ANALYTIC STRATEGIES EMPLOYED FOR PRIDE SURVEYS LEARNING SURVEYS

Analysis of the TES Pilot Instrument

   A. Preparation of the Data Set

A total of 35,944 scanable survey forms were returned from Alabama teachers. Because of the large number of pilot items, the survey items were divided into two forms, A & B, which were randomly intermixed at shipment and distributed to the teachers. Form A contained a total of 143 survey items; Form B contained 141 survey items (including demographic questions). Table 1.1 shows the number of scanable survey forms that were returned for processing. The number of non-scanable forms was negligible.

Table 1.1   Number of scanned survey forms collected from Alabama teachers

FORM	*N*	Pct.
Form A	18,015	50.1%
Form B	17,929	49.9%
Total	35,944	100%

The purpose of the pilot survey was to analyze item performance for reliability and reduce the number of items into a manageable set for a single survey form. Factor analysis was the primary analytic strategy used to reach this goal. Prior to commencing the analysis, several steps were taken to prepare the data set for use.

   1. All survey items were recoded to: a) produce a 0 value as the low point anchor of the individual item, and b) to reverse code items so that later scaling would be consistent in direction and interpretation across all of the items.
   2. In preparation for missing data analyses, a variable was created for each survey item coding for whether the respondent provided a valid response for that survey item. A code of '1' indicated a missing response, and a code of '0' indicated a valid response.
   3. Various demographic variables were recoded as needed in preparation for later analyses.

   B. Missing Data Analyses

The missingness status of all survey items was determined. A count of the number of missing items was made for each survey form. Table 2.1 shows the number of missing items in both Form A and Form B. Overall, low levels of missingness were found. However, the data were positively skewed, with a relatively small number of individual items accounting for a disproportionate amount of missingness.

Table 2.1   Missing data in the survey

	Form A	Form B
Mean Number Of Missing Items	4.95	4.45
Percentage of Items Missing	3.4%	3.2%

Median Number of Missing Items	0	0

The specific missingness problems are best illustrated with Figures 2.1 through 2.4. In these figures, the missingness of individual survey items across forms was examined. Figures 2.1 and 2.2 display the results for Form A, with the results broken out by both the teachers' experience level and by the school level being taught (i.e., Elem, MS, HS). Figures 2.3 and 2.4 display the results from Form B, with the same breakdowns. In all of these figures, the survey items are arrayed left to right in order of the presentation to the teacher on the survey form. The vertical axis codes for the percentage of survey forms that had a missing value on each survey item. Those items that had a high level of missingness are individually labeled.

Across all figures a slight, very gradual increase in the overall level of missingness can be observed. In other words, teachers became slightly more likely to not answer a survey question as the survey progressed. However, this effect is quite small and does not impact the overall integrity of the TES. Thus, we found no evidence of significant respondent fatigue with the TES in the pilot form format.

On Form A, high levels of missingness were associated with the commute distance item, the career intentions item, support staff hours, and alcohol abuse services for students. Figure 2.1 shows that elevated levels of missingness across all items were associated with experience level. In fact, being a new teacher increased the missingness about 4% across all items. Figure 2.2 shows a smaller missingness effect for being an elementary school teacher.

Form B results, shown on Figures 2.3 and 2.4, shows a similar elevated missingness for commute distance. However, one item on Form B had a missingness level of 33%, far beyond the y-axis scaling on these figures. Again, being a new teacher, and teaching at an elementary school, was associated with increased levels of missingness.

Figure 2.1.   Missingness on Form A, items arrayed in sequence of presentation, breakout by experience level.
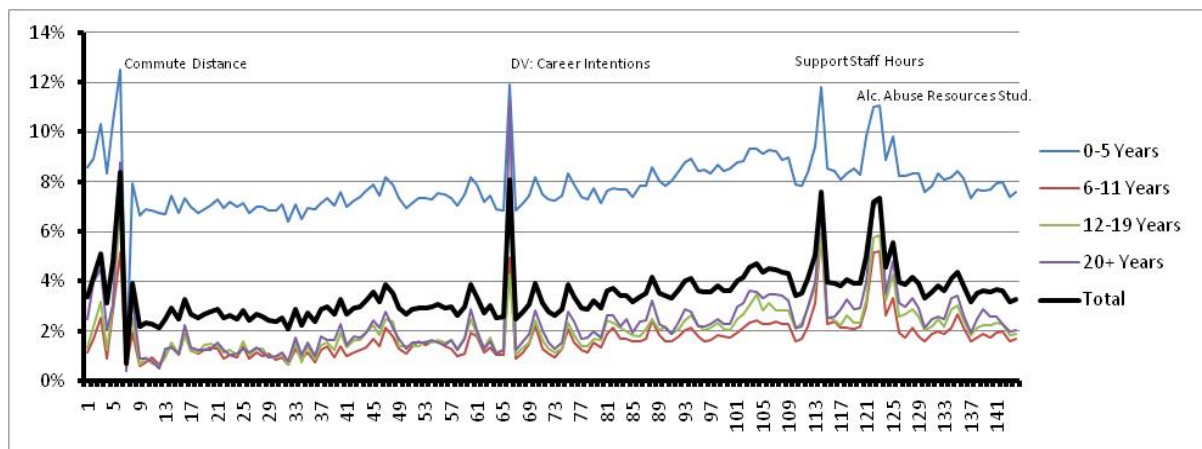

Figure 2.2.   Missingness on Form A, items arrayed in sequence of presentation, breakout by school level.
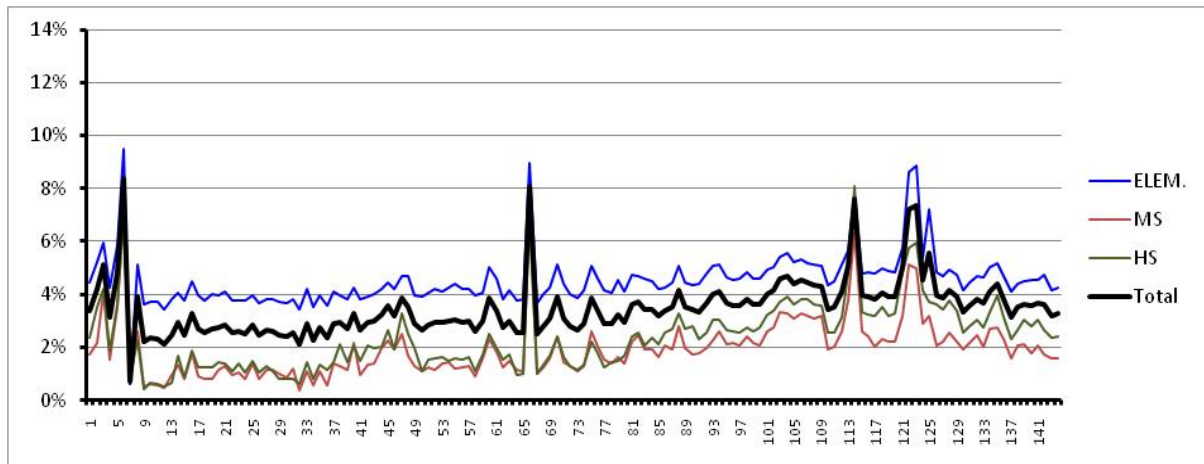
Figure 2.3. Missingness on Form B, items arrayed in sequence of presentation, breakout by experience level.
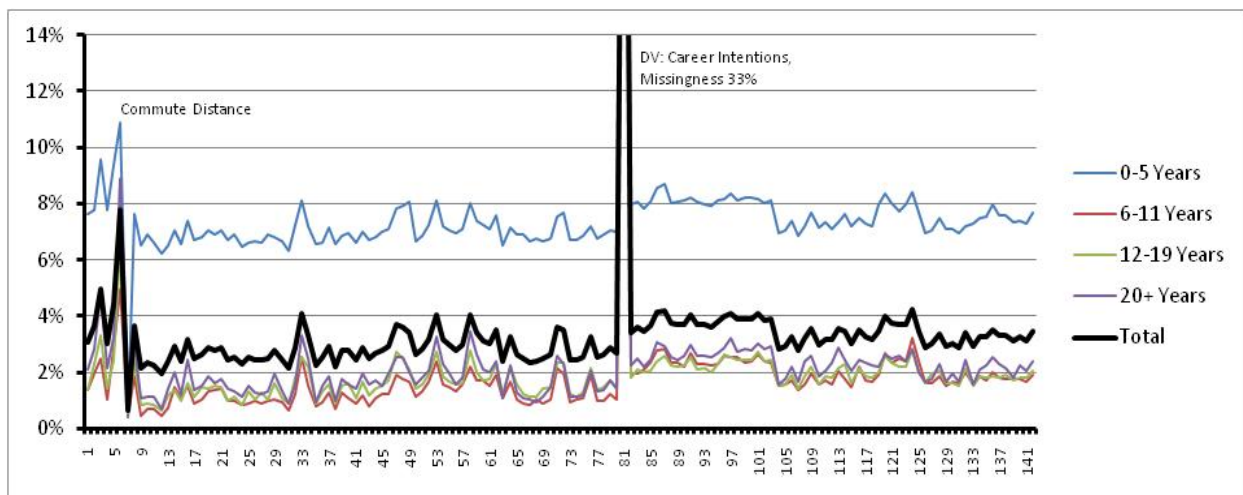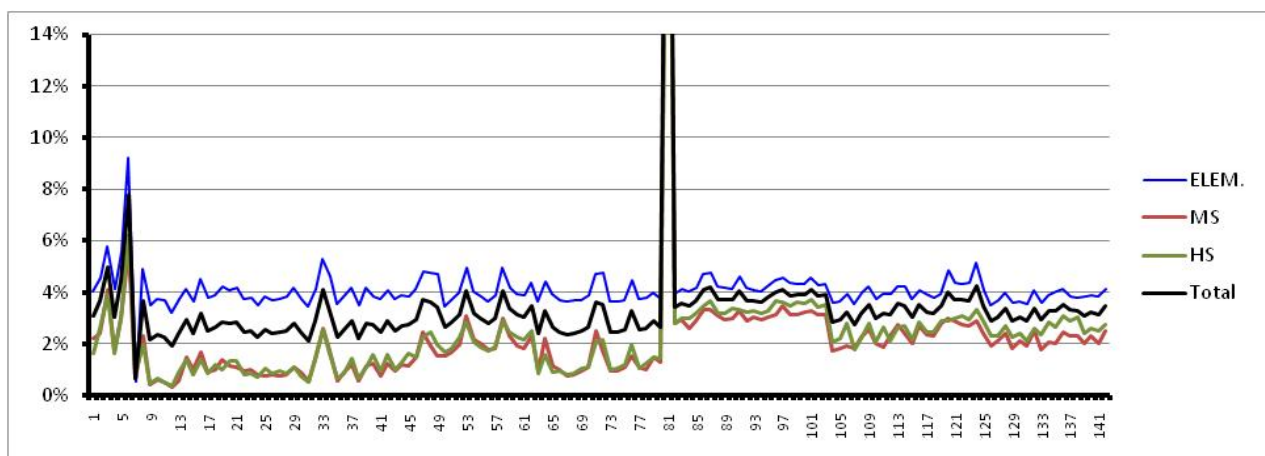

Figure 2.4. Missingness on Form B, items arrayed in sequence of presentation, breakout by school level.

Selected demographic variables were correlated with the number of missing items. Table 2.2 shows the correlation coefficients for these variables. Teacher ethnicity was dummy coded for this analysis. Most of the demographic variables showed modest or negligible correlations. Age, ethnicity, commuting distance, size of classes, certification status, and whether the teacher grew up in the local area did not show relationships of any magnitude. (Because of the sample size, virtually all of the correlations were statistically significant at the *P*<.05 level or better, so this is NOT a meaningful statistic in the analysis.) The two findings worth reporting are (as noted above): 1) that the experience level of the teacher was negatively correlated with the level of missing data; and 2) the typical grade level taught was negatively correlated with missingness.

Table 2.2.   Demographic variable correlations with the amount of missing data.

Pearson Correlations	Missingness Form A	Missingness Form B
Age	.06	.05
Sex (M=1, F=0)	.00	.02
White	-.06	-.06
Hispanic	-.01	.00
African-American	.06	.06
Other Eth.	.00	.02
Years Teaching At Current School	-.10	-.09
Total Years Teaching	-.13	-.13
Minutes Commute to School	.01	.02
Miles Commute to School	.01	.00
Grow Up Locally (1=Yes, 0=No)	-.01	-.01
PositionType (1=Reg.FT, 0 Oth.)	-.05	-.05
Education Level	.01	-.01
Grade Span Teacher Certificate	.01	.00
Teaches 2 or More Schools	.03	.01
Total Students Taught per Week	.03	.03
Average Class Size	.02	.03
Total Grades Taught	.04	.04
Average Grade Taught	-.15	-.14
Certification (1=Cert. 0 = Other)	-.04	-.04

C. Measurement of Future Career Intentions Regarding Education

The measurement of future career intentions regarding education was the area that most needed improvement in the TES. The development team used these results to modify the career intentions by removing non-performing items and adding new items, some of them based on the Teacer Follow-up

Survey Questionnaire for Current Teachers (2008-09, US Department of Education, National Center for Education Statistics).

D. Creation of the Final Data Sets

To create the final data sets used for the factor analysis, the following filters were used.

1. Keep ONLY regular full-time teachers. Table 4.1 shows the breakdown of the number of teachers by teaching position status. Since there were only a small percentage of teachers who were not regular, full-time teachers, the part-time and substitute teachers were removed from the data set.

Table 4.1 Teaching position status.

Teaching Position	Freq.	Percent	Valid Percent	Cumul. Percent
1 Regular Full-Time	34,205	95.2	98.3	98.3
2 Regular Part-Time	205	0.6	0.6	98.9
3 Long-Term Sub.	325	0.9	0.9	99.9
4 Short-Term Sub.	50	0.1	0.1	100.0
Total	34,785	96.8	100.0	
-9 Missing	1,159	3.2		
	35,944	100.0		

2. Keep ONLY teachers with valid, non-probationary teaching certificate. Table 4.2 shows the number of teachers for various certificate levels.

Table 4.2. Certification status of the teachers.

Certification Level	Freq.	Percent	Valid Percent	Cumul. Percent
1.00 No certification	280	0.8	0.8	0.8
2.00 Temporary	520	1.4	1.5	2.3
3.00 Additional Work Needed	850	2.4	2.4	4.7
4.00 Complete, but Probation	166	0.5	0.5	5.2
5.00 Standard Cert.	27,594	76.8	79.2	84.4
6.00 Advanced/Prof/NBC	5,430	15.1	15.6	100.0
Total	34,840	96.9	100.0	
-9.00 Missing	997	2.8		
-8.00 Out of Range Response	90	0.3		
System Missing	17	0.0		
Total	1,104	3.1		
	35,944	100.0		

3. Eliminate survey forms in the top four percent of the missingness distribution. For Form A this meant eliminating survey forms with 24 or more missing items (16% of the items); for Form B the cutoff was 20 or more missing items (14% of the items). Eliminating four percent of the surveys was somewhat aggressive for a missingness threshold. Butthe large data set allowed working with a nearly complete data set with minimal missing items.

Combining all of the filters, a total of 12.8% of the cases were eliminated, as shown in Table 4.3. About 15% of the cases failed one or more filters.

Table 4.3. The number of survey forms failing one or more flags, and the total number of cases eliminated.

Filter	N	Pct.
Not Full-Time Teacher	35,944	4.8%
Not Certificated	35,944	8.1%
High Missing N, Form A	18,015	4.2%
High Missing N, Form B	17,929	4.1%
Cases Eliminated	35,944	12.8%
Valid N (listwise)	35,944	

Finally, the data set was divided randomly into Group 1 and Group 2. Each group contained almost exactly half the cases, which included both Form A and Form B surveys. In effect, Group 1 and Group 2 are parallel data sets, which were used in the factor analyses described below.

E. The TES Scale Factor Analyses

Item and Scale Names

Survey item variable names begin with either an 'a', 'b', or 'ab'. This indicates that the item was included on the A form, B form, or both the A & B forms, respectively. A trailing 'R' on the variable name indicates that it was reverse scored for consistency in interpretation. The scale names developed from the factor analyses were given short names, consistent with SPSS syntax requirements, that described the general nature of the scale.

Conduct of the Factor Analyses

The factor analysis results are included in the Excel file, TES FactorAnalysisResults.xlsx. The details of the factor analyses of all of the scales were worked out using just Group 1 data. Then, after all of the factor analyses were completed, a complete rerun of the analyses, without any changes, was made using Group 2 data. This approach ensures that the first set of analyses did not take advantage of any particular chance arrangement in the data. Given the size of the datasets, no significant chance effects were expected. And, in fact, Group 1 and Group 2 results look very similar.

Within the Excel file, the tab named 'FA Summaries' presents all FA results using the following format. Within the blue bordered box, in the first four lines the following information is provided:

SCALE   The variable name of the scale developed during the SPSS runs.

TOPIC CODE   The assigned topic code as reflected in the Excel spreadsheet labeled 'Topic Codes'.

TOPIC   A short written description of Pollard's interpretation of what the scale measures.

ITEM POOL   A list of all of the items initially entered into the FA.

ITEMS IN THE ANALYSIS   A list of the items used for the specific factor analysis. Initially it was always the full item pool. Then, in subsequent analyses, selected subsets of items were employed.

N Fact.   The number of factors with eigenvalues > 1.0 that were identified in the analysis. The goal was always to create scales with a single identified factor accounting for a large proportion of variance with good reliability.

Pct. Var.   The percentage of variance accounted for by the identified factor(s).

Alpha   Cronbach's alpha was the measure of reliability for these analyses.

A standard approach was applied to the FA. Initially, all items from the item pool were included in the analysis. Sometimes only one factor emerged from the FA. In that case an attempt was made to eliminate items that shared minimal variance with the identified factor. The effect of the removal was an increase in the percent of variance accounted for by all of the items and usually an increase, or at least no real decrease, in Cronbach's alpha. At each step, the items included in the analysis are shown. To the right of the blue box is a list of the final items include in the analysis.

If more than one factor was identified in the initial FA, an attempt was made to arrive at a solution which included only a single meaningful factor. This was successfully achieved with all of the scales.

In some cases items, from the A and B forms of the scale were applicable to the specific FA. To avoid the complications of trying to generate scales with both A form and B form items, and the necessary missing data, separate analyses were run only using A and B form items, with 'AB' items as appropriate. The large size of the data sets allowed for this luxury.

Overall, most TES scales (27) that had good reliability and account for substantial amounts of variance from their contributing items. Items related to the few poorly performing scales (9) were subsequently eliminated by the development team.

7. Development of the Revised TES Instrument

The revised TES survey instrument is now complete. It contains numerous revisions to the original pilot instrument based on the development data described above. The TES now contains a total of 110 items in a single survey form; the A and B versions of the TES were used only for the piloting process. The TES instrument will be used in schools during spring 2011.