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ABSTRACT

The Texas Poll of Elementary School Teachers was a statewide telephone survey designed to accurately describe the current science teaching practices in Texas public elementary schools, and the extent to which these elementary teachers feel prepared for the task. This paper focused on the survey sampling procedures and questionnaire design used in the statewide poll. Two hundred public elementary school teachers from forty Texas elementary schools were randomly selected to participate in the poll. The survey sampling method was a probability proportionate to size sampling design implemented to ensure that every elementary school teacher in Texas had an equal chance of being selected. The specification plan for questionnaire design followed the question-generating strategy established by the annual Gallup Poll of Education. Accordingly, two- and four-year college and university faculty, public school curriculum specialists, educational service center specialists, and master teachers were designated to develop questionnaire items that accurately represented current science teaching practices and preparation of Texas public elementary school teachers. Questionnaire items were pilot-tested with a group of elementary teachers representative of the target population to ensure appropriate question construction, ordering, and accuracy. (Author)

THE TEXAS POLL OF ELEMENTARY SCHOOL TEACHERS: SURVEY SAMPLING PROCEDURES AND QUESTIONNAIRE DESIGN

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The Texas Poll of Elementary School Teachers was a statewide telephone survey designed to accurately describe the current science teaching practices in Texas public elementary schools and the extent to which these elementary teachers feel prepared for the task. This paper focused on the survey sampling procedures and questionnaire design used in the statewide poll. Two hundred public elementary school teachers from forty Texas elementary schools were randomly selected to participate in the poll. The survey sampling method was a probability proportionate to size (PPS) sampling design implemented to ensure that every elementary school teacher in Texas had an equal chance of being selected. The specification plan for questionnaire design followed the question-generating strategy established by the Annual Gallup Poll of Education. Accordingly, two and four year college and university faculty, public school curriculum specialists, educational service center specialists, and master teachers were designated to develop questionnaire items that accurately represented current science teaching practices and preparation of Texas public elementary school teachers. Questionnaire items were pilot tested with a group of elementary teachers representative of the target population to ensure appropriate question construction, ordering, and accuracy.

INTRODUCTION

Science literacy is a goal of the standards-based movement occurring across the nation (NRC, 1996). In a highly scientific and technological society, scientifically literate individuals possess the necessary knowledge to make informed decisions as they live and work in society. Science literacy begins with the young, in the elementary grades, and is nurtured by family, community, and school. However, the quality of teacher education has been a popular theme for critics of our educational system specifically preparing students to be science literate individuals. There have been an array of parallel but sometimes contradictory recommendations from reform movements for our public school system and for our public school teachers. Often these studies have not considered the opinions of public school teachers and ideas of their own science teaching practice in the process of educational reform.

What do elementary teachers think about their science teaching practice? What do they see as the science teaching practices of their schools and of their communities? The Texas Poll of Elementary School Teachers was a scientific survey to accurately describe the current science teaching practices in Texas public elementary schools and the extent to which elementary school teachers are prepared for this task. The purpose of the poll was to gather relevant teacher information that could be used to improve science teaching practices in Texas public elementary schools and to strengthen the science preparation of elementary teachers at colleges and universities across the state. Standard sampling procedures were used to select randomly two hundred teachers from the population of the approximately 85,000 classroom teachers currently teaching in the 3,757 public elementary schools in the state of Texas. This paper discusses the procedures used to develop the survey sampling plan and telephone questionnaire for the Texas Poll of Elementary School Teachers.

SURVEY SAMPLING PROCEDURES

A basic principle of probability sampling is that a sample will be representative of the population from which it is selected if all members of the population have an equal chance of being selected in the sample. More specifically, sampling used in the Texas Poll of Elementary Teachers was Probability Proportionate to Size (PPS) sampling. Probability proportionate to size sampling is a type of multistage cluster sampling in which clusters are selected not with equal probabilities but with probabilities proportionate to their sizes, as measured by the number of units to be subsampled (Babbie, 1990, p. 376).

Selection of Public Elementary Schools

The Texas Education Agency School Directory (1994-1995) was used to identify 3,757 public elementary school in Texas with representative enrollments of each elementary school. This listing constituted the sampling frame for the first stage of sampling. A total of 200 teachers was desired for the study, so a decision was made to select 40 elementary schools with probability proportionate to size and to take five elementary teachers from each of the schools selected. The poll was interested in grades one through six. Thus, representative enrollments were multiplied by a correction factor based on school structure.

To select the 40 elementary schools, the list of public elementary schools was arranged geographically by county and then by region. This arrangement allowed for implicit stratification of the list (Babbie, 1990, p. 87). From this arrangement, a table was created listing the elementary schools in Texas. This listing arranged the schools according to the twenty Regional Service Centers across the state. Beside each elementary school was entered its grade structure, its enrollment, its correction factor, and

its corrected enrollment. This corrected enrollment was used to compute a cumulative total running through the list (Table 1).

The final cumulative enrollment total came to 1,610,220. The object at this point was to select a sample of 40 schools in such a way that each school would have a chance of selection proportionate to its corrected enrollment. To accomplish this, the cumulative totals were used to create ranges of numbers for each region equal to the student enrollment of the region. The first region in table 1 was assigned numbers 1 through 115,223; the second region was assigned numbers 115,224 to 163,680; region three was assigned numbers 163,681 to 192,596; and so forth. By selecting 40 numbers ranging from 1 to 1,610,220, it was possible to select 40 schools for the study. The 40 schools were selected in a systematic sample as follows. The sampling interval was set at 40,255 (1,610,220/40), and a random start was selected between 1 and 40,255.

Table 1.
Summary of Elementary School Enrollments by Region

Area #	HQ City	# Students	% Students	Cum. # Students	Cum. % Students
1	Edinberg	115223	7.16	115223	7.16
2	Corpus Christi	48457	3.01	163680	10.17
3	Victoria	28916	1.80	192596	11.96
4	Houston	337376	20.95	529972	32.91
5	Beaumont	36012	2.24	565984	35.15
6	Huntsville	52871	3.28	618855	38.43
7	Kilgore	64899	4.03	683754	42.46
8	Mt. Pleasant	23514	1.46	707268	43.92
9	Wichita Falls	18784	1.17	726052	45.09
10	Richardson	226587	14.07	952639	59.16
11	Fort Worth	156608	9.73	1109247	68.89
12	Waco	56310	3.50	1165557	72.38
13	Austin	94754	5.88	1260311	78.27
14	Abilene	20048	1.25	1280359	79.51
15	San Angelo	23810	1.48	1304169	80.99
16	Amarillo	34270	2.13	1338439	83.12
17	Lubbock	38268	2.38	1376707	85.50
18	Midland	37076	2.30	1413783	87.80
19	El Paso	66879	4.15	1480662	91.95
20	San Antonio	129558	8.05	1610220	100.00

Increments of 40,255 (the sampling interval) were then added to the random start, and every school within whose range one of the resultant numbers appeared was selected into the sample of schools. In this fashion, each elementary school in Texas had a chance of selection directly proportionate to its student enrollment.

Selection of Teachers

After the selection of the 40 elementary schools, arrangements were made with 21 liaisons across the state to acquire faculty lists of teachers at each elementary school. The lists varied greatly in their form and content. It was necessary to sort out the elementary teachers responsible for teaching grades one through six and their specific arrangements for teaching science. As each list arrived from a selected school, the number of teachers at the school was determined. A random number table was used to select the desired number of teachers (five) from each school. A random start was determined and a determined pattern was followed on the number table until there were five numbers whose range appeared in the sample of teachers. This procedure was repeated for each school with a new random start and determined pattern on the random number table followed each time.

Questionnaire Design

The Texas Poll of Elementary Teachers was a twenty-six item, multiple-format telephone survey used to gather data describing current science teaching practices in Texas elementary schools. Specifically, the specification plan for telephone questionnaire design followed the question-generating strategy established by the Annual Gallup Poll of Education. Accordingly, two- and four year college and university faculty, public school curriculum specialists, educational service center specialists, and master teachers were assembled by a survey research team. These specialists were designated to develop questionnaire items that accurately represented current science teaching practices and the

preparation of Texas public elementary school teachers. Items were considered that would gather meaningful teacher data and help strengthen elementary teacher preparation. Questionnaire items were pilot tested with a small group of public school elementary teachers representative of the target population to ensure appropriate question construction, ordering, and accuracy.

CONCLUSION

This paper described the procedures used in survey sampling design and questionnaire construction for the Texas Poll of Elementary School Teachers. Science literacy begins with young children. To improve levels of science literacy, strengthening the science preparation of our elementary teachers that teach our children is essential. It is important to understand the concerns of elementary teachers and how these teachers were prepared to teach science. A common mistake made in educational research is to investigate persons that are not part of the target population or that are from the appropriate population but are studied simply because they are available (Borg & Gall, 1989). The procedures used in developing the sampling design and in generating questionnaire items used in the Texas poll are valid and reliable which ensure that data gathered from the Texas Poll of Elementary School Teachers will be meaningful and representative of elementary school teachers in Texas.

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