Actionable Human Capital Analytics for Studying School-Level Teacher Retention

Robert H. Meyer, Ryan Veiga, Anthony Milanowski,[1] and Jessica Doherty[2]

Education Analytics

Hillsborough County Public Schools — Preparing Students for Life

How can researchers help districts study and improve teacher retention?

Introduction

Teacher turnover has been shown to be harmful to student achievement and faculty cohesiveness (e.g., Hanushek et al, 2016; Ronfeldt et al, 2013). Excessive turnover also exacerbates teacher shortages and diverts district resources to otherwise unnecessary new teacher recruitment and hiring (Ingersoll, 1997).

Districts could address excessive school-level turnover by:

1. Identifying the schools that have higher than expected retention rates given their characteristics (e.g., student population) and study these schools to see what practices or conditions encourage retention.
2. Focus intensive support on schools that have substantially lower retention and are predicted to have low future retention, especially for experienced and highly effective teachers.

This strategy requires:

- A stable measure of school level teacher retention, to avoid chasing noise. Year over year school turnover rates are noisy (Holme et al, 2018).
- Distinguishing retention by teacher experience and effectiveness.
- Reliable and meaningful measures of retained teacher effectiveness.
- Tools that show schools' predicted stable retention rates, allow users to explore potential causes, and provide predictions of the number of expected future vacancies.

This project:

Education Analytics and Hillsborough County Public Schools expanded their long term research partnership to design and produce a web-based tool to allow district staff to examine school-level retention and target schools for more help or further study.

Hillsborough County Public Schools context:

Serves Tampa FL and surrounding communities

8th largest US district

Participant in Gates Intensive Partnership and TIF/TSL grants

Has developed value added measures for almost all teachers and uses them as part of teacher evaluation

Is challenged by difficulties in filling all teacher vacancies especially in high need schools

How can we create actionable measures of school-level retention?

Methods

We used multi-level modeling and multiple years of data to estimate persistent school effects on teacher retention, controlling for student population characteristics known to influence retention.

Basic model:

$$R_{jkt} = \mu_t + S_k\,\delta + \nu_k + \tau_{kt} + r_{jkt}$$

R_{jkt} is a binary indicator equal to 1 if teacher j at school k was retained in that school;

μ_t are year-specific means capturing district-wide average retention in a given year;

S_k includes school student population characteristics (% FRL, % Black, % Hispanic, % English learner)

ν_k is the time-invariant (i.e. "persistent") random school effect;

τ_{kt} is the time-varying (i.e. "transitory") random school effect;

r_{jkt} is the model residual.

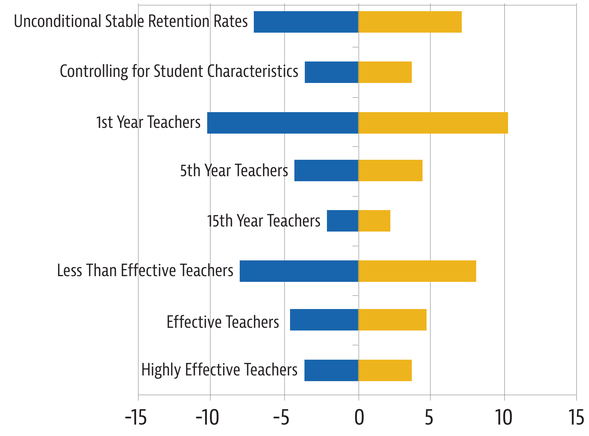
Fixed effects for teacher experience or effectiveness and random school X experience or effectiveness effects were added to estimate school retention effects for teachers at different experience or effectiveness levels.

We used multivariate shrinkage to estimate the likelihood that a school is really in the highest or lowest retention group.

Conclusions

- There are reliable and substantial differences across schools in their ability to retain teachers.
- These differences persist when controlling for schools' student population.
- There are reliable and substantial differences across schools in their ability to retain teachers at different levels of experience and effectiveness.

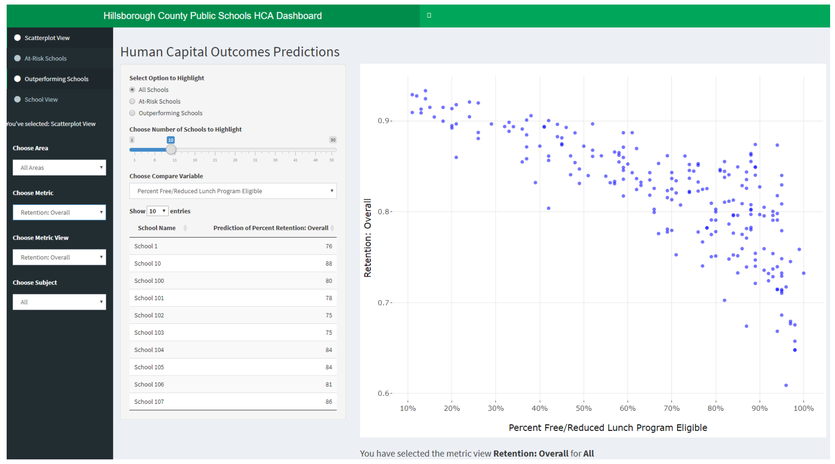
Range of School Stable Retention Rates -/+ 1 Standard Deviation



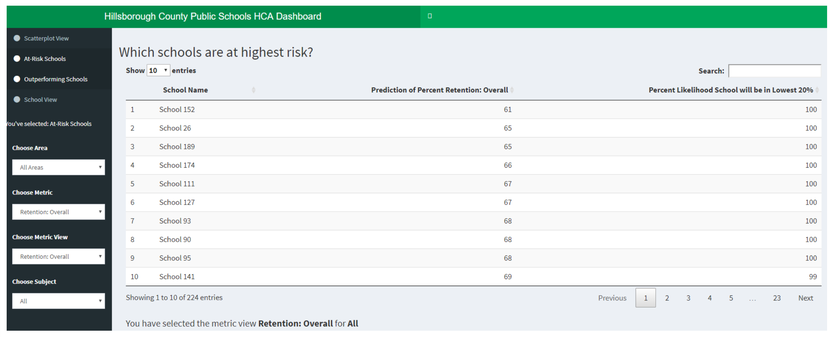
What could a retention analysis tool for districts look like?

Dashboard Views

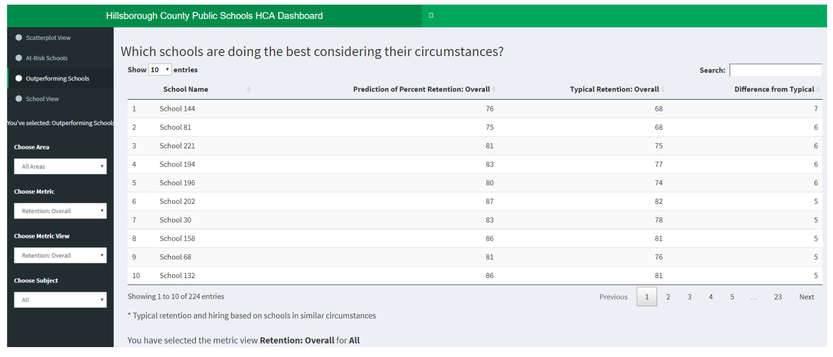
Scatterplot view: retention prediction plotted against student population characteristics.



At risk schools: sortable list of schools with lowest retention rates.



Outperforming Schools: Sortable list of schools with higher than expected retention, given student population.



For more information, visit us at edanalytics.org

[1] Education Analytics. Colleagues who contributed substantially to this project include (in alphabetical order) Jordan Mader, Sean Mclaughlin, Katie O'Brien, Tara Tucci-Exilus, and Peter Witham.

[2] Hillsborough County Public Schools