

THE DESIGN OF A SAS TEST SCORE MANAGEMENT SYSTEM FOR RICHMOND PUBLIC SCHOOLS

Ann S. Allen and Alvin M. Best, III
Richmond Public Schools

The Richmond Public School System collects and maintains a large volume of test score information from a wide variety of tests for its approximately 30,000 students. Collecting and managing this information, integrating it with other sources of information, and producing management reports on extraordinarily tight deadlines is the responsibility of a very small staff. This year, instead of piecemeal systems designed around each individual test, a unified SAS system of test score management was designed.

This paper outlines the design of a SAS test score management (TSM) system and discusses its flexibility and its application to other school systems. The development of this system was complicated by needs: (1) to maintain an historical information base on large numbers of students taking varying tests with different types of scores at many times during the school year and (2) to produce a variety of accurate reports for diverse uses, from management summaries for administrative decision-making and program planning to comprehensive profiles for counseling individuals and instructing groups of students. The turn-around times from scoring to reporting were usually a matter of weeks and reports using this information combined with information from other demographic files were needed immediately. SAS was seen as an optimal tool to manage these competing needs and to maintain the sanity of those responsible for the system.

PHASE 1: PRODUCTION OF AN INPUT SCORE FILE

The Item Response File

The first phase in the SAS TSM system involved data retrieval through scanning or keypunching. Once the data on individual items was captured in machine-readable form, it was reviewed to verify the subject ID variables, to edit for valid values and consistent data and to remove duplicate test results. SAS's random access of VSAM files was used to verify student ID numbers on the item file against those on the school system's student information file.

The output from this phase was the production of a "clean" raw data (item) file, with one record per subject, each with a unique identifier (student ID number). A different input format and varying editing needs necessitated a different SAS program for each test type in this phase. However, the resulting file was thin in a consistent format to be scored in the second part of this phase.

Test Scoring

In the majority of cases where we do "in house" scoring, SAS programs, using arrays, were written to score the tests. In the case of standardized tests, where norm tables were unavailable, item response tapes were sent to the testing company for scoring. Both item and score tapes were returned. As norm tables for standardized tests become available, SAS programs, using a table look-up procedure, will score and norm these tests also.

PHASE 2: REPORTING

In Phase 2, SAS programs were written to generate various reports for each test administered. These consisted of system and group score summaries (frequencies and means), group results (class rosters), and individual results (profile sheets and labels for permanent record folders). The summaries were generated with PROC FREQ and PROC MEANS, group results with PROC PRINT. Individual results used DATA _NULL_ with FILE PRINT and PROC FORMS.

PHASE 3: TSM FILE

The process of translating the test score file into a SAS file was accomplished in Phase 3 of the design. The input was a flat file containing one record per student and, depending on the test, up to 300 bytes of test score data. This was converted to two SAS files, a test score file and a demographic file. Table 1 contains a list of the variables found in each file. The TSM score file has one record per student ID number, test date, test, version subtest and score type. The TSM demographic file has one record per student ID number, test date, test, and version. Formats for test, test version, subtest, score type, and school name were stored in a SAS format library. Because school numbers were not consistent from year to year due to schools' opening and closing, the school number was appended to school year for historical identification. TSM variables and examples of these formats are given in Tables 1 and 2.

PHASE 4: HISTORICAL FILE MANAGEMENT

Phase 4 of the design integrated the previous pair of historical TSM files, and the pairs of TSM files corresponding to recent administrations

of tests into a single historical score file, a TSM Key file and a single demographic file. The Key file contained one record per BY variables (student ID number, test date, test, version), and a pointer to the score file (the observation number for the first score in TSM score file for that set of BY variables) and another implied pointer to the appropriate demographic file record since the demographic and Key file are organized identically. Because of the large number of observations involved, it was decided to build these historical files once per school year, at the completion of all testing for that year.

PHASE 5: HISTORICAL REPORTS

Production of historical (cumulative) reports and analyses made up the fifth and final phase of the TSM design. The reports were generated for individual students using DATA NULL and FILE PRINT to summarize that student's test performance throughout the time of enrollment in the school system, and were sent along with other records if the student transferred another school system.

SUMMARY

The system was designed for flexibility. New tests, versions, subtests, and score types can easily be incorporated by adding onto the format library a description of the new form and adding modules to phases 1 and 2 as needed. The demographic and school information are forced into a consistent representation to make historical comparisons possible. And finally, the increasingly large TSM files need not be completely read by SAS to excerpt a particular study population. If an inquiry relates to a particular student or test, only the Key file need be processed sequentially (or with a search algorithm, if appropriate) to produce a pointer file for use with the direct access feature of SAS. If a population with certain demographic file can be searched for those appropriate records and a direct access search through the score file can then be directed by the Key file for those observation. These procedures produce important cost savings and are quite flexible.

Table I

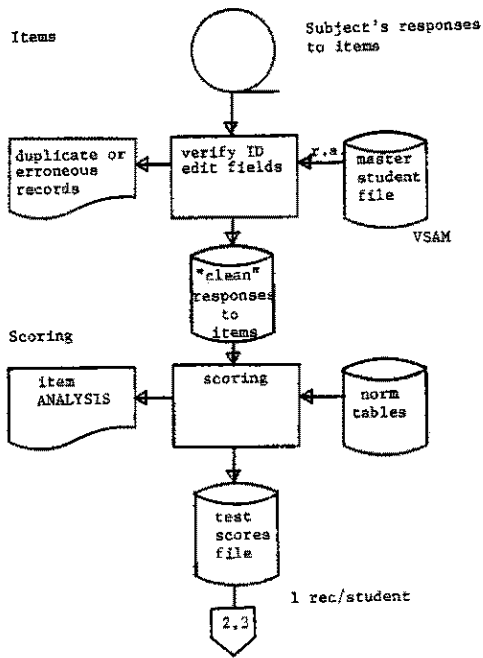
Variables in TSM Score and Demographic Files

VARIABLE	FORMAT	TSM FILE	
		SCORE	DEMO
Student ID number	7.	X	X
Test date	DATE.	X	X
Test	TEST.	X	X
Version (form and level)	\$TEST_VER.	X	X
Subtest	SUBTEST.	X	
Score type	SCR_TYPE.	X	
Score	5.	X	
School year	2.		X
Name	\$32.		X
School	YRSCHNUM.		X
Homeroom	3.		X
Grade level	\$GR.		X
Sex	\$SEX.		X
Ethnic	\$ETHNIC.		X
Birthdate	DATE.		X
Address	\$40.		X

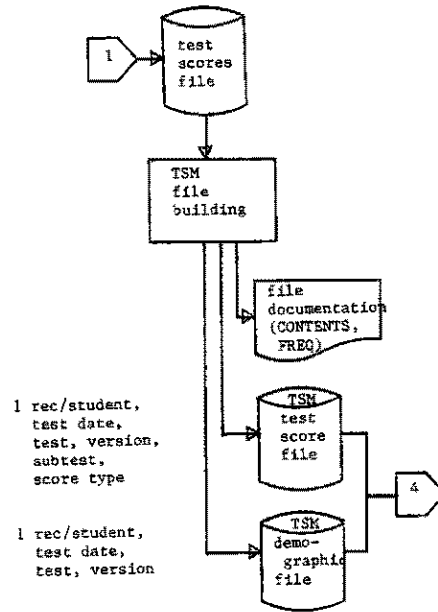
Table 2
Examples of TSM Formats

FORMAT	VALUE
TEST.	1=SRA 2=ITED 3=SHARP 4=EDST 5=Virginia State Competency 6=Basic Learning Skills 7=Communicative Arts Competency 8=Communicative Arts Proficiency
\$TEST_VER.	PIE=Primary I Form E MBF=Multilevel Blue Form F MRE=Multilevel Red, Form E X5=Form X-5 Y5=Form Y-5 A=Form A B=Form B 1=Phase 1 2=Phase 2
SUBTEST.	1=Language Arts 2=Spelling 3=Reading Comprehension 4=Total Reading 5=Written Communication Paragraph 6=Written Communication Composition 7=Functional Reading 8=Functional Writing
SCR_TYPE.	1=Pass/Fail 2=Percentile 3=Raw 4=Grade Equivalent 5=Growth Scale Value

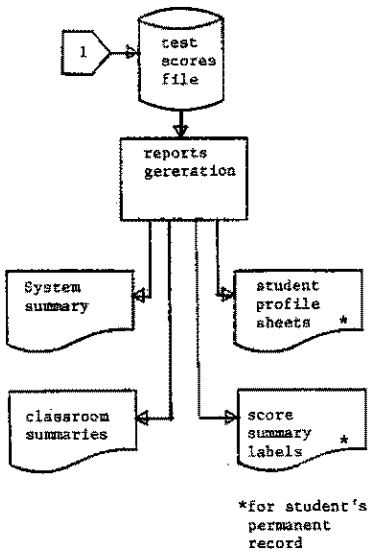
Phase 1
(Unique to each type of test)



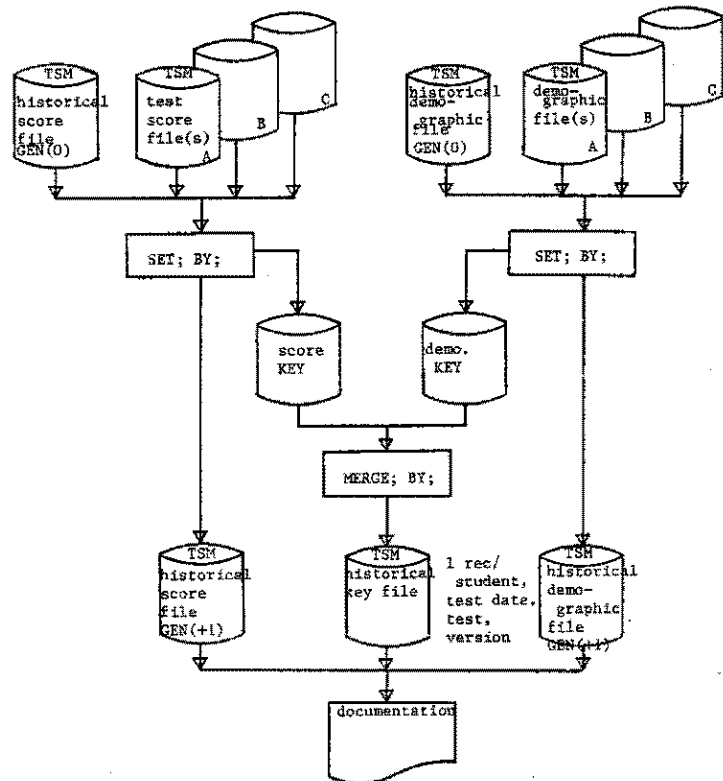
Phase 3



Phase 2
(Unique options for each type of test)



PHASE 4



INTERACTIVE TECHNIQUES (TSO and CMS)

CHAIRMAN:

Sheryl Preston, Radian Corporation