A METHOD FOR PROCESSING TEST SCORES WITH MINIMAL PUNCHED CARD EQUIPMENT

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With the installation of a set of IBM Series 50 punch card machines in the Manatee County Schools, it was decided that the machines should be utilized for processing test data wherever possible. The current installation consists of a sorter, key punch, and an accounting machine, which represent a minimal installation. This paper will describe the processing of an achievement test battery with maximum use of the available equipment. In addition to the above listed equipment, an IBM 805 test scoring machine was available.

In previous years the achievement tests were administered by the teachers and scored by machine in the county office. They were then returned to the teachers who converted the raw scores to grade placement scores and made class lists. With the present method the answer sheets are scored in the county office, the raw scores are converted by machine to grade placement scores, and a class list is returned to the teachers. The succeeding sections will detail the processing and suggest other applications using the same basic material.

IBM machine scoring answer sheets for the California Achievement Tests were scored in the usual manner with the 805 test scoring machine. During the administration of the test the teachers had instructed the pupils to place a three digit identification number on each answer sheet. This number indicated grade level and teacher. After scoring, the answer sheets were arranged into alphabetical order by hand. An order of reading, arithmetic and language answer sheets was maintained for each child. Appendix A lists times required per hundred students for the major operations so that the reader may estimate costs by his own clerical pay scale.

A key punch operator made a card for each student with identification of school, the class room identification, child's name, and six raw scores representing the six subtests of the achievement battery. Appendix B contains a list of card column contents.

When a group of approximately 1,000 such pupil cards had been accumulated, they were sorted on the basis of a single subtest raw score. A master deck was sorted which contained all of the possible raw scores and their corresponding grade placement scores. The master deck was utilized to punch the grade placement scores automatically onto the pupil

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data cards. This process is repeated six times to convert each raw score to a grade placement score.

The pupil data cards were then ordered alphabetically, by school, and home room. This ordering was done by machine sorting. After cards were ordered they were put through the accounting machine to produce a class list with pupil name and grade placement scores for the six subtests. Three additional columns were produced for each child on this run. The two reading grade placement scores were summed and the total printed. In a like manner a sum was printed for each child's arithmetic and language scores. This accounting machine run represents a work sheet from which a clerk in the county office hand calculated average grade placements for reacing, arithmetic, language, and the entire battery. Appendix C contains a sample of the work sheet.

After the averages were calculated, the work sheet was returned to the key punch operator who punched the averages in the child's original data card. A final run on the accounting machine produced class lists for the teachers, principals, elementary and secondary supervisors, and psychologist. Appendix D contains a sample of the final class list.

From the pupil data cards a frequency distribution is easily obtained in the accounting machine by sorting for a particular series of scores and using the card count device. During this same run the scores may be summed for computation of the mean.

With the data in a flexible form as provided by the use of individual pupil cards, many possibilities present themselves for increased use of the achievement test material. For example, Manatee County uses a spring testing program, and with class lists available to the principal during the summer, he is able to provide the following year's teachers with a complete set of achievement test scores for their new classes. These new class lists are available for pre-school orientation use.

By sorting in terms of scores, lists may be provided to the principal to aid in forming classes grouped according to achievement level. Selection of students with extremely high or low scores for special attention may be quickly done by using the mechanical sorter and the accounting machine for listing.

It is the writer's opinion that from four to six hours of teacher time are saved by the machine processing system outlined in this paper. In addition, there is a considerable saving in time due to the automatic tabulation available for statistical process. It is believed that the achievement test material will be more accessible and in a more useable form, and that these factors will encourage wider use by teachers of the available data.

Appendix A

Time Required Per 100 Students for Major Operations Discussed in Text

Operation	Time in Hours
Hand Order Answer Sheets	1.00
First Key Punch	.83
First Accounting Machine Run (Work Sheets)	.10
Averaging	.83
Second Key Punch	.25
Second Accounting Machine Run (Final Class List)	.14

Appendix B

Contents of the Pupil Data Card

Card Column	Contents	Source
1-2	School Number	First K.P.
3	Grade	First K.P.
4-5	Teacher Number	First K.P.
6-9	Date	First K.P.
10-30	Student Name	First K.P.
31-32	Age in Years	First K.P.
34-35	Rdg. Vocab. R.S.	First K.P.
36-38	Rdg. Vocab. G.P.	A.G.P.
39-40	Rdg. Comp. R.S.	First K.P.
41-43	Rdg. Comp. G.P.	A.G.P.
44-45	Arith. Reas. R.S.	First K.P.
46-48	Arith. Reas. G.P.	A.G.P.
49-50	Arith. Fund. R.S.	First K.P.
51-53	Arith. Fund. G.P.	A.G.P.
54-55	Mech. Eng. R.S.	First K.P.
56-58	Mech. Eng. G.P.	A.G.P.
59-60	Spell. R.S.	First K.P.
61-63	Spell. G.P.	A.G.P.
64-66	Tot. Rdg. G.P.	Second K.P.
67-69	Tot. Arith. G.P.	Second K.P.
70-72	Tot. Lang. G.P.	Second K.P.
73-75	Battery Av. G.P.	Second K.P.

Legend

K.P. - Key Punch
R.S. - Raw Score
G.P. - Grade Placement
A.G.P. - Automatic Gang Punch

Appendix C

Sample of the Work Sheet

21 911

Part, Virgil	16	102	105	207	88	81	169	88	72	160
Tee, Thomas	14	98	98	196	110	110	220	90	60	150
Right, Harry	14	115	136	253	103	104	207	105	88	193
Lang, Bill	14	100	112	212	114	113	227	111	113	224
Song, Gloria	15	78	88	166	83	77	160	97	65	162
Gus, Edithel	15	72	77	149	90	102	192	93	72	165
Ray, Bill	14	113	103	216	107	111	218	113	113	226
Son, James	15	105	96	201	109	102	211	85	75	160
Ton, David	14	77	92	169	90	82	172	95	69	164
Janes, Ann	14	102	95	197	91	81	172	85	106	191
Won, Loretta	14	103	103	206	114	101	215	115	103	218
War, Barbara	14	110	95	205	107	116	223	113	100	213
Was, Janice	15	105	91	196	112	118	230	109	103	212
Gin, Valerie	15	67	76	143	90	81	171	78	75	153
Will, Vernon	14	88	94	182	93	102	195	91	83	174

Appendix D

Sample of Final Class List

1 C A
2 M A
3 RDG VOCAB
4 RDG COMP
5 TOTAL RDG
6 ARITH REAS
7 ARITH FUND
8 TOTAL ARITH
9 MECH ENG
10 SPELLING
11 TOTAL LANG
12 AV GRADE PLACE

21 911	1	2	3	4	5	6	7	8	9	10	11	12
Part, Virgil			102	105	104	88	81	85	88	72	80	89
Tee, Thomas			98	98	98	110	110	110	90	60	75	94
Right, Harry			115	138	127	103	104	104	105	88	97	108
Lang, Bill			100	112	106	114	113	114	111	113	112	110
Song, Gloria			78	88	83	83	77	80	97	65	81	81
Gus, Edithel			72	77	75	90	102	96	93	72	83	84
Ray, Bill			113	103	108	107	111	109	113	113	113	110
Son, James			105	96	101	109	102	106	85	75	80	95
Ton, David			77	92	85	90	82	86	95	69	82	84
Janes, Ann			102	95	99	91	81	86	85	106	96	93
Won, Loretta			103	103	103	114	101	108	115	103	109	106
War, Barbara			110	95	103	107	116	112	113	100	107	106
Was, Janice			105	91	98	112	118	115	109	103	106	106
Gin, Valerie			67	76	72	90	81	83	78	75	77	78
Will, Vernon			88	94	91	93	102	98	91	83	87	91