TESTER:

A computer program to produce individualized multiple-choice tests

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With increasing frequency, courses in both college and secondary schools are taught with what has been described as a "self-paced" or "mastery" format. Such courses are often characterized by the division of course material into several topics and by the requirement that the student demonstrate mastery of one topic before proceeding to the next. These courses are often highly compartmentalized, with the student receiving a packet of information about a topic and being asked to study it until he feels able to pass a test on the material. The student then takes a test and, if he passes, advances to the next topic. If the student fails, he studies the material further and takes another test when ready. Such a loop may continue indefinitely.

With a mastery format, it is essential that there are a large number of different tests for each topic, so that a student may repeatedly take tests on each topic without "learning the test" rather than the material.

This abstract describes a computer program, TESTER, which produces up to 32,767 unique tests based upon the same material.

Description. TESTER is a computer program that randomly selects test items from a sequential file (e.g., cards) of such items to produce a variable number of tests, each with some random subset of the items in the file. TESTER uses a stratified random sampling procedure which allows the user great flexibility in the final output. After dividing the file of test items into as many strata as there will be items on the test, TESTER randomly samples one item from each stratum. For example, if the user wishes to produce a test consisting of 10 items, with the first 5 involving the same material and the second 5 different material, he need only plan his input file such that the first 5 strata involve the same material and the second 5 different material. If the user wishes to produce tests with 12 items, each covering a different domain, he need only insure that his item pool file contains 12 sets of items, each with the same number of items included.

Although TESTER is used most often with multiple-choice items, it may also be used with other types of objective items. In fact, TESTER may be used to generate tests with subjective items, although it is impossible to produce answer keys for such items.

Restrictions/Limitations. Because TESTER keeps only one line of the input file in core at a time, the

program has virtually no limitations, except that the number of items per test may not exceed 100. This restriction may be expanded with one change in the dimensioning of an array. The only other limits involve the magnitudes of the counters used to remember such things as the number of test items in the file, etc. These counters are single precision integers and, on most machines, have a maximum positive magnitude of 32,767. Usually, considerations such as available file space, the number of cards the user wishes to carry in, or the volume of printout he wishes to carry away, provide practical limitations on output.

Input. TESTER requires two input files, or two types of input. The first contains parameters and options, such as how many tests are to be produced, their length, the number of sets of answer keys, title lines, etc. When TESTER is executed interactively, parameters and options are usually entered via the terminal. The second input file contains the test items themselves, in a format (described in the user's manual) which allows TESTER to easily distinguish between questions and to extract the answers to print later.

Output. TESTER produces the following output: (1) from 1 to 32,767 tests, which may be identical or different; (2) from 1 to 32,767 sets of answer keys, each of which has the answers to the tests produced in that run; and (3) the seed used to initialize the random number generator so that the user may reproduce exactly the same series of tests on a different occasion.

Options and Parameters. TESTER has the following options and parameters: (1) number of copies, (2) number of items per test, (3) number of sets of answer keys, (4) random number subset, (5) date, (6) title line, (7) starting value for sequential numbering of the tests, (8) whether the tests are to be identical or different, and (9) chapter number of material covered. All options have defaults.

Computer and Language. TESTER is available in both FORTRAN and PL/I and has been used successfully on IBM 360 and 370 machines and the PDP-11/45. The dialect of FORTRAN is general enough so that little difficulty should be encountered in running TESTER on any machine with FORTRAN, sequential files, and a line printer.

TESTER may be used both interactively and in batch.

Availability. TESTER and its user's manual, including examples of both input and output, are available for \$50.00 from the first author at the Psychometric Laboratory, University of North Carolina, Chapel Hill, North Carolina 27514.

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