

IMPROVING COVERAGE IN A NATIONAL SURVEY OF TEACHERS

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1. INTRODUCTION

The National Center for Education Statistics (NCES) sponsors the Schools and Staffing Survey (SASS) conducted by the U.S. Census Bureau. The Census Bureau first conducted the SASS during the 1987-88 school year and again during the 1990-91 and 1993-94 school years. The SASS is an integrated set of surveys, one of which is a survey of public and private school teachers.

At the beginning of the fall semester of the school year in which the SASS is conducted, the Census Bureau mails a Teacher Listing Record (TLR) to each sample public and private school. The instructions request that the schools list the teachers in their school on the TLR. The SASS then uses the TLRs to create the teacher frame for sampling teachers within the schools. Later during the school year, the Census Bureau mails a separate School Questionnaire to these same schools. This questionnaire asks for information about the school, including head counts of teachers within the school.

In the 1987-88 and 1990-91 SASSs, the schools, on average, reported a different number of teachers on the TLR than the School Questionnaire. This inconsistency in the reporting of teachers prompted the National Center for Education Statistics (NCES) to enlist the Census Bureau to conduct a special Teacher List Validity Study (TLVS).

The purpose of the TLVS was to evaluate the quality of the teacher lists on the TLR, and to provide insight into how teacher estimates could be improved. We designed the study to be primarily qualitative in nature. The Census Bureau conducted the TLVS during the 1992-93 school year. Specifically, the study tried to determine whether:

- the schools were filling out the TLR per our instructions (i.e. the instructions on the form)
- the schools were listing eligible in-scope teachers
- the school districts could provide more accurate listings of teachers
- the TLR or the School Questionnaire, if either, elicits a more accurate count of teachers

- certain types of teachers/non-teachers created problems for the schools when computing the teacher counts

We selected a small sample of schools primarily in those states that reported inconsistent teacher counts between the TLR and the School Questionnaire.

We employed reinterview as the primary technique in the study with reconciliation of differences between the original listing and the reinterview. In addition, we employed a "think aloud" technique during the reinterview. This technique, which is normally used in a cognitive interviewing setting, has respondents describe their thoughts while answering the questions.

We feel the study succeeded in providing insight into how to obtain more accurate coverage of teachers. For the 1993-94 SASS, we were able to field a much improved TLR. This study also demonstrates how reinterview can be used in a trouble-shooting capacity to help make a survey work better.

2. METHODOLOGY

The TLVS had two separate components involving different samples of schools. The first component consisted of a reinterview and reconciliation of the TLRs. The second component consisted of a reconciliation of differences between the number of teachers listed on the TLRs and the head counts of teachers on the School Questionnaires.

2.1 Sample Selection (Initial Stage)

We selected samples of both public and private schools. We selected a public school sample from the public school universe file that was planned for use in the school phase of the 1992-93 SASS (postponed until 1993-94). We selected a private school sample from the private school universe file that was current as of August 1992.

Before selecting the public and private school samples, we deleted schools in certain states because they had high field costs. We then selected the samples using the average teacher adjustment factor (TAF) from the 1990-91 SASS. This adjustment factor is based on a weighted average of the ratio between the number of teachers reported on the School

Questionnaire (numerator) and the number of teachers reported on the TLR (denominator).

For public schools, we defined each state's TAF as "good" if $0.9 \leq \text{TAF} \leq 1.1$. For private schools, we defined each affiliation's (i.e., Catholic, Episcopal, etc.) TAF as "good" if $0.8 \leq \text{TAF} \leq 1.0$. Anything outside these ranges, we defined as "bad." (The private school TAFs were all less than 1. After the sample was selected, errors were found on the teacher file which made those counts greater than they were supposed to be.)

Both the public and private school samples contained higher percentages of schools from the "bad" reporting states: 70 percent public, 75 percent private. We then alternated the assignment of the schools to the two components.

2.2 Component 1: Reinterview of the TLRs

In mid-November 1992, we mailed TLRs to the 300 private schools and 290 public schools in this component of our sample. We also mailed TLRs to the 254 school districts (Local Education Agencies, or LEAs) associated with the 290 public schools. We conducted telephone follow-up for mail nonreturns.

When we received about 85 percent of the TLRs, we selected the reinterview sample. We selected 100 public schools (with their corresponding LEA) and 100 private schools.

We selected the 100 public schools with the highest difference ratio as defined below:

$$\begin{aligned} L &= \text{teachers reported only on the LEA TLR} \\ S &= \text{teachers reported only on the school TLR} \\ B &= \text{teachers common on both TLRs} \\ \text{difference ratio} &= \frac{(L + S)}{(L + S + B)} \end{aligned}$$

We obtained these counts by comparing name by name the LEA TLR to the school TLR. The ratios for the 100 public schools we selected for the reinterview ranged from .11 to .87.

We selected the 100 private schools with the highest difference ratio between what was reported on the TLR and what was reported as head counts (not names) in the 1991-92 Private School Survey (PSS).

$$\begin{aligned} S &= \text{teachers reported on the school TLR} \\ P &= \text{teachers reported in the 1991-92 PSS} \\ \text{difference ratio} &= \left| \frac{(S - P)}{S} \right| \end{aligned}$$

The difference ratios for the 100 private schools ranged from .18 to 23.5.

Reinterview began in mid-February 1993. We did not give the interviewers any formal training, but provided them with instructions to read before conducting the reinterviews. The interviewers we used were familiar with conducting reinterviews.

Of the 100 public schools selected, we assigned 50 for personal visit reinterview and 50 for telephone reinterview.

For the 50 personal visit cases, the reinterviewer asked the original respondent to fill out the TLR again, thinking aloud as he/she completed it. Our goal for these 50 cases was to determine how the respondent interpreted our instructions.

The reinterviewer then compared the reinterview TLR with the original TLR filled out in the previous Fall and reconciled any differences. We also instructed the reinterviewer to ask the school why the LEA reported certain teachers that they did not.

For the 50 telephone cases, the respondent did not complete another TLR. Instead, we instructed the reinterviewer to only reconcile differences between the TLR filled out by the school and the one filled out by the LEA.

Of the 100 private schools in our reinterview sample, we also assigned 50 for personal visit and 50 for telephone.

Here, the reinterviewers followed the same procedures as they did for the personal visit reinterviews for the public schools.

2.3 Component 2: Reconciliation of the TLRs and School Questionnaires

When we mailed the TLRs to the schools in the first component (in mid-November), we also mailed TLRs to a separate sample of 300 private schools and 290 public schools. (LEAs were not involved in this component.)

At the end of February we mailed School Questionnaires to each school and then followed-up by telephone any mail nonreturns.

When we received about 90 percent of the School Questionnaires, we selected the reinterview sample. We selected the public and private school reinterview samples the same way.

We selected the 100 public schools and 100 private schools with the highest difference ratio between what was reported on the TLR and what was reported on the School Questionnaire (as described below):

$$\begin{aligned} T &= \text{teachers reported on the (TLR)} \\ X &= \text{teachers reported on School Questionnaire} \\ \text{difference ratio} &= \left| \frac{(T - X)}{T} \right| \end{aligned}$$

The difference ratios ranged from .05 to .98 for the 100 public schools, and from .07 to 2.0 for the 100 private schools selected.

We sent out separate instructions to the interviewers in April. Reconciliation started at the beginning of May. The interviewers conducted all reconciliation by telephone.

We mailed back to the school a copy of the original TLR and School Questionnaire that they had completed. We also sent them a letter describing the study and letting them know that someone from the Census Bureau would be contacting them regarding the reconciliation.

2.4 Limitations

The major limitation of the study was that it was designed to be qualitative rather than quantitative. We selected a non-random sample of schools. Therefore, we cannot generalize our results to all schools. The discussions on significance tests apply ONLY to the schools in our sample. Even within the schools we did reinterview, we did not try to get specific numbers on how many teachers were erroneously missed or non-teachers that were erroneously included. Instead, we attempted to find out the types of teachers/non-teachers that the schools included or excluded in their counts.

We also tried to find out reasons why the schools excluded certain teachers and included persons who should not have been included. Unfortunately, the reinterview and reconciliation did not gather adequate reasons. Most of the respondents simply said they "forgot about that person" or "I thought this person should/shouldn't be included." Some didn't provide any reasons. Our Center for Survey Methods Research has implemented a program of cognitive research on the revised TLR which should provide this and other kinds of information.

3. Results

We present the types of teachers most often incorrectly excluded and the types of non-teachers most often incorrectly included by the schools and LEAs on the TLRs and/or School Questionnaires. Non-teachers are those persons that were not supposed to be included in the counts. These results were instrumental in the development of the revised TLR for the 1993-94 SASS. We also compare results between the TLRs from the schools and LEAs in our reinterview component, and between the TLRs and School Questionnaires from the schools in our reconciliation component. While the statistical tests

are limited to the sample only, the data suggest there are some differences in these comparisons.

Before we could analyze the data, we had to determine the actual count of teachers in each school. We used this count as the basis for our comparisons.

3.1 Types of Teachers/Non-teachers Erroneously Excluded/Included

We attempted to find out the types of teachers who were excluded in error from the teacher list or count, and the types of non-teachers who were included in error from the list or count. We gathered a wide variety of different types of teachers and non-teachers which we grouped into like categories.

The figures in the tables represent the number of schools and LEAs that mentioned that they excluded at least one teacher in the group, or included at least one non-teacher in the group. (i.e., If a school respondent said that he/she forgot to include 3 part-time teachers, then we would tally only once in the part-time teacher group, NOT three tallies. Or, if a respondent said that he/she included two pre-kindergarten teachers and three counselors by mistake, then we would tally once in the pre-kindergarten category and once in the guidance counselor category, NOT two and three, respectively.)

3.1.1 Public Schools vs. LEAs

When we compared the 99 public schools to their corresponding LEAs (there was one refusal during the reinterview), we found that 43 schools and 48 LEAs mentioned that they excluded at least one teacher from their list. **Table 1** shows that general full-time / general teachers, part-time teachers, and specialized subject matter teachers were among the types of teachers most often excluded.

The "general full-time / general teachers" category is a "catch all" category. Several schools and LEAs reported that they "forgot to include" or "missed" some teachers, but gave no explanation or description as to what type(s) of teachers. We wanted to account for these teachers, so we created this category. Unfortunately, it doesn't provide us with very much information, other than the fact that a large group of unknown teachers were missed.

Of the 99 schools and LEAs, 53 schools and 64 LEAs said they included at least one non-teacher on their list. **Table 2** shows "other" non-teachers (such as teachers on long-term leave and houseparents who teach their kids at home), librarians, speech therapists, and guidance counselors were among the types of non-teachers most often included in error.

There were several explanations of non-teachers that didn't fit into any of the non-teacher categories. Therefore, we created the "other non-teachers" category to capture those unique non-teachers.

Table 1. Types of Teachers Erroneously Excluded: Public Schools vs. LEAs

Teacher Groups	Number of Schools	Number of LEAs
general full-time / general teachers	22 (51.2%)	30 (62.5%)
part-time teachers	15 (34.9%)	21 (43.8%)
specialized subject matter teachers (i.e. voc. ed., art)	15 (34.9%)	17 (35.4%)
special education teachers	10 (23.3%)	10 (20.8%)
long-term substitutes	6 (14.0%)	10 (20.8%)
itinerant teachers	5 (11.6%)	9 (18.8%)
subject matter teachers (i.e. math, english)	3 (7.0%)	4 (8.3%)

Note: The percentages in the table add to over 100 due to schools and LEAs excluding more than one type of teacher. The bases used are the number of schools and LEAs excluding at least one teacher (43 schools and 48 LEAs).

Table 2. Types of Non-teachers Erroneously Included: Public Schools vs. LEAs

Non-teacher Groups	Number of Schools	Number of LEAs
"other" non-teachers	11 (20.8%)	18 (28.1%)
librarians	18 (34.0%)	10 (15.6%)
speech therapists	18 (34.0%)	10 (15.6%)
guidance counselors	9 (17.0%)	14 (21.9%)
principal / asst. principal	3 (5.7%)	6 (9.4%)
other school staff (i.e. secretary, social worker)	4 (7.5%)	5 (7.8%)
pre-kindergarten	2 (3.8%)	4 (6.3%)

Note: The percentages in the table add to over 100 percent due to schools and LEAs excluding more than one type of teacher. The bases used for the percentages are the number of schools and LEAs excluding at least one teacher (53 schools and 64 LEAs).

3.1.2 Teacher Listing Record (TLR) vs. School Questionnaire

We examined 198 schools (100 public and 98 private - we were unable to contact two private schools for the reconciliation) that completed both a TLR and a School Questionnaire. Of these, 72 TLRs and 59 School Questionnaires excluded at least one teacher from their teacher count. **Table 3** shows that respondents failed to report part-time teachers significantly more often than other types of teachers using both the TLR and the School Questionnaire.

Although the schools included several types of non-teachers in error using the TLR, **Table 4** shows the instances appear to be few and fairly spread out amongst several categories. While using the School Questionnaire, however, the respondents included librarians, "other" non-teachers, and pre-kindergarten teachers in error the most. Interestingly, of the 17 schools that erroneously included pre-kindergarten teachers using the School Questionnaire, the private schools did it significantly more often than the public schools (13 and 4, respectively).

3.2 Teacher Counts: Public Schools vs. LEAs

We compared the number of teachers in the school as reported by the school to the actual count of teachers in that school. We did the same with the LEA. We then looked at how many times each agreed with the actual count, and also how many times each agreed within ± 5 percent of the actual count.

Table 5 shows two-thirds (66 of 99) of the counts reported by the schools were within ± 5 percent of the actual count of teachers in the school. However, only about half (47 of 99) of the LEA reported counts were within ± 5 percent of the actual count of teachers in the school. The 66 schools is significantly greater than the 47 LEAs. This suggests that the public schools are more accurate listing teachers than their corresponding school district (LEA), at least for the schools in this study.

3.3 Teacher Counts: Teacher Listing Record (TLR) vs. School Questionnaire

We also wanted to find out whether the TLR or the School Questionnaire was a better instrument for obtaining the number of teachers in the school. In the 1990-91 SASS the teacher file weights (counts from the TLR) were adjusted so they equaled the teacher estimate (head count) from the school file (School Questionnaire count). This was done to make the

Table 3. Types of Teachers Erroneously Excluded: Teacher Listing Record (TLR) vs. School Questionnaire

Teacher Groups	Number of TLRs	Number of School Quest.
part-time teachers	27 (37.5%)	31 (52.5%)
general full-time / general teachers	15 (20.8%)	21 (35.6%)
special education teachers	11 (15.3%)	3 (5.1%)
specialized subject matter teachers (i.e. voc. ed, art)	10 (13.9%)	2 (3.4%)
subject matter teachers (i.e. math, english)	9 (12.5%)	1 (1.7%)
Chapter 1 teachers	6 (8.3%)	4 (6.8%)
itinerant teachers	3 (4.2%)	5 (8.5%)

Note: The percentages in the table add to over 100 percent due to schools excluding more than one type of teacher. The bases used for the percentages are the number of TLRs and School Questionnaires excluding at least one teacher (72 TLRs and 59 School Questionnaires).

Table 4. Types of Non-teachers Erroneously Included: Teacher Listing Record (TLR) vs. School Questionnaire

Non-teacher Groups	Number of TLRs	Number of School Quest.
librarians	8 (25.8%)	17 (22.4%)
"other" non-teachers	4 (12.9%)	18 (23.7%)
pre-kindergarten teachers	4 (12.9%)	17 (22.4%)
principal / asst. principal	4 (12.9%)	9 (11.8%)
guidance counselors	2 (6.5%)	8 (10.5%)
speech therapists	5 (16.1%)	4 (5.3%)
other school staff (i.e. secretary, social worker)	2 (6.5%)	7 (9.2%)

Note: The percentages in the table add to over 100 percent due to schools excluding more than one type of teacher. The bases used for the percentages are the number of TLRs and School Questionnaires excluding at least one teacher (31 TLRs and 76 School Questionnaires).

SASS estimated teacher counts from the School Questionnaire and TLR more consistent. Our hypothesis, however, was that the TLR would provide a more accurate count, since the respondent must list individual teacher names. The School Questionnaire

simply asks for an overall "head count" of teachers in the school.

For each school, we compared the number of teachers in the school as reported using the TLR to the actual count of teachers in the school. We did the same for the School Questionnaire. We then looked at how many times each agreed with the actual count, and also how many times each agreed within ± 5 percent of the actual count.

Table 6 shows 70 percent (123 of 176) of the counts obtained using the TLR were within ± 5 percent of the actual count of teachers in the school. Only about 35 percent (61 of 176) of the counts obtained using the School Questionnaire were within ± 5 percent of the actual count of teachers in the school. The 70 percent using the TLR is significantly greater than the 35 percent using the School Questionnaire. This suggests that, for the schools in this study, the TLR is a better instrument than the School Questionnaire at getting a reliable count of teachers.

4. The Revised Teacher Listing Record

In the 1987-88 and 1990-91 SASSs, we obtained a list of teachers in each school from the school, not the LEA. Since the study suggests the schools are more accurate, we did the same for the 1993-94 SASS. Although the schools were not completely accurate, they were more accurate at listing teachers than their corresponding LEA. Because of this, we plan to continue to use the public schools, rather than the LEAs to obtain these lists.

The results of the TLVS gave us some insight on how to improve the TLR. We made substantial changes to the form for the 1993-94 SASS.

The instructions are more concise and easier to read. We feel that the changed wording made it easier for the respondent to decide who should and should not be included in the list of teachers. We felt that respondents were confused whether to include on the list a person who teaches sometimes, but mostly has non-teacher duties (i.e., a principal, a guidance counselor, a speech therapist, a librarian, etc.).

The TLR used during the TLVS stated to "... include full-time and part-time teachers whose MAIN assignment at this school is teaching." It also stated to "... exclude the principal or school administrator, regardless of whether he/she teaches ..." and "... exclude any staff member whose MAIN assignment at this school is an administrator, guidance counselor, ... or other position in which the major responsibilities are not teaching." We think the phrase "MAIN assignment" may have confused respondents. Also, we

Table 5. School and LEA Counts Compared to the Actual Counts

Difference from Actual Count	Number of Occurrences	
	school count	LEA count
Zero percent difference (complete agreement)	33 (33.3%)	17 (17.2%)
0 < difference ≤ 5 %	33 (33.3%)	30 (30.3%)
difference > 5 %	33 (33.3%)	52 (52.5%)
total	99	99

Table 6. TLR and School Questionnaire Counts Compared to the Actual Counts

Difference from Actual Count	Number of Occurrences	
	TLR count	School Quest. count
Zero percent difference (complete agreement)	106 (60.2%)	45 (25.6%)
0 < difference ≤ 5 %	17 (9.7%)	16 (9.1%)
difference > 5 %	53 (30.1%)	115 (65.3%)
total	176	176

Note: The total does not add up to 200 (100 public schools, 100 private schools) because we couldn't determine the actual count of teachers for 24 schools (12 public, 12 private).

think respondents may have been confused with who qualifies as a part-time teacher.

The instructions on the revised TLR used during the 1993-94 SASS were more specific in addressing these concepts. The instructions stated to "INCLUDE ON THE LIST: part-time teachers (including those who may teach only one class each week)," and "persons who teach a regularly scheduled class but whose main assignment is: principal or vice principal, guidance counselor," It stated to "OMIT FROM THE LIST: persons who do not teach any regularly scheduled classes and whose main assignment is: principal or vice principal, guidance counselor," These revised instructions help the respondent decide whether or not to list the person on the TLR.

The Census Bureau's Center for Survey Methods Research (CSMR) is conducting cognitive research on the revised TLR. The results will be available in the fall of 1994. We will use what we find from this to again revise and improve the TLR. We plan to test this TLR prior to the 1997-98 SASS.

References

Forsyth, B.H. and Lessler, J.T. 1991. "Cognitive Laboratory Methods: A Taxonomy" in P.B. Biemer, R.M. Groves, L.E. Lyberg, N.A. Mathiowetz, and S. Sudman (eds), *Measurement Errors in Surveys*. New York: John Wiley and Sons.

Kaufman, S. 1991. "1988 Schools and Staffing Survey Sample Design and Estimation." Technical Report. National Center for Education Statistics. U.S. Department of Education. Office of Educational Research and Improvement. May, 1991.

Kaufman, S. and Huang, H. 1993. "1990-91 Schools and Staffing Survey: Sample Design and Estimation." Technical Report. National Center for Education Statistics. U.S. Department of Education. Office of Educational Research and Improvement. July, 1993.

Royce, D. 1993. "1993 Teacher List Validation Study (TLVS) for SASS: A Description." Internal Census Bureau memorandum. September 16, 1993.

Royce, D. 1994. "The Results of the 1993 Teacher List Validation Study (TLVS)." Internal Census Bureau Report. June 8, 1994.

Shapiro, G.M. 1992. "Sampling Specifications for Private Schools in the Schools and Staffing Surveys (SASS) Teacher List Validation Study and the Private Schools Survey Fiscal Component Feasibility Study." Internal Census Bureau memorandum. August 11, 1992.

Shapiro, G.M. 1992. "Sampling Specifications for Public Schools and LEAs in the Schools and Staffing Surveys (SASS) Teacher List Validation Study - Revised." Internal Census Bureau memorandum. September 14, 1992.

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