DOCUMENT RESUME

ED 451 256 TM 032 484

AUTHOR	Lee, Guemin; Fitzpatrick, Anne R.
TITLE	The Influence of Student Sampling Plan on Standard Error for School PAAC.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.; Council of Chief State School Officers, Washington, DC.
PUB DATE	2001-04-12
NOTE	23p.; Paper presented at the Annual Meeting of the National Council on Measurement in Education (Seattle, WA, April 11-13, 2001).
CONTRACT	R279A50006
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Academic Achievement; *Cutting Scores; Elementary Education; *Elementary School Students; *Error of Measurement; Estimation (Mathematics); *Generalizability Theory; *Junior High School Students; Mathematics Tests; Performance Factors; *Sampling

ABSTRACT

The percentage of students at/above a cut point (PAAC) is one of the most common measures used for reporting school-level performance relative to a proficiency standard (L. Cronbach, N. Bradburn, and D. Horvitz, 1994). The two purposes of this study were to introduce procedures for estimating standard errors for school PAACs under a generalizability theory model and to examine the influence of different student sampling plans on the standard errors. The tests used were mathematics tests for grades 4 and 8 from a statewide assessment. More than 25,000 students took each test form within a grade. A strong relationship between the standard error for school PAAC and the number of students in a school was found. Infinite- and finite-population assumptions for students provide somewhat different standard errors when relatively small numbers of students were used for estimating school PAACs. (Contains 2 tables, 3 figures, and 15 references.) (Author/SLD)

The Influence of Student Sampling Plan on Standard Error for School PAAC

Guemin Lee
Anne R. Fitzpatrick
CTB/McGraw-Hill

Paper Presented at the Annual Meeting of the National Council on Measurement in Education
Seattle, WA
April 12, 2001

A portion of this study was carried out under contract with the Council of Chief State School Officers and funded by OERI Grant No. R279A50006. The views and opinions expressed in this report are not necessarily those of the United States Department of Education, the Council of Chief State School Officers, the State Collaborative on Assessment and Student Standards, or the state participating in the study.

Abstract

The *p*ercentage of students *a*t/*a*bove a *c*ut point (PAAC) is one of the most common measures used for reporting school-level performance relative to a proficiency standard (Cronbach, Bradburn, & Horvitz, 1994). The two purposes of this study were to introduce procedures for estimating standard errors for school PAAC's under a generalizability theory model and to examine the influence of different student sampling plans on the standard errors. A strong relationship between the standard error for school PAAC and the number of students in a school was found. Infinite- and finite-population assumptions for students provide somewhat different standard errors when relatively small number of students were used for estimating school PAAC's.

The Influence of Student Sampling Plan on Standard Error for School PAAC

Assessing student achievement in terms of proficiency standards that have been set on a test is a common practice as a result of the educational reform movement, Title 1 requirements, and public demands for education accountability (Lewis, Green, Mitzel, Baum, & Patz, 1998). School districts, states, and the nation use standards such as 'basic', 'proficient', and 'advanced' to describe students' overall level of achievement (Berk, 1986; Jaeger, 1989; Kane, 1994). School-level reports as well as student-level reports that describe performance relative to such standards have been recommended for assessing schools' progress (Cronbach, Bradburn, & Horvitz, 1994).

The *p*ercentage of students *a*t/*a*bove a *c*ut point (PAAC) is one of the most common measures used for reporting school-level performance relative to a proficiency standard (Cronbach et al., 1994), and it has been recommended that the standard error of this PAAC also be reported. For example, the Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999) states that when average test scores for groups are used, "the standard error of the group mean should be reported, as it reflects variability due to sampling of examinees as well as variability due to measurement error" (Standard 2.19, p. 36). Such evidence about the uncertainty attached to a set of scores is required to avoid over-interpretation of the scores (Cronbach, Linn, Brennan, & Haertel, 1997).

The two purposes of this study were to introduce procedures for estimating standard errors for school PAAC's under a generalizability theory model and to examine the influence of different student sampling plans on the standard errors for school PAAC's.

In the paper, a dummy variable is assumed. This variable can be dichotomously coded either 0 or 1 to represent a student's pass/fail status, and it can be expressed by

$$S_i = \begin{cases} 1, & \text{if } X_i \geq C \\ 0, & \text{otherwise} \end{cases}, \tag{1}$$

where S_i is the status score for student *i*, X_i is the test score for student *i*, and *C* represents the cutscore. The average of scores on this dummy variable over students can be transformed to the PAAC score by

$$PAAC_j = \frac{\sum_{i=1}^{I_j} S_i}{I_j} \times 100, \tag{2}$$

where $PAAC_j$ is the PAAC score for school *j*, I_j is the number of students who took a test in school *j*.

Generalizability Theory Approaches to Standard Errors

The univariate $p:(s \times f)$ generalizability study (G-study) design involving persons (*p*) nested within schools (*s*) and test forms (*f*) was used to estimate variance components in the current study. The linear model for the response of a person within a school and a form treats schools as objects of measurement and persons and forms as random facets. The linear model can be represented as:

$$X_{psf} = \mu + \mu_s \sim + \mu_f \sim + \mu_{sf} \sim + \mu_{p:sf,e} \sim . \tag{3}$$

The terms of right-hand side are grand mean, school effect, form effect, school by form interaction effect, and person within school and form effect confounded with unexplained sources of error, respectively.

A decision study (D-study) is conducted for the purpose of determining the most efficient measurement procedures and/or estimating reliability coefficient and standard error of measurement. The analyst should decide which universe is of great interest. That is, the universe of generalization is one of the most important D-study considerations in applying generalizability theory into practice. In the current study, three types of possible universes of generalization that have different student sampling plans are considered, and associated formulas of estimating standard errors for school PAAC's are provided.

Let n_p' denote the **sample** size for students and N_p' denote the **population** size for students. If an investigator is interested in making inferences about school PAAC's to a infinite student population beyond students recently taught, it is appropriate to use the infinite universe definition for students. This student sampling plan is denoted as Sampling Plan 1 (SP1) in this study, and it requires the assumption that $n_p' < N_p' \to \infty$. That is, this investigator assumes that students tested in a school are simply a sample from an infinite universe of students. The standard error for the PAAC for this situation is estimated by

$$S\hat{E}(SP1) = 100 \times \sqrt{\frac{\hat{\sigma}^2(f)}{n_f'} + \frac{\hat{\sigma}^2(sf)}{n_f'} + \frac{\hat{\sigma}^2(p:sf)}{n_p' n_f'}} \tag{4}$$

where the estimates of variance components from a G-study are:

$\hat{\sigma}^2(f) =$ the estimate of variance of forms;

$\hat{\sigma}^2(sf) =$ the estimate of variance for interactions of schools and forms;

$\hat{\sigma}^2(p:sf) =$ the estimate of variance for students nested within school by form;

and n_f', and n_p' represent number of forms and number of students per form within a school, respectively.

Another decision-maker simply wants to draw conclusions about a particular school performance in a particular year and tests a sample of students. These students can be considered a sample from a finite population. This is called Sampling Plan 2 (SP2) in this study with a specification of $n_p' < N_p' < \infty$. This investigator's universe of generalization is "restricted." It is concerned only with a finite universe, but this does not mean that this investigator's universe is worse than the universe of previous investigator. The two investigators merely have different conceptualizations about the universe of generalization. The standard error for the SP2 is estimated by

$$S\hat{E}(SP2) = 100 \times \sqrt{\frac{\hat{\sigma}^2(f)}{n_f'} + \frac{\hat{\sigma}^2(sf)}{n_f'} + \frac{\hat{\sigma}^2(p:sf)}{n_p' n_f'}\left(1 - \frac{n_p'}{N_p'}\right)}. \quad (5)$$

The meanings of variance components and sample sizes are the same as defined in Equation 4.

A student facet is considered fixed when the sample of students tested serves as the population of students to which the test results are generalized. In this case, the relation of $n_p' = N_p' < \infty$ is assumed. Sampling Plan 3 (SP3) is used here to describe this situation. The analyst wants to make inferences about school performance only in a specific year and with regard to a specific group of students. The test results are used to describe the only students who are participated in the testing program. Thus, the universe of generalization for SP3 is more "restricted" compared to those of SP1 and SP2. The standard error for school PAAC under this specification is

$$S\hat{E}(SP3) = 100 \times \sqrt{\frac{\hat{\sigma}^2(f)}{n_f'} + \frac{\hat{\sigma}^2(sf)}{n_f'}}, \tag{6}$$

where other notations are the same as defined in Equations 4 and 5.

A comparison among three mathematical formulae for estimating standard errors described above is useful in understanding relationship between the sampling plan and a standard error estimate for a school PAAC. The most important difference among three formulae is related to the correction factor, $\left[1-\frac{n_p'}{N_p'}\right]$, as shown in Equation 5.

Because the correction factor is less than 1, the Equation 5 produces smaller standard errors than does Equation 4. If N_p' is infinite like SP1, the correction factor in Equation 5 will be 1 and Equation 5 should be the same as Equation 4. In contrast, because Equation 6 does not include the variance component term of "persons within schools by forms," this produces the smallest standard errors among three. In the SP3, because n_p' is equal to N_p', the correction factor in

Equation 5 will be 0. Consequently, the last term in Equation 5 would disappear and Equation 5 turns out to be the same as Equation 6.

From these relations, we can anticipate that the relationship among the standard error estimates for three sampling plans will be SE (SP1) > SE (SP2) > SE (SP3). This inequality is logical and to be expected because a sampling plan with a broader universe of generalization produces a larger standard error.

Method

Data Sources

The tests used in this study were the Mathematics tests for grades 4 and 8 from a statewide assessment. There were three test forms for each grade, and each test form was composed of 80 multiple-choice (MC) items and 3 or 4 constructed-response (CR) items. The test measured student's mathematics computation and application skills. The three forms were randomly assigned to students within a school by following the spiraling procedures to make randomly equivalent groups. More than 25,000 students took each test form within a grade. Student sample size and general characteristics of each test form are presented in Table 1.

Insert Table 1 About Here

Analyses

Two item response models were used for scaling; the three-parameter logistic model (Lord & Novick, 1968; Lord, 1980) was used to scale the MC items and the two-parameter partial credit model (Muraki, 1992; Yen, 1993) was used to scale the CR items. The item parameters were estimated using the PARDUX computer application program (Burket, 1996).

A cut score was set at a scale score of 475 in grade 4, which corresponded to the 40^{th} percentile of score distribution. In grade 8, the cut score was set at a scale score of 461, which corresponded to the 45^{th} percentile. Cut scores near the 40^{th} percentile were chosen as realistic example of cut scores that might be set. With a cut score for each grade, students were classified into dichotomous pass/fail categories and coded 1 or 0, respectively. The percentage of students in a school was computed using the formula expressed in Equation 2.

The analyses for generalizability study were conducted to estimate variance components. Because the number of students for each school and each form varied, the conditions for a balanced design were not met. ANOVA-like procedures were used with urGENOVA computer application program (Brennan, 1999) for estimating variance components for an unbalanced design. Using variance component estimates from a generalizability study, standard errors for school PAAC's were estimated in several D-studies with varying number of students from 10 to 200 and varying number of forms from 1 to 6.

Results and Discussion

G-Study

Variance component estimates for the random effects $p:(s \times f)$ G-study design are presented in Table 2. The variance components in a G-study represent the observed score variance for a single student in a single school on a single test form. The school variance is an estimate of the variance of schools' mean scores over students and test forms. Table 2 also shows that the percentages of variance component associated with schools were 8.1% for grade 4 and 7.4% for grade 8. Form variance represents the variation of form mean scores over all schools and students, and the percentages were small, 0.0% for grade 4 and 0.2% for grade 8. The magnitude of the school by form interaction variance component shows the degree to which the rank orderings of schools varied across forms. These interactions were also small, 1.4% for grade 4 and 0.0% for grade 8. The largest variance component was the 'students nested within schools and forms', $\hat{\sigma}^2(p:sf)$. Because this variance component includes variance components due to unexplained sources of error, it was not surprising that it is relatively large.

Insert Table 2 About Here

D-Study

Figure 1 shows the standard error estimates resulting from the use of the three student sampling plans for 20 student samples whose sizes were ranged from 10, 20, 30,

..., 200. For computing standard errors for school PAAC's in the SP2, the student population size was set to 200 for convenience.

Insert Figure 1 About Here

In both grades, the plots show that the standard errors for the SP1 were consistently greater than the standard errors for the SP2, regardless of student sample size. This finding is predictable given the relations among standard error formulae explained in the previous section. The differences in the standard errors for the two sampling plans increased as the number of students within school increased.

Also in both grades the standard errors for the SP3 consistently were lower than those associated with the SP1 and SP2. The results for the SP3 did not vary with student sample sizes. This occurred because in the SP3 the student sample was fixed and referred to the whole student population of interest.

The SP2 produced standard errors for school PAAC's that appeared between the values produced by SP1 and SP3. Therefore, the standard errors for the SP1 and SP3 can be considered upper- and lower-bound for the SP2 standard errors.

The difference between standard errors from the SP1 and SP3 can be regarded as defining the range for possible values for the SP2 standard errors. For example, if student sample size of 10 was used in grade 4, the SP2 could produce SE's between 3.2% and 8.8%. The range is 5.6%. In contrast, if student sample size of 100 was used, the standard errors for the SP2 would have values between 3.2% and 4.1%, and the range would be less than 1%.

These results and the plots also show that three different student sampling plans produced somewhat different SE's for the relatively small student samples (e.g., less than 50). However, they did not make meaningful differences on standard errors if sufficiently large students (e.g., greater than 100) were used for estimating school PAAC.

The SP2 standard errors estimated using different student sample sizes and population sizes are given in Figure 2. In both grades, student sample size had notable effects on the size of the standard errors for school PAAC's. For the population of 50, increasing the sample size from 10 students to 20 students produced a decrease in the standard errors of about 2.5%. Increasing the sample size from 20 to 30 produced a decrease of about 1.1%. Further reductions in the SE's were obtained by further increasing the sample size, although the rate of reduction slowed down. The positive effects of increasing the sample size were similar across populations that ranged in size from 10 to 300. Also, it is useful to note that the effects of student sample size mitigated the effects of student population size. That is, as the student sample size increased, the effects of student population size on the standard errors for school PAAC's diminished.

Insert Figure 2 About Here

Figure 2 also shows that the effects of student population size on the standard errors for school PAAC's were small after the student population size was reasonably large (e.g., greater than 150) for a given student sample size. In this situation, the SP1 method could be an alternative to the SP2 method in estimating standard errors. The SP1 is a simple method compared to the SP2 because it does not depend upon student population size.

To investigate the form effects on the standard errors for school PAAC's, several D-studies were completed under the SP1 and SP3 specifications. The analyses for the SP2 were not performed because they are so complex since the use of majority of combinations with student sample and population sizes were required as its inputs. However, because standard errors for the SP2 are between the SP1 and SP3, we can predict the range of the SP2 standard errors. The form effects on standard errors for school PAAC's are presented in Figure 3.

Insert Figure 3 About Here

In this figure, the total number of students sampled was set to a certain number, 120 per school. That is, if two forms were used, 60 students were assumed taking the first form and another 60 students were assumed taking the second form. If three forms were involved, each of three groups of 40 students was assumed to take each of three forms. Consequently, the total number of students sampled for a school remained constant regardless of the number of forms. After controlling the total number of students per school used for estimating school PAAC's, we can still observe non-negligible form effects. Fitzpatrick, Lee, and Gao (in press) and Yen (1997) reported similar form effects in their papers.

Conclusions

One of the primary purposes of current state assessment programs is to measure progress to performance standards at the aggregate level. Some states may do census-testing, but others may sample students for testing. The effect of student sampling on aggregate-level performance measures should be a critical issue in making inferences from these measures. Three student sampling plans were investigated in this study in the context of estimating standard errors for school PAAC's. Based upon the results, the following generalizations can be offered:

First, the standard errors for school PAAC's depend primarily upon the number of students in a school who take each test form within the school. Thus, standard errors for school PAAC's should be reported in relation to student sample size.

Second, the different assumptions in student sampling plans provide different standard errors for school PAAC's. When relatively fewer students (less than 50) are sampled for estimating school PAAC's, three different assumptions will lead to SE estimates that are different. However, if sufficiently large students are sampled (greater than 100), they will provide similar standard errors.

Third, the effects of student sampling from the finite population are clear for the small sample of students. In this case, student population size should be considered.

However, if student population size is reasonably large, infinite-population method can be an alternative for the finite-population method.

Fourth, form effects are evident. Using two forms instead of one form can reduce standard errors for school PAAC's by non-negligible amounts. Controlling form effects could be considered a practical way to obtain targeted standard error for school PAAC.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (1999). Standards for educational and psychological testing. Washington, DC: American Educational Research Association.

Berk, R.A. (1986). A consumer's guide to setting performances standards on criterion-referenced tests. Review of Educational Research, 56, 137-172.

Brennan, R.L. (1999). Manual for urGENOVA (version 1.4). (Iowa Testing Programs Occasional Paper No. 46). Iowa City, IA: University of Iowa.

Bucket, G.R. (1996). PARDUX [Computer program]. Monterey, CA: CTB/McGraw-Hill.

Cronbach, L.J., Bradburn, N.M., & Horvitz, D.G. (1994). Report of the Select Committee: Sampling and statistical procedures used in the California Learning Assessment System.

Cronbach, L.J., Linn, R.L., Brennan, R.L., & Haertel, E. (1997). Generalizability analysis for performance assessment of student achievement or school effectiveness. Educational and Psychological Measurement, 57, 373-399.

Fitzpatrick, A.R., Lee, G., & Gao, F. (in press). Assessing the comparability of school scores across forms that are not parallel. Applied Measurement in Education.

Jaeger, R.M. (1989). Certification of student competence. In R.L. Linn (Ed.), Educational measurement (3rd ed.). New York: American Council on Education and Macmillan.

Kane, M. (1994). Validating the performance standards associated with passing scores. Review of Educational Research, 64, 425-461.

Lewis, D.M., Green, D.R., Mitzel, H.C., Baum, K., & Patz, R.J. (1998, April). The Bookmark standard setting procedure: Methodology and recent implementations. Paper presented at the Annual Meeting of National Council of Measurement in Education, San Diego, CA.

Lord, F.M. (1980). Applications of item response theory to practical testing problems. Hillsdale, NJ: Lawrence Erlbaum.

Lord, F.M., & Novick, M.R. (1968). Statistical theories of mental test scores. Menlo Park, CA: Addilon-Wesley.

Muraki, E. (1992). A generalized partial credit model: Application of an EM algorithm. Applied Psychological Measurement, 16, 159-176.

Yen, W.M. (1993). Scaling performance assessments: Strategies for managing local item dependence. Journal of Educational Measurement, 30, 187-213.

Yen, W.M. (1997). The technical quality of performance assessments: Standard errors of percents of pupils reaching standards. Educational Measurement: Issues and Practice, 16, 5-15.

TABLE 1
Scale Score Descriptive Statistics for Student Performance
On Three Test Forms In a Grade

		No. of Items			Scale Score	
Grade	Form	Multiple Choice	Constructed Response	No. of Students	Mean	Standard Deviation
4	A	80	3	28,821	492	89
	B	80	4	28,103	491	88
	C	80	3	27,543	490	97
8	A	80	3	26,935	464	112
	B	80	4	26,404	462	112
	C	80	3	25,844	464	110

TABLE 2

Variance Component Estimates for the Random Effects $p:(s \times f)$ Generalizability Study Design With Unequal Number of Students (*p*) Per School (*s*) and Form (*f*)

Variance Component	Estimate	Percentage of Variance Component
	Grade 4 Mathematics	
$\hat{\sigma}^2(s)$	0.01800	8.1
$\hat{\sigma}^2(f)$	0.00004	0.0
$\hat{\sigma}^2(sf)$	0.00303	1.4
$\hat{\sigma}^2(p:sf,e)$	0.20087	90.5
	Grade 8 Mathematics	
$\hat{\sigma}^2(s)$	0.01480	7.4
$\hat{\sigma}^2(f)$	0.00044	0.2
$\hat{\sigma}^2(sf)$	0.00002	0.0
$\hat{\sigma}^2(p:sf,e)$	0.18556	92.4

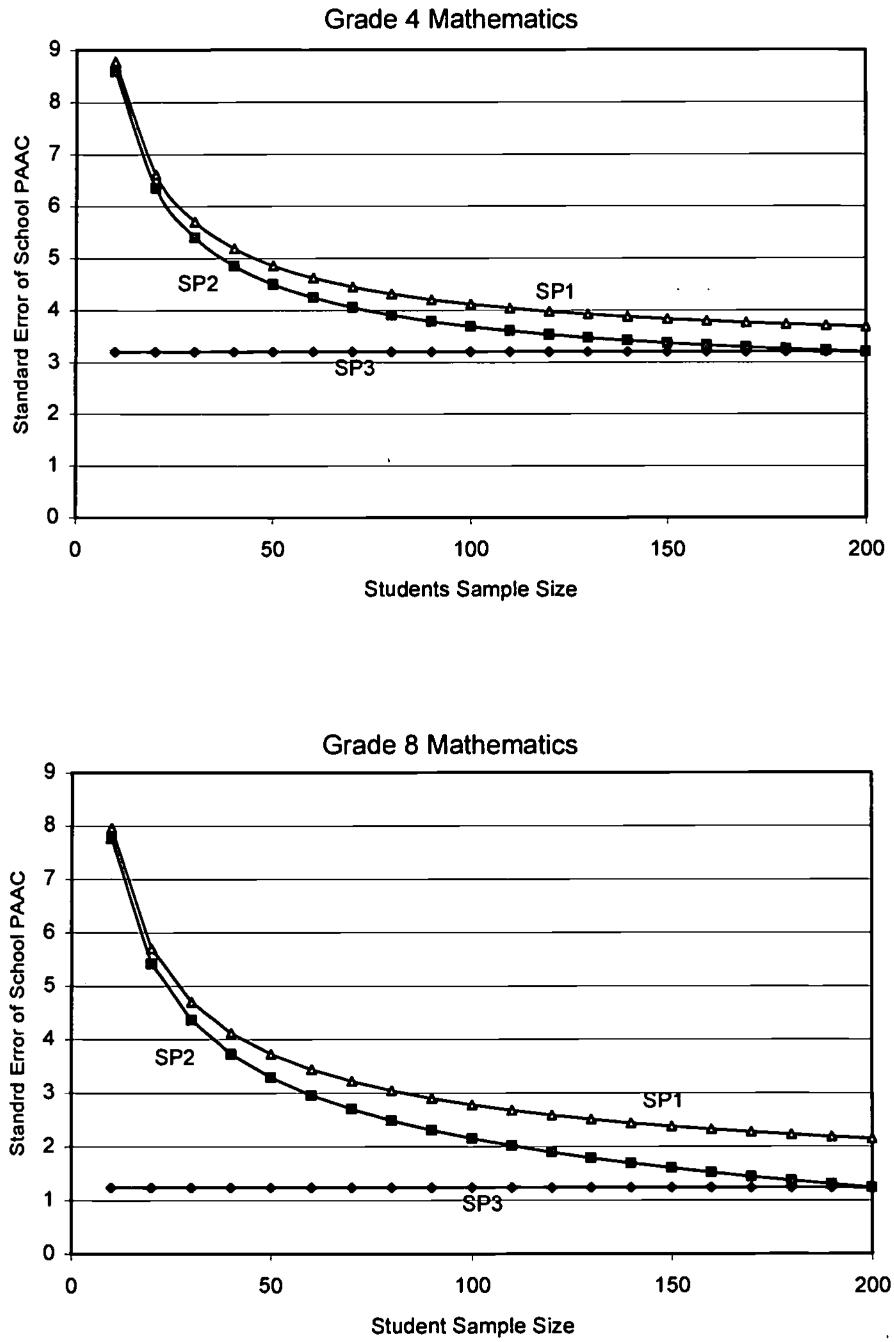
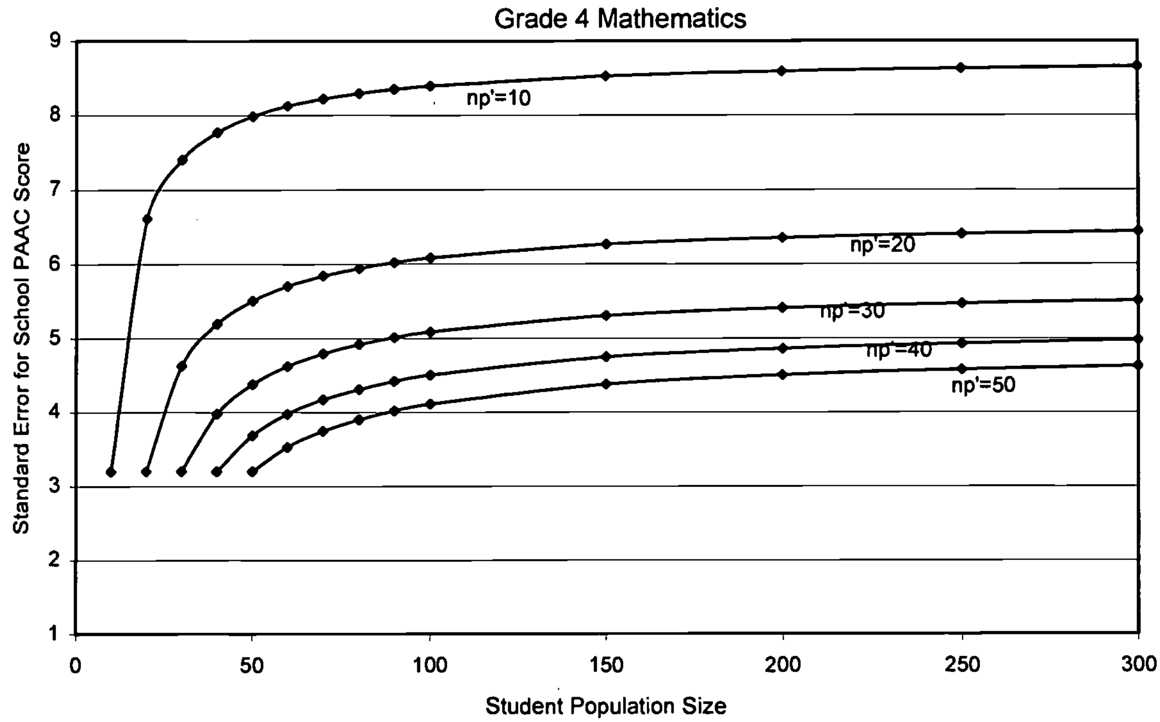


Figure 1. The effects of student sample size on standard errors for school PAAC's for three student sampling plans.



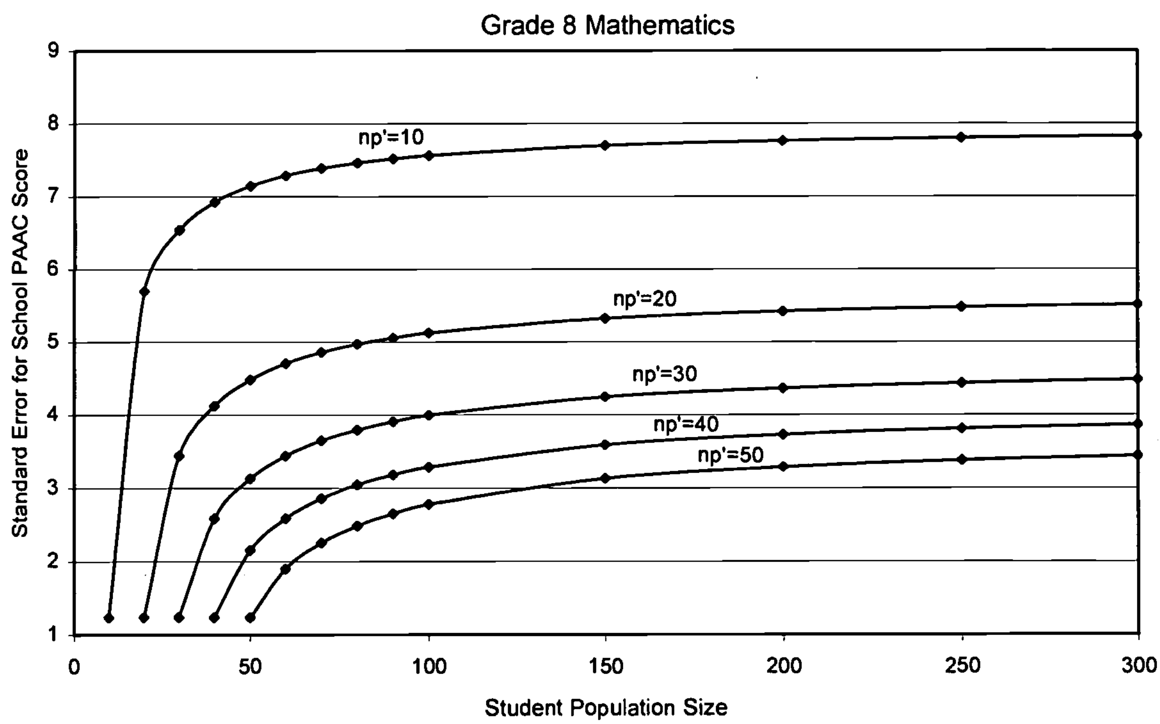
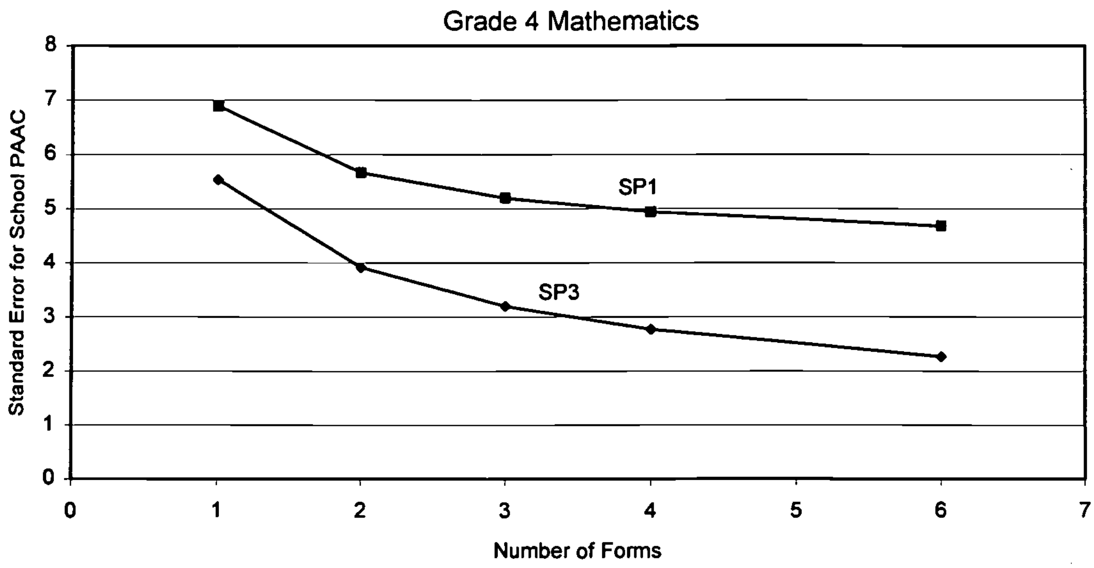


Figure 2. The student population size effect on standard errors for school PAAC's for the student sampling from the finite population



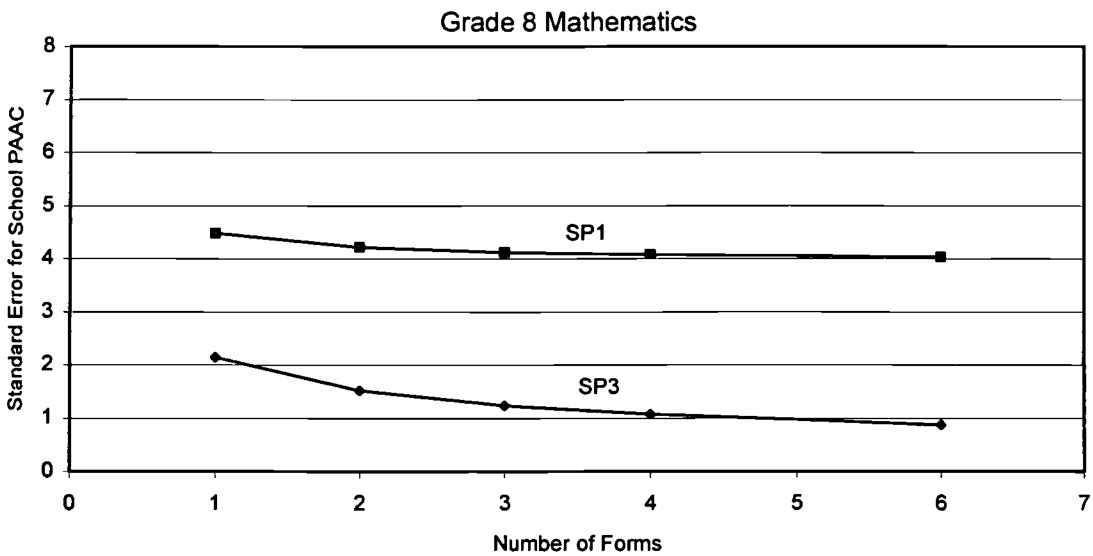


Figure 3. The form effects on the standard errors for school PAAC's given the same total number of student sample per school.

Reproduction Release

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: The influence of student sampling plan on standard error for school PAAC	
Author(s): Guemin Lee and Anne R. Fitzpatrick	
Corporate Source: CTB/McGraw-Hill	Publication Date: April 12, 2001

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign in the indicated space following.

The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixed to all Level 2B documents
PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
Level 1	Level 2A	Level 2B
☑	☐	☐
Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g. electronic) *and* paper copy.	Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only	Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche, or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature: Guemin Lee	Printed Name/Position/Title: Guemin Lee, Research Scientist	
Organization/Address: CTB/McGraw-Hill, 20 Ryan Ranch Road, Monterey, CA 93940	Telephone: (831) 393-7745	Fax: (831) 393-7016
	E-mail Address: glee@ctb.com	Date: March 13, 2001

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:	
ERIC Clearinghouse on Assessment and Evaluation **1129 Shriver Laboratory (Bldg 075)** **College Park, Maryland 20742**	**Telephone: 301-405-7449** **Toll Free: 800-464-3742** **Fax: 301-405-8134** **ericae@ericae.net** **http://ericae.net**

EFF-088 (Rev. 9/97)