COMPUTERIZED PRELIMINARY SCREENING OF CHILDREN WITH LEARNING DISABILITIES[1]

JOHN F. BROSSEAU and JANETTE M. FOX
Edmonton Separate School Board

EUGENE W. ROMANIUK
University of Alberta

Abstract

A computerized program was developed to screen students with learning disabilities, using standardized tests from student records. The selection method utilizes the Tinker-Bond Formula:

$$\frac{(\#\text{ years in school}) \times (\text{I.Q. Score})}{100} + 1 = \text{reading expectancy}$$

The expected reading level is compared to the child's actual reading level on a standardized test. Children who are one-third or more behind their expected reading level would be identified as having a possible learning disability.

Résumé

Un programme sur ordinateur a été développé dans le but d'identifier les étudiants qui manifestent des difficultés d'apprentissage. On a utilisé des tests standardisés tirés de dossiers d'étudiants pour préparer ce programme.

La méthode de sélection utilise la formule Tinker-Bond:

$$\frac{(\#\text{ années passées à l'école}) \times (\text{point du quotient intellectuel})}{100} + 1 = \text{attente en lecture}$$

Le niveau d'attente en lecture est comparé au niveau actuel de lecture sur un test standardisé. Des enfants qui manifestent une lacune d'un tiers ou plus de leur niveau d'attente en lecture, seraient considérés comme ayant possiblement des difficultés d'apprentissage.

OBJECTIVES

The objective of this project was to develop a computer program which would use student records as a basis for screening students with learning disabilities. This would enable a school system to rapidly review its student records to identify those students who may require additional assistance in school.

The method selected for screening was the Tinker-Bond Formula:

$$\frac{(\#\text{ years in school}) \times (\text{I.Q. score})}{100} + 1 = \text{reading expectancy}$$

This formula utilizes standardized intelligence test scores (I.Q.) to arrive at an expected reading level which can then be compared to the actual reading level achieved by a student on a standardized reading test. Children who are one-third or more behind their expected reading level would be identified as having a possible learning disability.

Although the computer program was designed for use with the Edmonton Separate School System's

[1]Information about the computer program may be obtained from Eugene Romaniuk, 3rd Floor, Education Centre, North Tower, University of Alberta.

student cumulative records, it can likely be adapted to accommodate student records at other school systems as well. This objective can be met by making the Edmonton Separate School Board (ESSB) computer program available to other school systems who then only need to modify it to suit their computing systems and student record files. If a school system does not have a computer facility, there is still the possibility of computerizing the information and running the program on a commercial facility. Once the original data are computerized, then only new data would have to be added periodically. The additional cost of buying computer time from a service bureau would be more than off-set by the increased effectiveness and speed of screening a school system for children with learning disabilities.

DEVELOPMENT OF THE COMPUTER PROGRAM

Work was begun in April, 1976, on developing the computer program. The initial meetings were spent discussing the proposed objectives of the program, and how these objectives might best be met. As the computer program was being developed, it went through several revisions. Since the standardized tests used in the school system were not identical at all grade levels, several 'sub-programs' had to be written into the over-all design. For example, the I.Q. score used in the Tinker-Bond Formula is taken from the Primary Mental Abilities Test (PMA) for grades one to three, and from the Lorge-Thorndike Intelligence Test for grades four to twelve. In some schools, the child's actual reading level is taken from the Gates-McGinitie Reading Test (comprehension score) and in other schools, the Canadian Test of Basic Skills (CTBS) is being used instead. Thus the program was written to include scores from the appropriate intelligence and reading tests.

The resulting computer listing provides a student list by school and by grade level. This makes it much easier to get the information to the appropriate school and teachers who work with these individuals. In addition, it is possible to identify each student who has not had the required standardized tests. This enables each school to administer the appropriate tests to those students who missed the original testing, and to determine if they qualify for placement in special programs. By identifying students who have missed tests, fewer children would be passed over or identified too late for special placement.

By May, 1976, the first completed draft of the program was ready for a trial run. The sample school chosen for the trial run was a relatively large school with several special classes. This insured a large sample at any particular grade level (K-9) and provided a cross-check on children in the special classes.

At this time, hand-checking of a cross-section of the student body was conducted using the identical method to that of the computer program. The hand derived results were compared to the results from the computer run to verify the accuracy fo the program. A major problem arose at this point which had nothing to do with the computer program itself. Earlier in the school year, the Edmonton Separate School Board had begun conversion from one computer system to another. This change-over was to have been completed in January 1976, but various difficulties arose which kept extending the final date of the conversion from one system to the other.

The first trial run was therefore not available for comparison to the hand-checked results until June 1, 1976. When the two sets of results were compared, two major problems were apparent. First, and probably most important, the program appeared to work for those students who had taken the standardized tests and had these test results recorded in their records. However, an overall error rate of 90 to 95% was discovered. Extensive examination of the information of the computer listing revealed several major problems which had to be corrected before the program could be of use to the schools.

By and large, the greatest number of errors was attributed to the fact that all test data from the school year 1975-76 had not yet been transferred to the new computing system, so that, for several grade levels, there simply were insufficient data for use. This problem was eliminated in September, 1976, when the remaining test scores were put into the computer files. However, there were some other errors in the computerized student records which, although of a much lesser magnitude, were more difficult to correct. These included errors in the positioning of data in specified storage fields which resulted in incorrect test scores being manipulated. Also some of the test scores and associated percentiles were in error. These errors appeared to affect few students, and hopefully by running the program periodically during the school year, the teachers will help pick out those student scores which are obviously incorrect, and these can be rectified.

A second trial run was conducted in July 1976. Three schools were selected which represented a cross-section of the city. An examination of the computerized results coincided perfectly with hand-calculated results and closely matched the ESSB predicted distribution of children who have learning difficulties. Some minor adjustments were made to the program at that time, so that the program not only

provided a list of students with learning difficulties by school and grade, but also provided summary totals for the number of children in each shcool who were below a certain cut-off (this takes into consideration children who don't quite qualify for special placement, but who are also in need of extra assistance) and also indicated the number of students who have missing test scores, as well as showing just which tests they were lacking. These refinements actually gave more information on the status of the children in the school system than the original proposal, and provided for a much more effective way of identifying children who need extra attention.

The final test run was completed in early August 1976, at which time the program proved to be completely operable and ready for use in the school system. The missing test data from the 1975-76 school year had not been entered into the computing system prior to the final run, but there was a sufficient sample so that the success of the program was assured. The first copy of the print-out was then made available to the respective schools in the system. It is proposed that this program be run several times each year, in the fall, in mid-winter, and again in the spring, so that the student information records are updated periodically.

PREPARING THE SCHOOLS FOR COMPUTER SCREENING OF LEARNING DISABILITIES

As soon as approval for the proposed computer screening of learning disabilities was received, several of the resource room teachers were interviewed. The resource room teachers have been using the same formula as used for the computer program in selecting students for placement in their classrooms. Generally the resource room teachers were not screening the entire school population, just those pupils whom other teachers had pre-selected as possible candidates. This resulted in a good deal of time spent screening that could otherwise have been used for teaching. As well, there was a high risk of missing candidates who for some reason were passed over in the classroom. (This can happen if a child changes schools frequently or for some other reason manages to escape the regular classroom teachers' attention.)

The sample of teachers who were interviewed in May was quite small. At that time we were mainly interested in estimating problem areas in teacher acceptance of screening children via computers. It came as something of a surprise that, in general, the reaction to such a suggestion was very positive. In fact, one teacher (whose husband is a computer analyst) broached the subject first, and asked if it couldn't be possible to write a computer program to identify the children who should be in her classroom.

The print-outs for the various schools were taken to the respective schools and explained in detail to the principals and teachers. This was done about six weeks after school started to avoid the first few weeks of chaos associated with the new school year, but early enough in the year to get students placed appropriately. In the future, the selection can be made at the end of the school year for the following year, with a review being made just after school starts in the fall.

APPLICATION TO OTHER SCHOOL SYSTEMS

In association with the computer program, the computer consultants have written an explanatory summary of the program with some suggestions as to how to adapt the program for other tests. The Edmonton Separate School System is willing to make this program and summary available to other school systems with a computer capacity so that they can adapt it to their use. Even if a school system does not have a computer facility the option for using the program is still available if they decide to rent computer time. The initial expense may be well worth the cost in view of the amount of time saved, as well as the wealth of information which is available with the program. Also, after the initial work is done, only new data would need to be added to the data file. The program is written in Cobol and runs on the IBM 370/125 at the Edmonton Separate School Board Data Processing Centre.

OTHER USES

As well as providing information regarding children who qualify for placement in classrooms for the learning disabled, there are several other advantages to using this program. This includes a printed list of the children who have not received the standardized tests and the tests which they are lacking. Children who change schools frequently, who were absent on the day of testing, or who are new to the system could then be identified, and tested. Otherwise, they may never be given the standard tests.

One of the major advantages which is a by-product of this program, is that when used near the end of the school year, the program can give school board administrators an estimate of demand for special classrooms and teachers. Each school will have an estimate of how many of their students will require additional help, thus determining if they need any special classrooms, and if so, how many. Also, the school system as a whole will have a reasonably

accurate estimate of how many special classroom teachers will be required, and at what schools to place them. This can be done at the time of hiring rather than waiting until school starts, and then trying to juggle teachers and special classes among the various schools.

SUMMARY

The computer program which was written to provide screening for children with learning disabilities appears to be a success in more ways than one. The original objectives of saving teacher time in selecting candidates and of selecting all possible candidates for special placement (where some would otherwise be overlooked) are certainly functional.

The additional advantages the program provides are of significant interest as well. The information on the demand for the number of special classrooms and the location of these in the schools is of great importance to those persons responsible for the hiring of special class teachers, and to those responsible for the development of special programs to meet the needs of the students.

Using the computer program several times during the school year could help a school system to monitor the flow of students requiring extra attention, and to keep track of the students who are receiving help. Also, it could possibly provide a means of looking at the long-range effectiveness of special classrooms at some time in the future.

In essence, the computer program which was developed to screen learning disabled children, has done that and much more. It appears to be well received by teachers; primarily because it provides them with the needed information on their students in a most efficient way. The computer program appears to be a very valuable tool in the screening of children with learning disabilities, and the Edmonton Separate School System will be pleased to share it with other interested school systems.