 15.0
  - **Kent**: 18.5
  - **Sussex**: 17.4

Correlations between Students without an IEP and full-time non-SPED Teachers:
- **Statewide**: 0.99
  - **New Castle**: 0.98
  - **Kent**: 0.97
  - **Sussex**: 0.98

Teacher Retention (SPED)

Takeaway: SPED Teacher retention has declined across all counties, with Kent experiencing the largest drop – potentially signaling greater staffing instability in SPED services over time if trends continue.

Teacher Retention Rate (SPED) is the percentage of SPED Teachers who continued in their role and LEA* from the previous year.

6-year trends (2019-20 to 2024-25):
- **Statewide:** 92.0% → 89.5%
    - **New Castle:** 91.8% → 90.1%
    - **Kent:** 89.6% → 85.2%
    - **Sussex:** 90.6% → 88.9%

*See note on retention rates

Teacher Retention (non-SPED)

Takeaway: Retention of non-SPED Teachers has declined statewide, with Kent showing the largest drop – highlighting potential challenges in maintaining a stable non-SPED workforce.

Teacher Retention Rate (non-SPED) is the percentage of non-SPED Teachers who continued in their role and LEA* from the previous year.

6-year trends (2019-20 to 2024-25):
- **Statewide:** 91.9% → 88.7%
  - **New Castle:** 91.0% → 89.4%
  - **Kent:** 89.7% → 82.4%
  - **Sussex:** 91.4% → 89.7%

*See note on retention rates

Notes

…On Years of Available Data

All figures and estimates are based on population, enrollment, and staffing data from the 2011–12 to 2024–25 school years, as reliable Student enrollment (unit count) data is not currently available for earlier years.

…On Retention Rates

To accurately reflect meaningful workforce movement, Teachers are considered retained if they stay within the same planning group – whether at the county, LEA, or state level – from one year to the next.

For example, at the state level, only those who leave Delaware public school employment are counted as non-retained.

How Planning Targets are Forecasted

The **Compound Annual Growth Factor Rate (CAGFR)** is the annual growth multiplier required to move from a current value to a target value over a specific number of years. It represents how much a value must move each year to reach the target through compounded change.

$$\text{CAGFR} = \left(\frac{\text{Target Value}}{\text{Current Value}} \right)^{\frac{1}{\text{Target Year} - \text{Current Year}}}$$

The CAGRF was selected to model future trends because enrollment and staffing changes tend to be cumulative, with each year's figures building on the previous year's base. For example, as the local school-age population grows, LEAs tend to enroll more Students each year. Most of these Students remain enrolled the following year, which drives sustained increases in enrollment and the corresponding demand for Teachers.

A key **limitation** of using CAGRF is that it assumes consistent growth over time. This approach may not account for sudden shifts, such as the opening of new schools or major housing developments, which can quickly and significantly change enrollment patterns.

CAGRF Example

Projected Decline: Students per Teacher (2025–2030)
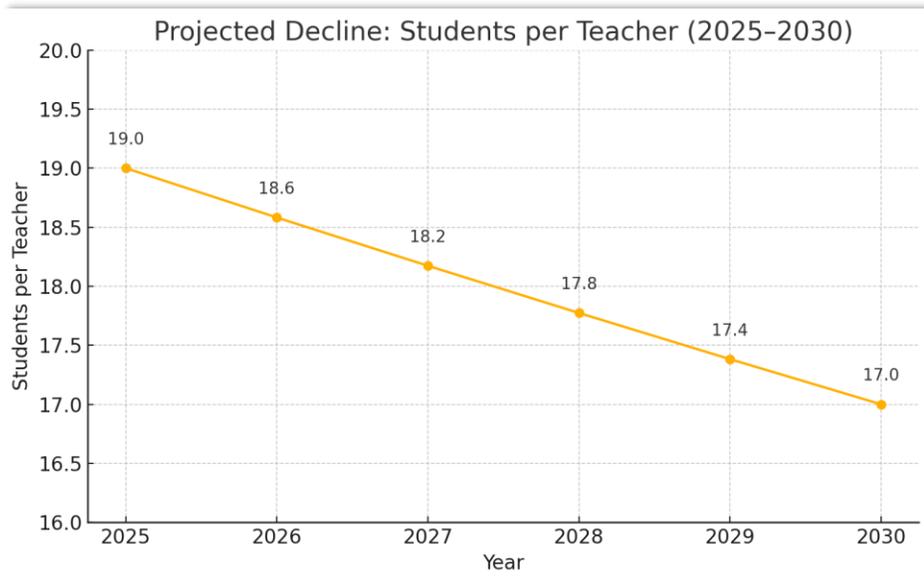
Planning Target:

- Students per Teacher (non-SPED).

Inputs:

- **Current value (2025):** 19
- **Target value (2030):** 17
- **Time period:** 5 years

$$CAGFR = \left(\frac{17}{19}\right)^{\frac{1}{2030-2025}} \approx 0.9780005$$

Computations:

1. **SY 2026:** 19·0.9780005 ≈ 18.5820
2. **SY 2027:** 18.5820·0.9780005 ≈ 18.1732
3. **SY 2028:** 18.1732·0.9780005 ≈ 17.7734
4. **SY 2029:** 17.7734·0.9780005 ≈ 17.3824
5. **SY 2030:** 17.3824·0.9780005 ≈ 17

Appendix III: Walkthrough

Step 1: Choose a LEA Grouping

- **Local Education Agency**: Pick a district, charter, county, or statewide view to get started.
- Your choice sets the data scope and loads default planning values from the latest school year.

Local Education Agency

All LEAs ▾

Statewide

All LEAs

Districts

Charters

New Castle

New Castle LEAs

Academia Antonia Alonso

Appoquinimink School District

Brandywine School District

Charter School of New Castle

Step 2: Define the Forecast Year

- **Projected School Year**: Set the target school year for your staffing forecast.
- This becomes the target year used to estimate growth in your planning targets.

Projected School Year

2034-35 ▾

2025-26

2026-27

2027-28

2028-29

2029-30

2030-31

2031-32

2032-33

2033-34

2034-35

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Step 3: Enrollment

- Set the **matriculation rate** to reflect the percentage of the school-age population (5-18) that will enroll in your selected LEA.
  - Enrollment is projected using population and matriculation rates.

Matriculation Rate

%	86

- Set the **IEP identification** rate to estimate how many Students will need special education services.
  - Enrollment is split into Students with and without IEPs based on this rate.

IEP Identification Rate

%	17.3

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Step 4: Teacher Demand

- Set the average number of **Students per Teacher**:
    - **SPED**: Students with IEPs per full-time SPED Teacher.
    - **Non-SPED**: Students without IEPs per full-time non-SPED Teacher.
- Teacher demand is calculated by dividing projected enrollment by these ratios, then adding SPED and non-SPED totals.

Students per Teacher (SPED)

| 9.1 |

Students per Teacher (non-SPED)

| 16.2 |

Step 5: Retention

- Set the percentage of **Teachers expected to return** to their role:
    - **SPED**: Retention rate for SPED Teachers.
    - **Non-SPED**: Retention rate for non-SPED Teachers.
- The number of returning Teachers is estimated by applying retention rates to the prior year's SPED and non-SPED demand, then adding them together.
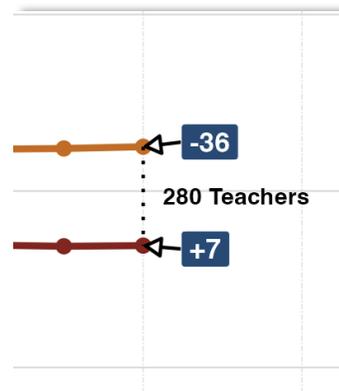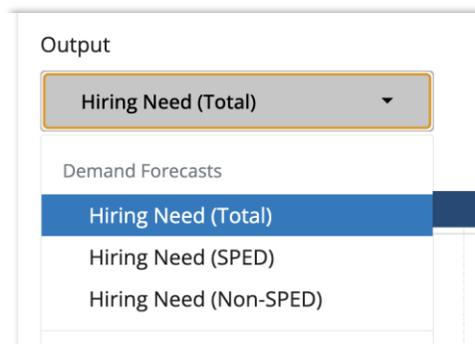
Teacher Retention Rate (SPED)

| % | 89.5 |

Teacher Retention Rate (non-SPED)

| % | 88.7 |

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Step 6: Hiring Needs

- **No inputs here**, just results!
  - Choose a Teacher demand forecast to view and download the chart with your planning targets.
- Hiring needs are estimated by subtracting expected retention from demand, then combining SPED and non-SPED needs.

Forecast Outputs

- **Forecasts Tab**: See Teacher demand and other forecasts like population, enrollment, and IEPs based on your planning targets.
- Click **Download Forecast** to grab a ZIP with your chart and the target values driving it.

Additional Teachers Needed: projected Teacher demand (2,661 + 133 = **2,794**)

Output Dropdown: Choose which hiring forecast to display (Total, SPED, or non-SPED)
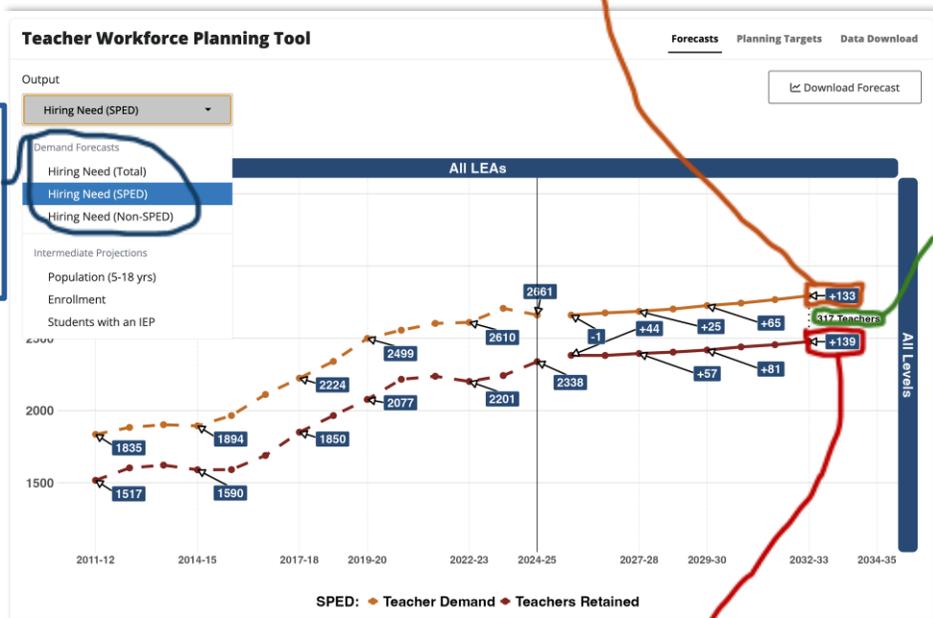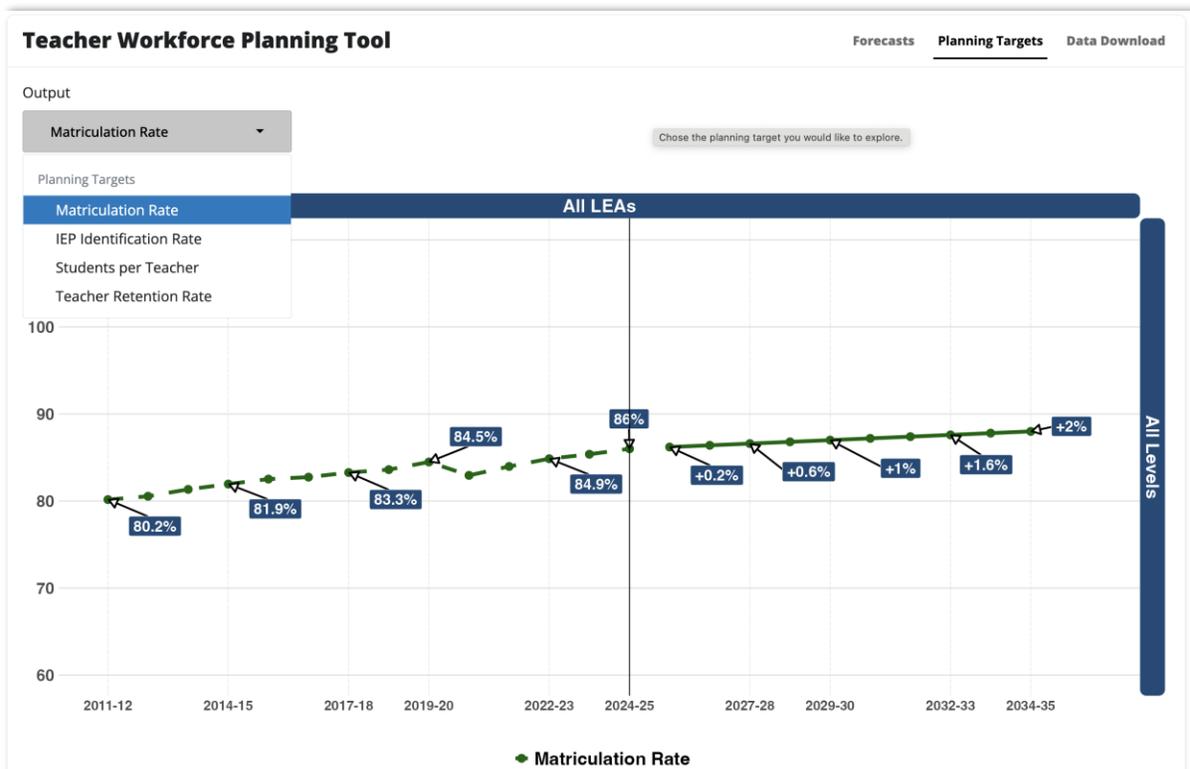
Demand-Retention Gap: Difference between needed and retained Teachers (2,794 - 2,477 = **317**)

Additional Teachers Retained: projected returning Teachers (2,338 + 139 = **2,477**)

Choosing Planning Targets

- Check out the **Planning Targets** tab to explore historical trends associated with your LEA's planning targets.
- Use this tab to help inform your planning targets.

Previous Recruitment Numbers

- Check out the **Past Recruitment Numbers** panel for a summary of Teacher hiring.
    - **New Hires**: Not in a Delaware public school the year before
    - **Transfer Hires**: Moved between LEAs or between SPED and non-SPED roles
    - **Total**: New + transfer hires
- The table updates based on the Teacher type (Total, SPED, or Non-SPED) you selected in the **Forecast** tab.

👥 Past Recruitment Numbers

Staffing Pool	All LEAs									
	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Total - All Levels										
New Hires	881	1081	1010	973	984	854	904	1060	896	815
Transfer Hires	243	239	207	199	202	197	236	276	339	192
Total	1124	1320	1217	1172	1186	1051	1140	1336	1235	1007

Spreadsheet Download

- Head to the **Data Download** tab to view and download a spreadsheet with your LEA's forecasted and historical data.
- The table includes everything used to create the forecast, plus all available historical data.

Teacher Workforce Planning Tool   Forecasts   Planning Targets   **Data Download**

Excel

Data Type	School Year	County	LEA Type	LEA	Grade Level	Population (5-18 yrs)	Matriculation Rate (%)	Enrollment	IEP Identification Rate (%)	Students (IEP)	Students per Teacher (SPED)	Teacher Demand (SPED)
Forecast	2028-29	Statewide	All LEA	All LEAs	All Levels	160082	87	139271	18	25069	9	2785
Forecast	2027-28	Statewide	All LEA	All LEAs	All Levels	160330	86.7	139086	17.8	24791	9	2748
Forecast	2026-27	Statewide	All LEA	All LEAs	All Levels	160897	86.5	139176	17.6	24564	9	2716
Forecast	2025-26	Statewide	All LEA	All LEAs	All Levels	161210	86.3	139046	17.5	24301	9.1	2680
Actual	2024-25	Statewide	All LEA	All LEAs	All Levels	162479	86	139737	17.3	24183	9.1	2661
Actual	2023-24	Statewide	All LEA	All LEAs	All Levels	163521	85.4	139601	16.8	23463	8.7	2707
Actual	2022-23	Statewide	All LEA	All LEAs	All Levels	164306	84.9	139428	16.1	22455	8.6	2610
Actual	2021-22	Statewide	All LEA	All LEAs	All Levels	164583	84	138202	15.6	21582	8.3	2603
Actual	2020-21	Statewide	All LEA	All LEAs	All Levels	164312	82.9	136290	15.5	21078	8.2	2556