Enrollment Projections Working Group Update

School Committee Capital Subcommittee
May 21, 2019

Agenda

1. Overview - Enrollment Projections Working Group

2. What the EPWG learned

3. Recommendations

4. Next Steps

Overview of Enrollment Projections Working Group

Recent History - Enrollment Projections in Brookline

- 2009 - MGT as part of the [2009 Facilities Master Plan](#) (updated in 2011)

- 2013 - [Brookline School Population and Exploration Committee](#) (B-SPACE) Report

- 2014 - [Override Study Committee](#)

- SY 2015 - 16: PSB Report led by Interim Superintendent Joseph Connelly

Internal Report Developed by Cross-Department Team - Introduced current methodology with the stated intention of reviewing and updating the methodology

- SY 2016 - 2017 *([Full report](#))*

- SY 2017 - 2018 *([Full report](#)) ([Corrected projections released November 2018](#))*

- SY 2018 - 2019 *([Memo](#) and [Presentation](#) released November 2018)*

4

Current Methodology

- Current Methodology instituted in 2016 - 2017 report. Developed by Town/School working group that included representatives from various Town departments

- Kindergarten Projections: Uses a 5-year average of Birth to K progression rates
    - Students in METCO and Materials Fee programs included in progression rates because they are part of actual enrollment

- Grades 1-12: Cohort survival rate that uses a 5-year average to determine the proportion of students enrolled in one grade that proceed to the next grade)

- New Housing Developments - Student generation rate for large residential developments based on actual enrollment from similar developments

- Reports show 10-Year enrollment projections with and without new housing developments

5

EPWG - Members

- **Cliff Brown** - Advisory Committee Member, Town Meeting Member, Member of Fiscal Advisory Committee member

- **Ruth Quinn Burdell** - Expert Consultant on School District Enrollment Projections

- **Erin Cooley** - Director of Data Analysis & Information Management, PSB

- **Ben Lummis**, - Special Assistant to the Superintendent for Strategy & Performance, PSB

- **Nathan Shpritz** - Town Meeting Member, Fiscal Advisory Committee member

- **Mike Toffel** - Town Meeting Member, Fiscal Advisory Committee member

The EPWG's Four Primary Questions

1. How accurate and precise is PSB's current enrollment projection methodology for predicting each K enrollment and grades 1-12 enrollment?

2. What approaches have communities used to project school enrollment?

3. How can we get more complete data about incoming students between the ages of birth and 5?

4. Are there more effective ways school enrollment projections can be done by Brookline?

Data and Information Review

To determine whether to recommend a methodology modification for PSB's enrollment projections, the EPWG analyzed current and historic data on PSB enrollment and residents including:

1. Brookline Historical Birth Data

2. METCO and Materials Fee kindergarten Enrollments Over Time

3. PSB Mobility Rate Over Time

4. Actual School Enrollment Over Time

Other Communities

1. Not an exact science - Communities struggle with accuracy and precision and use a variety of methodologies

   - Kindergarten Projections: Birth to Kindergarten Progression Rates, Average of past Kindergarten Enrollment, and a combination of the two are commonly used

   - Grades 1-12: Cohort survival method is almost always used

   - Lexington, Cambridge, Newton have all adjusted methodologies recently

   - Internally done projections are typically limited to 5 years

   - Other communities also include additional factors including: fertility rates, mortality rates, in- and out-migration, changes in median age, rate and price of existing home sales, and community/regional economic assumptions.

9

Other Communities *(continued)*

2. External Support - Communities also look to external firms

   ○ To supplement internal reporting

   ○ Provides ability to include greater number of variables or use a methodology that can't be built internally (fertility rates, mortality rates, long-term economic factors, etc)

   ○ Helps communities address significant, atypical, or new factors -- (e.g. rapid housing growth, significant in-migration or out-migration, etc)

     ■ Newton example - Fall 2018 Internal Report followed by 2019 external study

10

Other Communities *(continued)*

- Using Birth to Five Years Old Census

  - Lessens unpredictability in the gap between birth and Kindergarten

  - Requires strong collaboration between Town Clerk and School Department

  - Building a record of children in town ages 0 to 5 through a variety of means

    - Stronger census practices

    - PSB Office of Student Affairs adding information learned from families about younger siblings

    - Tracking in and out migration of families with children ages 0 to 5

11

Backcasting

To assess the accuracy and precision of enrollment projections based on PSB's current methodology, the EPWG used "backcasting" by applying the current methodology to prior years' data.

- Used the original 2016-17 "birth-based" methodology
    - *B to K progression rates, including students in calculating METCO and Materials Fee in the B to K progression, and used cohort survival for grades 1-12*

- Generated enrollment projections for prior years

- EPWG compared those projections to actual enrollment numbers.

- Also ran a similar backcasting exercise using three- and four-year rolling averages of actual kindergarten enrollment to see if it was predictive of K classes and future enrollment

12

Backcasting – Three Conclusions

1. Kindergarten enrollment is the primary driver of the year to year variation in our elementary school population
   - Once a kindergarten class size is established, a cohort of approximately the same size will graduate almost thirteen years later.

2. The EPWG determined that the number of Brookline births does not predict kindergarten class size five years later. Prior kindergarten class enrollment also fails to account for year to year variation in the size of the total kindergarten class.

3. Both methodologies (birth to K progression rates or averages of recent actual K enrollments) are inaccurate predictors of Brookline's K enrollment between September 2005 and September 2018.

Backcasting – Conclusion #3

3. Both methodologies (birth to K progression rates or averages of rolling averages of K enrollment) are inaccurate predictors of Brookline's K enrollment between September 2005 and September 2018.

    ○ EPWG's review found that both approaches underestimated kindergarten enrollment for the years 2010 to 2014 and overestimated kindergarten enrollment between 2015 and 2019.

    ○ Using the current methodology (birth based) - the largest underestimate was using data available in SY 2011-12, which predicted SY 2012-13 K enrollment to be 557. Actual K enrollment was 666, an underestimate of 109 students.

    ○ Largest overestimate used data available in SY 2015-16, which predicted SY 2016-17 K enrollment to be 671. Actual K enrollment was 582, an overestimate of 89 students.

14

Limitations of Current Methodology

1. Largely reliant on strong kindergarten projections
   - Birth to K progression in Brookline varies significantly and year to year
   - Brookline does not have sufficient information about families with children between 0 and 5
   - Likely significant difference in the actual families that have children born while living in Brookline and those who are here five years later
   - Don't understand when families move into Brookline between 0 and 5 and at what rate

2. Does not take into account other key variables (e.g. fertility rate, mortality rate, in-migration, out-migration, data within school zones, etc)

3. Challenging to anticipate enrollment during times of fluctuation
   - When birth rates are changing rapidly
   - At "inflection points" or where the level of enrollment is nearing highs or lows

4. Does not account for long-term demographic trends or regional trends (aging of baby boomers, "senior sell-off" in housing, predicted growth of school-age children)

Conclusion

- While the birth to kindergarten methodology may be effective for many communities it is not currently effective for Brookline.

- The Enrollment Projection Workgroup believes the currently used birth to kindergarten progression rate methodology should not be used further in Brookline.

- Further, the EPWG recommends that the current long term projections should not be relied upon.

Recommendations

Updating Birth to Kindergarten Methodology

1. Town Clerk and School Department Work Together to Improve the Birth to Five Census

2. Move from Point Projections to Ranges

3. Determine when METCO and Materials Fee Students are Included

4. Survey Licensed Pre-School and Day Care Centers Annually

5. Use an External Consultant to Identify and Use a More Complex Methodology

6. Massachusetts School Building Authority

1. Town Clerk and School Department Work Together to Improve the Birth to Five Census

School Department and Town Clerk's office should collaborate to create a joint record of school enrollment and census data. Creating this type of record would require a number of steps including: *(NOTE: will take a number of years to develop this record)*

- Understand current Town Clerk practices on developing, accessing, and maintaining census records

- Improve census data by populating all known children on census forms and making it clearer that all children should be listed from birth

- PSB's Office of Student Affairs (OSA) sharing data with Town Clerk about families with younger siblings (0 to 5) so these children are added to census forms

- OSA asking families about younger and older siblings and adding this information to the family record when necessary

2. Move from Point Projections to Ranges and/or Error Bars

- Current reporting of exact enrollment numbers in future years gives false sense of certitude

- Range or error bars reflect appropriate variance in any projection of a future state
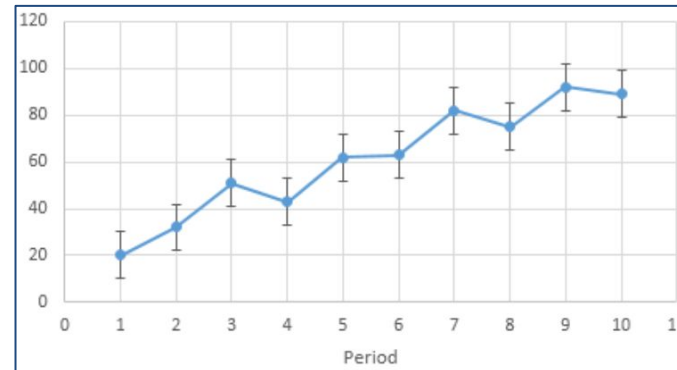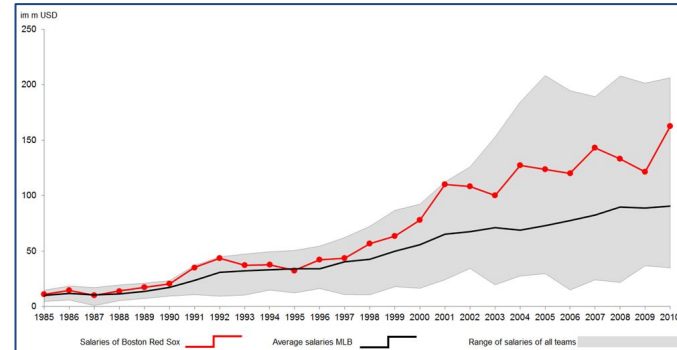
3. Determine when METCO and Materials Fee Students are Included

IF we continue with some version of Birth to K Progression model how students in the METCO and Materials Fee programs are included in the model must be reconsidered.

A. Current Methodology calculates B to K progression with M/MF included

B. Suggestion Option: 2018 Projections were re-run without M/MF included in B to K progression rate. Then a five year rolling average of the actual K students in M/MF were added once the K progression was created.

- Less than 1% difference between A and B. With current methodology always being projecting fewer students than Version B.

4. Survey Licensed Pre-School and Day Care Centers Annually

- EPWG discussed surveying licensed pre-schools and daycare providers in and around Brookline to identify children who live in Brookline but may not be on our census roles.

- With dozens and perhaps hundreds of such providers within the area, the time and cost of this effort would have to be carefully weighed against the potential benefit.

- May be possible to begin a pilot to see whether or not a smaller, focused effort yields useful information.

5. Use an External Consultant to Identify and Use a More Complex Methodology

- Likely will need support in determining which approach fits best for Brookline

- External firm could use a variety of methods and make a determination about which is the best fit for the Brookline.(cohort survival using birth to K for kindergarten, cohort survival using a rolling average of kindergarten enrollment, linear regression, average percentage increase, etc.)

- External firms have capability to develop forecast using a much wider set of variables including fertility and mortality rates, in and out migration, population age, home sales, housing conversions and construction, and long term demographic shifts.

- Could look at this complex set of data within each school assignment zone to identify how they may impact enrollment in different parts of the town.

Cautionary Tale: Newton's External Study did not alter its internal projections significantly, but it did reassure the community they were on the right track

23

6. Massachusetts School Building Authority

- Pierce entering Eligibility Period with Massachusetts School Building Authority
- One of the MSBA's first steps is to work with the district to project enrollment
- MSBA uses a version of Birth to Kindergarten Progression rate and adds other factors such as female population data, economic trends, and housing information
- MSBA will work with the district to come up with projections that fit Brookline's scenario
- MSBA projections must be completed by February and is likely to happen this Fall

Because of this timing, MSBA could serve as Brookline's "External Consultant"

Next Steps

Timeline

1. EPWG recommends the Town and PSB begin deciding on next steps and implement them without delay. It will take time to get this work going and fully implemented.

2. Maintain existing timeline for reports to be released in November each year

3. Allows district to use official October 1 enrollment data

4. Provides time to make initial changes in Town/PSB practices.

5. Fits well with work done in collaboration with MSBA (for 2019 report)

Updating Birth to Kindergarten Methodology

1. Town Clerk and School Department Work Together to Improve the Birth to Five Census

2. Move from Point Projections to Ranges

3. Determine when METCO and Materials Fee Students are Included

4. Survey Licensed Pre-School and Day Care Centers Annually

5. Use an External Consultant to Identify and Use a More Complex Methodology

6. Massachusetts School Building Authority