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Descriptors-Autoinstructional Aids, *Autoinstructional Programs, Counseling Services, Diagnostic Tests, *Individualized Instruction, *Reading Diagnosis, Reading Improvement, *Remedial Reading, Self Evaluation

Identifiers-Automated Individualized Diagnosis System

A self-diagnostic system called the Automated Individualized Diagnosis System (AID) tested at the Reading and Study Skills Center, University of Minnesota, was designed to replace the human counselor. It consists of an answer sheet, a Self-Analysis Profile Blank, and an audio tape which helps the student derive his reading profile and select the practice materials he needs. Three trials conducted showed that the system had no adverse effect on the length of contact the students had with the reading program. The students were generally satisfied with the system's efficiency in giving specific information on profiling reading ability and using this profile as the basis of diagnosis and remediation. However, they felt that the presence of a human counselor would add warmth, friendliness, and a feeling of security. Like other automated instructional systems, the AID fails in the affective domain. (NS)

An Automated Individualized Diagnostic for College Centers

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Many investigators have reported on the automation of various educational activities. Cogswell, (1966) and Loughary, Friesen, and Hurst, (1966) have both described a computer program which conducts an educational planning interview with high school students. Forster, (1966) developed an individualized programmed instruction package which was effective in teaching students how to interpret their Minnesota Scholastic Aptitude test scores. The field of teaching machines, and particularly computer assisted instruction is, of course, the pre-eminent example of the use of adaptive automation in the educational process. In this paper I want to extend these motions and describe a system for the self-diagnosis of reading and study skills problems. The system has a specific objective: To teach a student to analyze his measurable reading skills, and make decisions about his treatment. As are the other examples cited, it is an attempt to automate a significant aspect of the educational process.

Context of the System

The self diagnostic system is designed for and has been used experi-

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mentally in the Reading and Study Skills Center at the University of Minnesota. In the normal, i.e. non-automated situation each student applicant for service at the center completes a battery consisting of the Diagnostic Reading Test, Survey Section, the OM Form of the Cooperative Spelling Test and a short locally developed Individual Record Form. Then at some mutually agreed upon future time, the student and a counselor sit down and discuss the results of the battery. They select an individualized program of remedial and developmental work tailored for the needs of that student. The selected exercises are all self-instructional and student paced. The student works on these materials under the supervision of a counselor. The individualized nature of the program allows great flexibility of scheduling. No two students would necessarily be working on the same material in the same sequence. Students may enter the program any time during the school year, work in the practice room as their schedules permit, and stay with the program as long as they wish. The Automated Individualized Diagnosis System (A.I.D.) is designed to take the place of the human counselor in the intake process. It has been used, with some trepidation, during periods of high intake such as the beginning of fall quarter. The system could be modified for use at other institutions, as a routine procedure, or as a training experience.

Elements of AID

1. The Test Answer Sheet

AID uses a basic Digitek answer sheet, scored for the usual sub scores of the Diagnostic Reading Test. In addition, we score separately the 20 item paragraph comprehension test. Raw scores are presented on the test answer sheet along with percentiles based on a sample of 392 Minnesota Arts

College freshmen tested in the fall of 1967.

2. The Self Analysis Work Sheet

At the self-diagnostic session each student receives a Self-Analysis Profile Blank. The profile grid is set up to magnify differences at the extremes of the distribution of percentiles

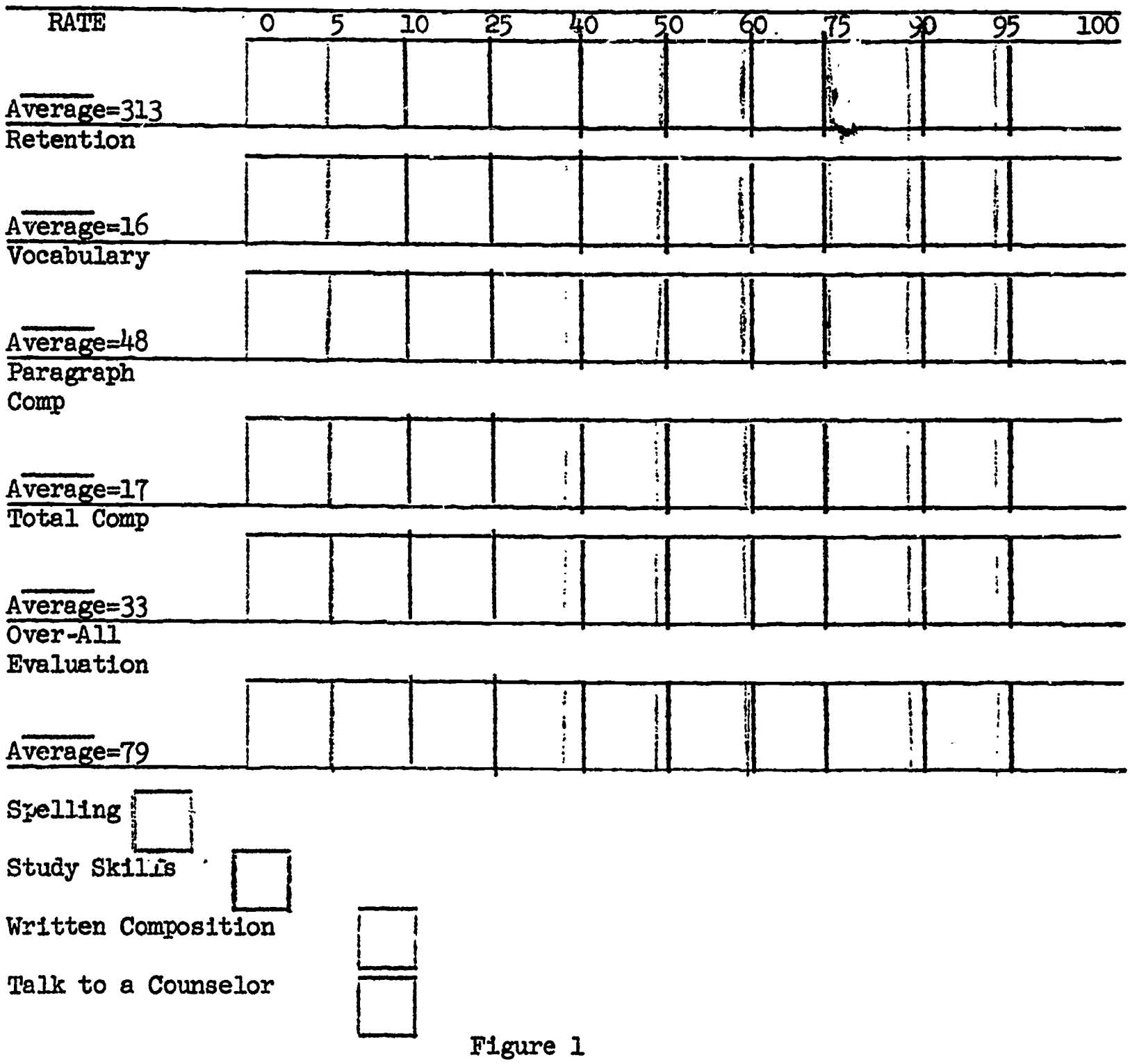

Figure 1

Percentile Profile for Self Analysis Worksheet

This, of course, is the part of the range in which the norms are most influenced by chance. However, this is also the area of major concern for treatment. For example, scores falling between the 40th and the 60th percentile on rate are probably of less treatment concern than those between the 10th and the 25th percentile. Thus we trade significance in treatment for reliability of measurement.

3. Audio Tape

An audio tape directs the student through the process of profiling his reading ability. Then the tape gives decision making rules that are to be used when selecting the practice exercise. The rules are either (1) the result of empirical investigation, or (2) clinical experience or (3) practical limitations of the system. The rules are as follows:

a. Select rate if the scores for retention and paragraph comprehension are at the 40th percentile or higher and there are no more than six errors on the vocabulary test.

b. When selecting between retention and paragraph comprehension, select the area with the lowest percentile.

c. If both retention and paragraph comprehension are at the same level, select retention for work first.

d. If multiple choice examinations are a problem, select paragraph comprehension.

e. Before working on vocabulary see a counselor to decide in which particular area of vocabulary to work.

f. If reading percentiles are satisfactory, select spelling, study skills or written composition.

g. In all other cases, stop the tape and make an appointment to see a counselor.

The last section of the tape asks the student to indicate, on the Self-Analysis Worksheet, the areas of reading and study skills in which he wishes to begin work.

4. Treatment Materials

The fourth component of the system, which will not be discussed at length in this paper, is a set of practice materials. Suffice to say that it is necessary to have a specific treatment regime worked out for each option the student can make. This regime should be emperically validated. That is, there should be some evidence that given problem X, as evaluated by pre-test X, if a student follows treatment X he will produce higher scores on the post-tests than if he took some other treatment Y. Using the particular version of the system now operating, a student may analyse his profile and opt to work on rate. In that case he would automatically start a series of procedures which seem to be maximally effective in our setting.

Evaluation of AID

1. Does the method of intake affect students' tendency to remain in the Reading and Study Skills Center?

In the fall of 1966, 45 students used the first version of the system to do their own diagnosing and intake into the Reading and Study Skills Center. The quarterly report for fall showed that the types of intake---group, taped, or counselor interview---had no effect on the number of practice sessions in the center. The 45 students who used AID had an average of 7.0 practice sessions. The 111 who went through the normal

face-to-face personal counseling procedures spent an average 6.8 sessions. The differences are related to the experience of the counselor in the practice group, not to the method of intake and diagnosis.

2. Do students follow the decision rules?

In the spring of 1967, 26 students in the How to Study Course made a self-diagnosis using the second version of the system. Students listened to the tape through the sections where it described the test and showed them how to profile their study skills. Then the tape was stopped and the students were told to select practice areas on the basis of their profile. They were given no explicit rules for making this decision. This procedure was in a sense a test of the use to which untrained students would put knowledge of their own reading ability. After they had made the initial decision, they heard the rest of the tape which gave them explicit decision making rules, and then made their final decision.

Fourteen of the students, or 55 percent, changed their choice of material after listening to the rules. Thus it seems reasonable that the tape can both give information on profiling and give explicit information which students follow in making use of their profile.

3. Do students learn about their reading ability from the system?

The latest version of AID was used in the fall of 1968 by students in another section of the How to Study course. They were asked before listening to the tape to estimate their rate, retention and paragraph comprehension percentile in comparison with the typical Arts College freshmen. Then they heard the tapes. Without warning at the end of the class, some 35 minutes after listening to the tapes, they were asked to recall their ability percentiles. The results are presented in Table I.

Amount of Deviation	RATE		RETENTION		PARAGRAPH COMP	
	PRE	POST	PRE	POST	PRE	POST
(Under Estimate) -60						
-50			2			
-40						
-30			2		1	
-20	22		3	1		
-10		2		1	2	
-3		1	2	1	1	2
0	1	13		9	1	8
+10	2		3		1	2
+20	3		2	4	5	3
+30	2		2	1	3	
+40	3	1	1			
+50						
(Over Estimate) +60					3	1
$\bar{X}$	14.0	.23	-11.8	4.24	16	5.70
σ	22.3	9.5	25.4	16.1	25.3	15.9

Table I

Amount of Deviation From True Percentile for Three Reading Skills in Pre-Treatment Estimation and Post-Treatment Recall.

Deviation from actual score can be positive representing an over estimation or negative indicating under estimation of ability. In general, pre-treatment deviations are large. Post-test deviation tends to cluster at zero. There were few students who made rather marked individual deviations. These were in some cases confusion between percentiles and raw scores. In general, however, it seems fair to conclude that the students did learn from the tape as measured by pre and post scores.

It is, of course, possible that the pre-test sensitized them to pay particular attention to their self-analysis work sheet. Therefore, in another section of the course students were not given a pre-test. They merely listened to the self-analysis tape, made their own diagnosis and then were asked in an unannounced test to recall their percentiles. The results are presented in Table II.

This group recalled their scores with even better accuracy than did the first group reported in Table I. Whether they would have retained their scores better if they had received the information face-to-face from a counselor is beside the point. The issue here is whether the tape works to teach the students valid information about themselves. Clearly, the answer is yes.

4. Are the students satisfied with the self analysis system?

Thirty-five students in the How to Study course were administered a questionnaire after profiling their scores. The first item, and the number selecting each response were as follows:

Amount of Deviation	RATE	RETENTION	PARAGRAPH COMP
(Over Estimate) (Under Estimate)			
-60			
-50			
-40			
-30			
-20			1
-10		1	2
0	1		2
0	12	9	5
+10		3	1
+20			
+30			1
+40			1
+50			
+60			
$\bar{X}$	.30	.46	.08
σ	1.1	3.9	16.1

Table II

Amount of Deviation From True Percentile for Three Reading Skills in Recall Without Pre-Treatment Estimation.

You have received the results of your reading test and were guided to select practice materials by a tape recorder. It would have been possible for your instructor to sit down with you and help you make the same selection. You could have told him something about yourself that would have changed the final choice. But you would have to have waited some time to see him.

Under the circumstances, how do you feel about the self-analysis?

5	20	5	5	0
completely satisfied	generally satisfied	indifferent	generally unsatisfied	quite unsatisfied

Clearly then the students were reasonably satisfied with the self-analysis under the circumstances.

5. If students had an option between an instructor and a tape, which would they choose?

Another question on the survey was as follows:

If there were no waiting period for either the tape or the instructor, which would you prefer?

0	2	3	20	10
strongly prefer the tape	prefer the tape	indifferent	prefer the instructor	strongly

Here again we see a rather definite trend. Given a choice, students would prefer to talk to a live instructor. However, a review of the Self-Analysis Worksheet indicates that only 9 out of 35, or 25 percent of the students in the latest group, and 7 of 26 or 29 percent of the students in the spring 1967 sample actually asked to see a counselor. Thus it appears that in spite of the fact that according to an attitude measure 60 percent of students would like to see a counselor, by a behavioral measure only about

25 percent of them take the opportunity. Looking at the data from another point of view, 70 to 75 percent are satisfied with the intake system to begin immediately the work that they have selected for themselves.

Summary

As it stands now, the AID system is certainly not perfect. But there are some positive things we can say about it. It does not seem to adversely affect length of contact with the reading program. Students learn from the system both what their ability scores are, and how to use the scores for diagnosis. Students seem reasonably satisfied with the system although when given the option they would prefer to talk to a human being. Subjectively, I would say that AID was about as competent as a well trained but nervous graduate student conducting his first few intak terviews. At least the AID sounded like it knew what it was doing. Those findings are consistent with reports in the literature of automated instruction. Forster (1966), for example, notes that "subjects who receive test results from counselors appear to become more relaxed more quickly than subjects who receive test information from the program manual." However, he notes that the subjects getting their information from the program tended to improve more in the accuracy of their self-estimation. Loughary (1966) reports on students' attitudes toward the computer program developed by Cogswell. In general the students seem to feel that the program had more factual, specific information than the human counterpart, were more positive toward the human counselor than the machine, and would like to see the computer used regularly <u>if</u> there were a human counselor somewhere around

for security. The results for the AID system are in line. To recap, the system seems to teach factual information quite well, seems to work in achieving its major objective which is to get students in contact with material. Like other automated instructional systems it fails in the emotive area. It may be functional, but it is not warm and friendly.

Perhaps those of us concerned with the automation of education and counseling should take some consulation from the psycho-biological hypothesis that a woman is nothing more than a rag, a bone and a hank of hair. Harry Harlow attempted (in 1958) to build a surrogate mother monkey out of a nipple, a wire frame and a hank of terry cloth. From the point of view of simian social learning and monkey mental health, the effects were disasterous (1962). However, Harlow had expected his creation to be all things to the baby monkey. It may be possible to design educational technology around an answer sheet, #2 pencil and a hank of magnetic tape. It will work quite well but we can not expect it to be a mother.

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