DOCUMENT RESUME

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ABSTRACT
        While school systems most often use achievement test
results for individual appraisals, increasing attention to program
evaluation and accountability requires that test results be used for
institutional appraisals as well. When institutional test results are
desired--that is, results for schools or school districts--not all
pupils need be tested. Two alternative testing program designs are
proposed, for situations where individual test results are desired
for some subject areas or grades, and institutional results are
desired for others. Seventeen alternative finite-population sampling
procedures can be used with these designs. The efficiency of each
procedure is evaluated using data from a medium-sized school
district, and relative efficiencies are derived. Some sampling
procedures are found to yield acceptable precision for estimation of
district-mean achievement with a sampling fraction of only five
percent. (Author)

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Handout for

AN EVALUATION OF SAMPLING DESIGNS FOR SCHOOL TESTING PROGRAMS

by

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Table 1: Sampling procedures that can be used only with a complementary
testing program where all pupils are tested in some subjects
and sampled pupils are tested in other subjects (Plan I).

1) Stratified sampling of pupils with proportional allocation
    of sample sizes to strata

2) Stratified sampling of pupils with optimal allocation of
    sample sizes to strata

3) Linear systematic sampling of pupils from a list arranged
    in increasing order of an auxiliary variable

4) Linear systematic sampling of pupils from a list arranged
    in increasing order of an auxiliary variable, with use of
    end corrections in estimation

5) Linear systematic sampling of pupils from a list arranged
    in increasing order of an auxiliary variable, then with
    order reversed in alternate strata

6) Centrally located systematic sampling

7) Balanced systematic sampling

8) Simple random sampling of classrooms (single stage
    cluster sampling), with ratio estimation

9) Single stage cluster sampling of classrooms where class-
    rooms are selected with probabilities proportional to
    the values of a classroom-related auxiliary variable,
    and PPES estimation

Table 2: Sampling procedures that can be used either with a comple-
          mentary testing program where all pupils are tested in some
          subjects and some pupils are tested in others (Plan I), or
          with a plan where all pupils are tested in some grades and
          some pupils are tested in others (Plan II).

1) Simple random sampling of pupils

2) Linear systematic sampling of pupils from a list arranged
   in alphabetic order

3) Simple random sampling of schools (single stage cluster
   sampling), with unbiased estimation

4) Simple random sampling of schools (single state cluster
   sampling) with ratio estimation

5) Single stage cluster sampling of schools where schools
   are selected with probabilities proportional to their
   enrollments (PPS sampling) and PPS estimation

6) Single stage cluster sampling of schools where schools
   are selected with probabilities proportional to the
   values of a school-related auxiliary variable, and
   PPES estimation

7) Simple random sampling of classrooms (single stage
   cluster sampling), with unbiased estimation

8) Single stage cluster sampling of classrooms where
   classrooms are selected with probabilities proportional
   to their enrollmants (PPS sampling) and PPS estimation

Table 3: Sizes of Samples Required to Estimate Mean Reading Achievement within ± 0.2 Grade Equivalent Units with 95 Percent Confidence.*

Sampling and Estimation Procedure	Required Sample Size
Simple Random Sampling (SRS)	106 pupils
Stratified Sampling by Lorge-Thorndike Ability Test Scores - Six Strata:	
Proportional Allocation (Strat-prop)	26 pupils
Optimal Allocation (Strat-opt)	25 pupils
Linear Systematic Sampling:	
Alphabetic Order (LSS-alpha)	$\leq$ 59 pupils**
Increasing Order of Lorge-Thorndike Scores (LSS-inc)	$\leq$ 59 pupils**
Increasing Order of of Lorge-Thorndike Scores; End Corrections Used (LSS--E.C.)	$\leq$ 59 pupils**
Order Reversed in Alternate Strata (LSS-O.R)	$\leq$ 59 pupils**
Centrally Located Systematic Samples (CSS)	$\leq$ 59 pupils**
Balanced Systematic Sampling (BSS)	118 pupils
Single Stage Cluster Sampling:	
Unbiased Estimation, Schools Used as Clusters (RSC-schools-unb)	1041 pupils
Ratio Estimation, Schools Used as Clusters (RSC-schools-rat)	394 pupils
Probabilities Proportional to School Enrollments, Schools Used as Clusters (PPS-schools)	577 pupils
Probabilities Proportional to Fifth-Grade SCAT Score Totals, Schools Used as Clusters (PPES-schools)	236 pupils
Unbiased Estimation, Classrooms Used as Clusters (RSC-class-unb)	865 pupils
Ratio Estimation, Classrooms Used as Clusters (RSC-class-rat)	262 pupils
Probabilities Proportional to Classroom Enrollments, Classrooms Used as Clusters (PPS-class)	314 pupils
Probabilities Proportional to Lorge-Thorndike Score Totals, Classrooms Used as Clusters (PPES-class)	53 pupils

*Midcity data, population size = 1180 sixth-grade pupils.
**Five percent is the smallest sampling fraction investigated. Smaller sampling fractions might provide acceptable precision for these sampling methods.

Table 4: Sampling Fractions Required for Estimation of Proportion of
Low-Achieving Pupils* for Various Sampling and Estimation Procedures.

	Required Sampling Fractions	
Sampling and Estimation Procedure	For Estimation within $\pm$ 0.02 at 95% Confidence	For Estimation within $\pm$ 0.05 at 95% Confidence
Simple Random Sampling (SRS)	60%	20%
Linear Systematic Sampling:		
Population in Alphabetic Order (LSS-alpha)	25%	20%
Population in Increasing Order of Lorge-Thorndike Test Scores (LSS-inc)	25%	10%
Population in Increasing Order of Lorge-Thorndike Test Scores, End Corrections Used (LSS-E.C.)	25%	10%
Population in Increasing Order of Lorge-Thorndike Scores, Order Reversed in Alternate Strata (LSS-O.R.)	25%	10%
Balanced Systematic Sampling, Population in Increasing Order of Lorge-Thorndike Scores (BSS)	25%	10%
Centrally Located Systematic Samples, Population in Increasing Order of Lorge-Thorndike Test Scores (CSS)	25%	10%

*Proportion of 1180 sixth-grade pupils in Midcity with reading achievement
scores at least one grade equivalent unit below national norm.