Paper 216-25

SAS® Procedures for Use in Public School Accountability Programs

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ABSTRACT

A national agenda in education currently gaining popularity is the use of accountability models to evaluate public schools. A result of this movement has been the identification of a systemic problem with management of educational data in local schools. Most accountability programs have identified several variables as important indicators of academic performance for inclusion in models designed for public schools. The use of this data has necessitated an examination of the aggregation, storage, and analysis of data maintained by schools, culminating with the identification of a plethora of data management and analysis problems. A typical obstacle in obtaining this data is the lack of a consistent management forum for the aggregation and storage of different types of educational data collected in public schools. The most common mechanisms used are packages like EXCEL or DBASE IV. This paper demonstrates techniques for transitioning data from database packages to data management in SAS® and use of appropriate statistical procedures to enhance data aggregation, storage, analysis, and reporting for use in accountability programs. A novice user of SAS® with a personal computer and knowledge of BASE SAS® will be able to complete the procedures demonstrated in this paper.

INTRODUCTION

The development and implementation of state-wide accountability models for evaluating public school systems is increasing throughout the nation. This influx of accountability programs in the schools is, in part, a result of increasing demands for higher student performance on both a state and national level. Most accountability programs have identified several variables as important indicators of "student success" and have included both academic and non-academic indicators as variables that are important in evaluating public schools. However, an obstacle to successfully implementing accountability programs, targeted at assessing student growth, has been a systemic problem, with management of educational data at the local educational agency (LEA) level. The use of educational data to evaluate school systems has necessitated an examination of the current procedures for aggregating, storing, and analyzing the data maintained by public schools. This has led to the identification of several data management and analysis problems. A typical obstacle to obtaining this data in a usable format is the lack of a consistent management forum. Public school data is obtained and stored using numerous observational units: student level data, classroom level data, school level data, and district-wide data. An obstacle to the statistical analysis of the data is commonly the mechanism used to store the data, including packages such as EXCEL or DBASE IV. The statistical analysis procedures provided in these database packages are limited compared to the options available in SAS. This paper demonstrates techniques for transitioning data from database packages to data management in SAS and use of appropriate statistical procedures to enhance data aggregation, storage, analysis, and reporting of public school data for use in models such as accountability programs.

DATA AGGREGATION

The data collected by most public school systems are a combination of variables required by state and national departments of education or local administrative school boards. The data is collected, but due to the eclectic nature of the data, aggregation becomes problematic. Most school districts do not have statisticians available to help them with processing this data so an administrator or teacher is assigned this task. The availability of database managers such as EXCEL or DBASE IV are typically utilized due to the "point-and-click" interface and availability. Prior to the development of accountability programs the data remained in separate databases and the need for merging any of this data was never considered a priority or concern. The accountability programs have altered this position and created the necessity for use of statistical packages that provide the required features for data management, aggregation, and analysis. Further, as reports are typically required for accountability programs, a statistical package that can facilitate use of programs, and enhance the reporting of results is also desirable. The SAS statistical computing package provides all of these components and can be used to help make accountability programs operational.

DATA MANAGEMENT

The first step in managing data is to convert the data from the current database format into a SAS database. This can be accomplished expeditiously by using the data import procedure. The next step is optional, but is recommended, and that is to create a data library with data formats. The following steps are suggested:

Create a folder on your hard drive to store the data and associated programs.

1. Create a library using the add new library icon on the tool bar; be sure to check the box marked "enable at startup." (See Sample Program 1)

2. Create an autoexec program, including library name (libname) statement and format search statement (fmtsearch) or add these statements to the current autoexec program. This will invoke the use of pre-written formats stored in the data library without having to repeatedly run a proc format statement with every job using this data set.

3. Restart SAS and type syntax similar to the following example.

SAMPLE PROGRAM 1:

(Creates a library data set from a fixed data set)

```
DATA NEW.NEWDATA;
```

(The data statement tells SAS to load the data into a file called NEWDATA in the library NEW)

```
INFILE 'D:\OLDDATA' LRECL=230;
```

(INFILE statement tells SAS where to find the data; the LRCL command indicates the data set has 230 columns)

```
INPUT       @1 (VAR1) (2.) @3 (VAR2)
            ($20.) @24 (VAR3) ($11.) ....etc.
            continuing field stream to
            column 230.
```

SAMPLE PROGRAM 2:

(Designed to create a file of variable formats and to load the formats into the data library)

```
PROC FORMAT LIBRARY= NEW;

VALUE  FORMATA      0= 'NOT
                    AVAILABLE';
VALUE  $FORMATB     'F'= 'FEMALE'
                    'M'= 'MALE';
VALUE  $FORMATC     'Y'='YES' 'N'=
                    'NO';
```

SAMPLE PROGRAM 3:

(Use of the new data library, data set, and format statements)

```
DATA ONE;
 SET NEW.DATANEW;

PROC MEANS;
 CLASS VAR2;
 MEANS VAR1;
FMT;
RUN;
```

USE OF NEW DATA SET FOR ACCOUNTABILITY PROGRAMS

The transition of these data sets to SAS will allow for the development of more elaborate scoring and reporting procedures for use in accountability programs. For example, the Arkansas Department of Education (ADE) has requested the use of cross-sectional and longitudinal indicators of performance. The development of longitudinal indicators requires several data transformation and analytical procedures. These iterations are easily completed using SAS and the new data sets. Further, the ADE requested a standardized approach to reporting the data to schools and use of the SAS reporting features. The reporting format, arguably, is as important as the actual accountability program. These reports can be generated interactively and Sample Program 4 provides an example of a possible scoring sheet.

SAMPLE PROGRAM 4:

```
OPTIONS LS=99 PS=60 NODATE NONUMBER;

DATA REPORT;
 SET NEW.DATANEW;

header1='State  Dist.  School          Your';
header2=' Tier I Indicators:   Mean  Mean    Mean
Scaling  Score';
header4=' Tier II Indicators:  Mean  Mean    Mean
Scaling  Score';
header3=' _____  ___  ____  ___  _____
___ ';
nametag='Distict Name:';
schtag='       School Name:';
crtrtag=' 1. CRT Literacy      ';
multag=' x.40=';
multag2=' x2.0=';
multag3=' x40=';
crtmtag=' 2. CRT Mathematics        ';
nrtag=' 3. NRT Literacy   ';
nmtag=' 4. NRT Mathematics         ';
nltag=' 5. NRT Language           ';
crtr2tag=' 1. CRT Trend Lit.';
crtm2tag=' 3. CRT Trend Math
nr2tag=' 5. NRT Trend Lit.       ';
nm2tag=' 7. NRT Trend Math    ';
nl2tag=' 9. NRT Trend Lang.     ';
crtr3tag=' 2. CRT Long Lit. ';
crtm3tag=' 4. CRT Long Math     ';
nr3tag=' 6. NRT Long Lit.       ';
nm3tag=' 8. NRT Long Math     ';
nl3tag='10. NRT Long Lang.       ';
dr2tag='11. Dropout Rate';
at2tag='12. Attendance  ';
l2tag='13. Licensure     ';
sd2tag='14. Staff devel.       ';
df2tag='15. Drug free              ';
nstag='    NS ';
nultag='       ';
drtag=' 6. Dropout Rate';
attag=' 7. Attendance  ';
ltag=' 8. Licensure      ';
sdtag=' 9. Staff devel.       ';
dftag='10. Drug free              ';
titag='Tier I Score=';
t2tag='Tier II Score=';
comtag='School Composite Score=';
litag='          _____';
RUN;

PROC SORT DATA= REPORT;
 BY SCHOOL;
RUN;

PROC FORMS DATA=REPORT LINES= 46
DOWN= 2;
line 1 nametag DISTRICT schtag SCHOOL;
line 3 header1;
line 4 header2;
line 5 header3;

line 7 crtrtag CRT1_RT CRT1_RD CRT1_RS multag
CRT1_RY;
line 8 crtmtag CRT1_MT CRT1_MD CRT1_MS multag
CRT1_MY;
line 9 nrtag NRT1_RT NRT1_RD NRT1_RS nstag
NRT1_RY;
line 10 nmtag NRT1_MT NRT1_MD NRT1_MS nstag
NRT1_MY;
line 11 nltag NRT1_LT NRT1_LD NRT1_LS nstag
```

```
NRT1_LY;
line 13 drtag DR1_T DR1_D DR1_S multag3 DR1_Y;
line 14 attag ATT1_T ATT1_D ATT1_S multag3
ATT1_Y;
line 15 ltag LT1_T LT1_D LT1_S multag3 T1_Y;
line 16 sdtag SD1_T SD1_D SD1_S multag3 SD1_Y;
line 17 dftag DF1_T DF1_D DF1_S multag3 DF1_Y;
line 19 titag TS1 / i=63;
line 20 litag;
line 22 header1;
line 23 header4;
line 24 header3;

line 26 crtr2tag CRT2_RT CRT2_RD CRT2_RS multag2
CRT2_RY;
line 27 crtr3tag CRL2_RT CRL2_RD CRL2_RS multag3
CRL2_RY;
line 28 crtm2tag CRT2_MT CRT2_MD CRT2_MS
multag2 RT2_MY;
line 29 crtm3tag CRL2_MT CRL2_MD CRL2_MS
multag3 RL2_MY;
line 30 nr2tag NRT2_RT NRT2_RD NRT2_RS nstag
NRT2_RY;
line 31 nr3tag NRL2_RT NRL2_RD NRL2_RS nstag
NRL2_RY;
line 32 nm2tag NRT2_MT NRT2_MD NRT2_MS nstag
NRT2_MY;
line 33 nm3tag NRL2_MT NRL2_MD NRL2_MS nstag
NRL2_MY;
line 34 nl2tag NRT2_LT NRT2_LD NRT2_LS nstag
NRT2_LY;
line 35 nl3tag NRL2_LT NRL2_LD NRL2_LS nstag
NRL2_LY;
line 37 dr2tag DR2_T DR2_D DR2_S multag DR2_Y;
line 38 at2tag ATT2_T ATT2_D ATT2_S multag
ATT2_Y;
line 39 l2tag LT2_T LT2_D LT2_S multag LT2_Y;
line 40 sd2tag SD2_T SD2_D SD2_S multag SD2_Y;
line 41 df2tag DF2_T DF2_D DF2_S multag DF2_Y;
line 43 t2tag TS2 / i=62;
line 44 litag;
line 46 comtag SCS / i=53;
title 'Grades 1-8 Scoring Sheet for ACTAAP';
title2 "Date Report Completed: &sysdate";
RUN;
```

The preceding program, Sample Program 4, produces output that is consistent with a format that has been recommended by a southern state currently developing an accountability program. The proposed scoring system is multifaceted with several tiers, academic, and nonacademic indicators used to determine the performance of individual schools. A key element of this program is the data analytic components will be completed using SAS® BASE features and data management components. The output data set, in a matrix format will essentially be placed on the proposed scoring sheet with the necessary supporting labels added to the page. This is very analogous to the Output Data System (ODS) currently recommended for use in developing unique data reporting schemes for SAS® STAT packages. The labels around the data set are representative of the reporting shell in ODS. The goal of this analysis is a low cost, efficient technique for compiling and reporting individual school performance in an accountability program. The schools will also have state and district norms provided to allow for direct comparison against other schools. The scaling or scoring schemes allow for weighting of the individual components based on a perceived importance. Finally, the design of this system also creates a high degree of flexibility for making any necessary modifications and mandated by educators, administrators, politicians, or parents. The use of sample program 4 produces the output shown in Figure 1.

Summary

The education community has a persistent problem with data management and analysis and most of these problems emanate from using database packages that do not meet all their needs. More specifically, this community emphasizes a point-and-click mentality and the necessity of writing programs is not acceptable. Thus, it is important for researchers in education to develop new approaches and model how programming and use of SAS® can enhance their reporting, analysis, and overall use of educational data. The purpose of this paper is to demonstrate the utility of using the SAS® statistical package and to demonstrate its use in a specific area, accountability programs, where it may be very beneficial.

REFERENCES

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ACKNOWLEDGMENTS

Funding for this research was provided by the Arkansas Department of Education.

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Figure 1.

Grades 1-8 Scoring Sheet for ACTAAP
Date Report Completed: 05JAN00

Distict Name: District A School Name: Thorn Elementary

Tier I Indicators:	State Mean	Dist. Mean	School Mean	Scaling	Your Score
1. CRT Literacy	20	18	60	x.40=	24
2. CRT Mathematics	25	20	80	x.40=	32
3. NRT Literacy	660	665	680	NS	-
4. NRT Mathematics	640	620	690	NS	-
5. NRT Language	650	680	700	NS	-
6. Dropout Rate	.05	.03	.09	x40 =	3.6
7. Attendance	.05	.05	.08	x40 =	3.2
8. Licensure	.97	.96	.99	x40 =	3.0
9. Staff devel.	.95	.98	.98	x40 =	3.1
10. Drug free	.95	.96	1.00	x40 =	4.0
			Tier I Score =		72.9

Tier II Indicators:	State Mean	Dist. Mean	School Mean	Scaling	Your Score
1. CRT Trend Lit.	02	05	08	x2.0=	16
2. CRT Long Lit.	.20	.25	.20	x40 =	08
3. CRT Trend Math	03	12	11	x2.0=	20*
4. CRT Long Math	.25	.40	.35	x40 =	14
5. NRT Trend Lit.	15	27	30	NS	-
6. NRT Long Lit.	22	30	30	NS	-
7. NRT Trend Math	18	24	24	NS	-
8. NRT Long Math	40	40	35	NS	-
9. NRT Trend Lang.	32	27	35	NS	-
10. NRT Long Lang.	15	25	35	NS	-
11. Dropout Rate	95	98	99	x.04=	3.96
12. Attendance	97	95	94	x.04=	3.76
13. Licensure	97	96	92	x.04=	3.68
14. Staff devel.	84	84	75	x.04=	3.00
15. Drug free	95	96	100	x.04=	4.00
			Tier II Score=		76.4

School Composite Score= 149.3

* denotes maximum score possible
Note. Labels in chart have been modified to fit printing format for SUGI Proceedings Guide