A Review of 100Kin10's Methods to Track Increased STEM Teacher Supply
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Overview

Inspired by President Obama's 2011 call, 100Kin10 has been working for the last decade to prepare 100,000 new, excellent STEM teachers by 2021 while addressing systemic barriers to increasing and retaining well-trained STEM teachers in the U.S. workforce. Through its networked impact approach, the organization inspires its 300+ partners to take on bold, unique commitments to the network's shared goals. 100Kin10 partnered with Bellwether Education Partners to ensure the validity of the processes it uses to track the network's progress toward its ambitious goal of preparing 100,000 STEM teachers.

This memo provides a summary of Bellwether's work to audit the methods 100Kin10 has employed during the last ten years to track the number of excellent STEM teachers who entered the profession due to the efforts of 100Kin10's partners. Below, we describe our data quality assurance process, outline steps that were taken to address inconsistencies in the data, and explain the limitations of our review.

After careful review, we found that 100Kin10 leveraged valid methods **to collect data and track progress toward its goals. We affirm that** the process 100Kin10 used to count and track the number of teachers prepared is valid and reliable. 100Kin10 has used this process consistently over the last ten years, and **we affirm that there is sound and sufficient evidence that 100Kin10 exceeded their goal to prepare 100,000 excellent teachers.**

Our Methods

Our review of 100Kin10's data focused on auditing 100Kin10's formulas and calculations to ensure that their conclusions were valid, rather than counting teachers to determine whether the organization reached the specific 100,000-teacher mark. To track recruitment and preparation of teachers, 100Kin10 collected data from network partners regarding the number of teachers who completed or graduated from partner preparation programs each year. These numbers included:

- graduates of teacher preparation programs who received STEM-related degrees or training,
- elementary teachers who were STEM-certified or otherwise being trained in STEM, and
- classroom teachers who received a STEM certification from 100Kin10's partner organizations.

100Kin10 collected *source data* from partners via emails and surveys, and organized the collected data in its tracking spreadsheet*.*

It is not uncommon for two or more 100Kin10 partners to work with the same teacher or teacher candidate, an instance 100Kin10 refers to as *overlap*. To ensure that it did not count a teacher twice, 100Kin10 asked its partners to report the number of teachers or candidates for whom there was overlap. According to 100Kin10's yearly tracking spreadsheet, example overlaps included those between:

- Teach for America and its university partners,
- IHEs that are part of the same university system,
- UTeach replication sites, and
- IHEs that partner with the Institute for Citizens and Scholars (formerly known as the Woodrow Wilson National Fellowship Foundation).

Inclusion and Exclusion Criteria

100Kin10's tracking spreadsheet included data for 95 partners for the period of 2011-2021 (representing school years 2011-12 through 2020-21). Because the research firm American Institutes for Research (AIR) validated 100Kin10's first five years of data (2011-2015), our process sought to validate data from 2016 through October 2021.

Of the 95 partners in the tracker, only 18 partners did not report data for each year from 2016-2021. This attrition is normal given the complexities of longitudinal research. Our validation process focused on the 77 organizations that consistently shared data with 100Kin10 between 2016-2021.

Sampling

Over the last ten years, some network partners prepared thousands of teachers, while others prepared fewer than twenty. Instead of validating data for all 77 partners, we designated partners as large, medium, and small for the purpose of sampling[1] (see Table 1 for more detail). In order to validate a sufficient amount of data from a representative sample of partners, we included all large (4) and medium (11) partners in the sample and randomly sampled 15 small partners from the remaining 62 organizations. Our final sample included 30 partner organizations who reported that they prepared 87,269 teachers. The sample represented approximately 81% of the total number of teachers reported over the last ten years and 32% of the 95 partners.

Table 1: Sampling categories

Designation	Total number of teachers prepared between 2011-2021	Number of partners in the sample (n)	Number of partners in the network (N)
Large partner	Greater than 5,000 teachers	4	4
Medium partner	Between 1,000 and 5,000 teachers	11	11
Small partner	Less than 1,000 teachers	15	62

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[1] We used a stratified sampling approach to select partner data to validate. Stratified sampling involves dividing a population (in this case, all teachers reported) into subgroups based on specific characteristics in order to ensure a representative sample. For the purposes of this work, we divided organizations into subgroups based on the number of teachers they prepared over the last ten years to ensure that we validated data from an adequate range of partners.

	Total	30	77

Table 2: About the sample

Number of partner organizations sampled	30 of 95
Percent of all partners	*32%*

Number of teachers reported by partners in sample	87,269 of 107,719[2]
Percent of total teachers reported	*81%*

Data Quality Assurance Process

Bellwether's data quality assurance process included four steps.

1. **Ensure that the tracker includes accurate calculations**:
   a. 100Kin10's tracker is an Excel spreadsheet and uses formulas to calculate totals and other summary data. We checked that the formulas are correctly written and consistently used in each tab of the spreadsheet. We also checked that the calculation of the total number of teachers produced by each partner over the five-year period (2016-2021) was correct based on the formulas in the spreadsheet.
   b. The tracker includes an overall tab that summarizes the number of teachers prepared in total over the last ten years, along with tabs that include data for each individual school year. We validated that the values on the overall summary tab match the values on the individual tracking tabs for each school year from 2016-2021.
2. **Ensure that the data in the tracker reflects the data collected from partners:** To populate the tracker, 100Kin10 collected data from partners about the number of teachers they prepared each school year. Prior to 2015, they collected data via emails, but all data from our five-year review period (2016-2021) were collected via a survey. We reviewed data 100Kin10 collected and ensured that it matched the data 100Kin10 entered in its tracker.
3. **Ensure that calculations from the tracker match data reported by 100Kin10**: We also reviewed the data in 100Kin10's 2019-2020 summary report to ensure that the numbers in the tracking spreadsheet matched those listed in the publication. Although this is an internal report, we reviewed it to determine whether the organization's numbers were consistent across multiple mediums (i.e., tracking spreadsheet and internal reports).

We worked with the 100Kin10 staff to ensure that we understood the purpose of the tracking spreadsheet and how it is intended to function. We also documented data questions and inconsistencies (e.g., discrepancies between numbers in the partner source data and numbers

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[2] Total number of teachers reported as of October 27, 2021.

in 100Kin10's tracking spreadsheet), and we worked with 100Kin10 to resolve them. Most discrepancies resulted from updates to the number of teachers partners reported to 100Kin10, which sometimes weren't accurately reflected in the current version of the tracking spreadsheet. When we completed the data quality assurance process, there were no outstanding data questions or unresolved inconsistencies in the data.

Findings

Our data quality assurance process revealed that **100Kin10's tracking methodologies were logical, have face validity, and were applied consistently during the past five years**.

Specifically,
- In 100Kin10's tracker, the **formulas and calculations are error-free and consistent** on each tab of the workbook.
- The data in the IS tracker **accurately represented source data** collected from partners.
- 100Kin10 **correctly accounted for potential overlaps**, which allowed them to accurately count the total number of teachers prepared by each partner.
- Based on the IS Tracker, the 2019-2020 **summary report correctly documents the total number of teachers** prepared by the network.

Assumptions

We did not review network data from 2011-2015, as AIR conducted a review of 100Kin10's data and tracking methodology from those five years. Consequently, our findings regarding the success of the network's efforts over the last decade rely on the rigor and accuracy of AIR's review. The AIR validation memo provides a full recounting of its methods and findings and demonstrates that both our work and AIR's used similar methods. Consequently, we are confident in the rigor and accuracy of the AIR review.

Limitations

There are two limitations to note regarding 100Kin10's data collection and tracking process. First, the Increase Supply survey that partners completed each year asked them to report "how many STEM teachers completed or graduated from [their] program in this school year." There may have been some variation in how programs interpreted the definition of "STEM teacher." For example, some partners may have defined a prepared teacher as one who received a Bachelor's degree in a STEM-related field. Others may have included new elementary teachers who received STEM-specific training. Still others might have used a strict definition of preparing excellent teachers and only counted teachers who received Master's degrees. Although there may have been variation in the ways in which partners interpreted "STEM teacher," this variation does not impact our assessment that 100Kin10's data collection methods are valid.

We also noted that compared to previous years, fewer partners responded to the Increase Supply survey to report the number of teachers they prepared in the 2019-20 school year. 100Kin10 believes that the lower response rate was likely due to the urgent and significant demands associated with the COVID-19 global health pandemic, and expects that as organizations adjust to the challenges of the pandemic, the response rate will increase.

Nonetheless, a sufficient number of partners shared data for the 2020-21 school year for Bellwether to complete our assessment.

Conclusion

After careful review, Bellwether formally affirms the validity and quality of the organization's data collection and tracking methods, and we maintain that there is sound and sufficient evidence that the network exceeded its goal of 100,000 STEM teachers as of October 2021. Despite the limitations and challenges associated with any effort to collect and track longitudinal data, 100Kin10 has meticulously and accurately tracked the number of teachers recruited and prepared by partner organizations in its network.