

## Development of a Research-Based and Computer-Assisted Guidance System

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THE purpose of this report is to specify some of the major problems confronting the guidance function in the American school and to describe operational research procedures and system analysis steps taken to solve these problems at the local district level. The following list of questions describes the type of problems with which the Covina-Valley Unified School District has been engaged for the past seven years:

1. Is there some systematic way to identify students who need counseling help but who may not request it?

2. Can counselors develop some type of consistent framework for evaluating the educational and vocational plans of students so that students, parents, and counselors themselves will be able to plan by a set of common ground rules?

3. Is it possible by the use of computers, or otherwise, to reduce the amount of counselor time allocated to clerical functions, including verification of programs and the monitoring of student decisions regarding postgraduate plans and the selection of elective subjects?

4. Is there some feasible way of developing a "quality assurance" system for identifying students with "high-risk" plans so that they can receive additional advisement in the decision-making process and/or counseling support in the implementation of the "high risk" decisions?

As a result of research connected with the study of the career development of scientists, Cooley (1965) advocated the development of a computer measurement system for guidance. Cooley advocated the use of computers in the guidance function as a means of automating many of the time-consuming details currently associated with that function. He stressed the fact that current school testing programs need to shift from an emphasis on recording sets of numbers on student cumulative records to a procedure of "flashing red lights" indicating when certain students seem to be in particular types of danger.

Cooley pointed out that auto manufacturers shifted from complex gauges and dials to a system in which the red light on the dashboard signaled "dan-

ger" to drivers regarding oil pressure, water temperature, etc. Only critical points or *exceptions* were noted. By using a method of identifying *exceptions* to normal conditions, Cooley maintained that a guidance system could significantly increase its efficiency in identifying students who need guidance help.

Cooley visualized a computer-based system that would provide for a systematic examination of several types of data that quickly would uncover a variety of potential problems among large groups of students. He maintained that a computer measurement would allow the early identification of potential problems soon enough to do something about them.

Essential to Cooley's proposal was the development of *dynamic norms* that would convert test scores, grades, and other indices of behavior into predictors. Cooley outlined procedures for periodic follow-up studies of students which would make it possible for schools to forecast subsequent educational or vocational implications based on current behavioral and environmental observations.

In order to establish the validity of key predictor variables in the Covina-Valley guidance system (G.P.A., aptitude test scores, and achievement test scores), it was necessary to complete an intensive follow-up of all the graduates of several successive classes: 1963, 1964, 1965, and 1966.

The results of this follow-up study enabled programmers to identify G.P.A. requirements and course requirements for each of nine postgraduate plans to which students had option. These options included (1) working full time;

(2) enlisting in military service; (3) marriage; (4) attending special schools, e.g., business, trade, or technical; (5) attending junior college; (6) attending junior college with subsequent transfer to four-year college; (7) attending four-year college; (8) undecided about whether to go to work or go to school; (9) no plans at this time.

From these findings, it was possible to write a program for an IBM 1440 computer to monitor the postgraduate plans and course selections projected by each student.

At this point six possible "Alert" conditions were identified:

1. Appropriateness
2. Feasibility
3. Consistency
4. Placement
5. Load
6. Missing Data.

These conditions were actually *exceptions* to the decision-making model outlined for students in the Student Guidelines. The two primary conditions among the six were those of *appropriateness* and *feasibility*. For students who specified that they were following a college preparatory course of study, the computer was programmed to check to see whether or not they were enrolled in a minimum of three academic courses.

For students who specified that they were in one of the remaining six prevocational courses of study (e.g., Business Education), the computer was programmed to check to see whether or not they were enrolled in at least one course within their specified fields. The initial monitoring function of the computer, therefore, was to determine whether or not students had selected

courses that were consistent with the minimum course requirements of the course of study which they indicated that they were following. If the course choices of students were not consistent with the appropriateness criteria specified, the computer indicated an "Alert" condition for the student.

The second primary condition monitored was that of *feasibility*. To check this condition, the computer was programmed to see whether or not the minimum G.P.A. requirements specified for each of the nine postgraduate plans were being met by the student. For example, students specifying direct entry into a four-year college following graduation would be monitored to see whether or not their current G.P.A. was 2.5 or higher. All students intending to enroll directly in a four-year college following their graduation who did not meet a minimum G.P.A. requirement of 2.5 were indicated on an "Alert" listing as failing to meet minimum feasibility requirements.

By checking the exceptions listings for *appropriateness* and *feasibility*, counselors had immediate access to students who either were confused regarding the course requirements of the courses of study which they were following or who were projecting postgraduate plans which their current grade point averages suggested were "high-risk" plans.

In addition to these two conditions, the computer was programmed to check the plans and programs of all students to determine whether or not the courses of study being followed were *consistent* with the postgraduate plans projected. For example, if students were planning enrollment in junior college transfer programs or four-year college programs

after graduation, they would be expected to follow college preparatory courses of study. If these conditions were not met, students would be listed as exceptions to the *consistency* condition.

Since English and Social Science are required courses for all students in the Covina-Valley Unified School District, there naturally are large enrollments in these courses. Students are grouped on the basis of learning rates and past performance in these two subject fields. The more accelerated sections of English and Social Science are considered to be college preparatory, while the slower or remedial sections are not so considered.

The computer was programmed to check to see whether or not students were placed in English and Social Science classes that were consistent with their specified plans and courses of study. For example, if students specified that they were following college preparatory courses of study, they logically were expected to be placed in college preparatory sections of English and Social Science. If they were placed in slower or remedial sections of these subjects, "Alert" conditions were indicated for these students in the area of *placement*.

Two remaining "Alert" conditions were identified. These pertained to the amount of *load* which students logically could carry. *Load* was related to the number of college preparatory electives carried by students. Students following college preparatory courses of study would be considered to be "overloaded" if they attempted more than three academic courses and had G.P.A.'s below 2.5.

The remaining "Alert" condition pertained to *missing data*. In this instance, the computer was programmed to scan the course enrollments of all students to determine whether or not they were enrolled in certain required courses specified for all ninth, tenth, eleventh, and twelfth grade students. These courses were primarily in the fields of English, Social Science, and Physical Education. By oversight, or possibly by design, some students did not enroll in these required courses. The computer also was programmed to check for *double* enrollments in these areas in order to pick up students who might be involved in "repeat" or "makeup" enrollments.

Once the computer program was written and debugged, it was possible for the computer to prepare a complete "Alert" listing for a 2,000 student high school in approximately eleven minutes. Using counselor code numbers, it was possible to provide counselors within the three high schools with listings of all the counselees who had any of the possible six "Alert" conditions. Table 1 shows the number and percentage of "Alert" conditions identified by the computer monitoring program for the 3,831 students enrolled in grades ten, eleven, and twelve in the three high schools of the district. Examination of Table 1 indicates that the greatest concentration of "Alert" conditions existed in the areas of *placement*, *feasibility*, and *appropriateness*.

When counselors examined the "Alert" listings for their counselees, they noted a variety of circumstances leading to the fact that these students had been noted as "exceptions" by the computer. "Alert" conditions in the area

School A (N=1,391); School B (N=1,079);  
School C (N=1,361)

	Grades 10-12	
"Alert" Conditions	N	%
<b>Appropriateness</b>		
School A	292	.21
School B	61	.06
School C	189	.14
Total	542	.14
<b>Feasibility</b>		
School A	372	.27
School B	149	.14
School C	316	.23
Total	837	.22
<b>Consistency</b>		
School A	115	.08
School B	11	.01
School C	32	.02
Total	158	.04
<b>Load</b>		
School A	179	.13
School B	44	.04
School C	106	.08
Total	329	.09
<b>Placement</b>		
School A	419	.30
School B	105	.10
School C	326	.24
Total	850	.22
<b>Missing Data</b>		
School A	65	.05
School B	14	.01
School C	47	.03
Total	126	.03

Table 1. Number and Percentage  
of "Alert" Conditions in  
Grades 10, 11, and 12 (N=3,831)

of *placement* were primarily of two types: college preparatory students who were placed in non-college preparatory sections of English, and students with grade point averages below 2.0 who were placed in college preparatory sections of English and Social Science.

In two of the three high schools,

students were placed in English and Social Science sections upon the recommendation of teachers, based on their past performance in these two subjects. In the third high school, students had the option of electing either college-preparatory or general sections of English, based on their postgraduate plans. In this latter high school, the "Alert" conditions in these areas were limited to 10 percent of the total population. In the other two high schools, 24 percent of the students in one instance and 30 percent of the students in the other instance had "Alert" conditions in *placement*.

The computer monitoring system not only identified students who were not properly placed in terms of their courses of study and postgraduate plans, but also identified problems within the organization of two of the three high schools that required immediate solution. Counselors in the two high schools with heavy concentrations of *placement* problems were able to present the genesis of the *placement* problems to the administration and the faculties of the English and Social Science Departments and to effect necessary adjustments in placement in most instances.

*Feasibility* "Alert" conditions pointed up a critical problem among students whose plans included enrollment at the junior college level. The largest concentration of "Alert" conditions in all three high schools was among students who planned to enter two-year technical-vocational programs at the junior college level. A significant number of these students had grade points below 2.0. Previous follow-up studies of approximately 1,000 graduates entering two-year programs at the junior college

level indicated that students with high school G.P.A.'s below 2.0 had only one chance in four of earning C grades in their first semester at the junior college level. They also entered the junior college on a probationary status.

Students planning to enroll in junior college transfer programs were in almost as critical condition as those planning two-year programs. There were a significant number of students in this group who had grade point averages below 2.0, yet were planning to enroll in programs that would lead to transfer to state colleges where grade point averages of 2.5 were a minimum for eligibility. Counselors in one of the three high schools of the district were particularly concerned regarding the 27 percent of their population who had "Alert" conditions in *feasibility*. This percentage was approximately twice that of one of the other high schools.

Counselors in the school with the highest incidence of *feasibility* "Alert" conditions projected a series of small group meetings with their junior college-bound students to clarify for them the grade-point requirements for junior college entrance and also to explore with them on a continuing basis problems connected with their academic success at high school level. Counselors noted in reviewing the programs of these students that a number of them who projected junior college enrollment were carrying heavy loads. They also noted that a significant number of these students were enrolled in prevocational programs and possibly had alternatives other than junior college enrollment that they might follow with less long-term risk.

Examination of "Alert" conditions

in the area of *appropriateness* indicated that there were approximately an equal number of students who were exceptions in this area because they were attempting to follow college preparatory programs but were not enrolled in a minimum of three academic courses and an equal number of students who were following one of the prevocational courses of study but were not enrolled in courses appropriate to the prevocational areas indicated (e.g., Business Education, Home Economics, Industrial Education, etc.). In one high school, 6 percent of the students were exceptions in the area of *appropriateness*. In the other two high schools, the percentages were 14 percent and 21 percent. Counselors in these latter two schools were concerned regarding the extent to which students had been able to gain clear understandings of the specific requirements of the courses of study which they were following. Counselors scheduled immediate review conferences with these students in order to determine the extent to which "Alert" conditions indicated omissions or confusions.

Although the overall percentage of "Alert" conditions in the area of *load* was 9 percent for the three high schools, there was considerable variation among the percentage of "Alert" conditions in the area of *load* in the three schools. In one school the rate was 4 percent; in another 8 percent; and in the third school 13 percent. Counselors in all three schools were concerned regarding this particular condition. An "Alert" in the area of *load* indicated that students were attempting to carry more academic courses than their grade point averages would suggest.

The largest number of "Alert" con-

ditions, for example, was the result of students with grade point averages below 2.5 or C+, carrying more than three academic courses. Most of these students planned to enroll directly in four-year colleges upon graduation from high school or, at least, to enroll in transfer programs at the junior college level. If their high school grade point averages remained below C+, they would have a more difficult time in securing their enrollment at the collegiate level.

In reviewing specific students in this particular "Alert" category, counselors found that a number had grade point averages below 2.0 and in many instances were attempting to carry four, rather than three, academic courses. With this group in particular, as with students who showed "Alert" conditions in the area of *feasibility*, counselors were particularly concerned regarding test score levels.

Many of the students appearing in these two categories, *feasibility* and *load*, were underachieving in terms of their test scores (upper quartile) but seemed to be maintaining their high level of educational aspiration without any realistic output in terms of academic effort. Counselors identified these students as the "hard core" of their counseling loads and as students with the most critical need for counseling services. Many of these students had had only marginal contact with the counseling office, but some had been "steady customers," though with little return on the counseling they had received.

A number of the "Alert" conditions identified in the two remaining areas of *consistency* and *missing data* were found to be the result of omissions, oversights,

and errors connected with the programming function. Counselors set up procedures in which the clerical staff checked students with "Alert" conditions in these categories. In most instances, corrections or modifications in these categories did not involve detailed or extended counseling sessions. For those students among the 3 percent who appeared on *missing* "Alert" listings because they needed particular required courses to meet graduation requirements, their identification by the computer monitoring program was much to their advantage.

The guidance system has provided and will continue to provide the administrative and instructional staffs of the district with extensive information regarding student populations, their plans, their performance histories, and their aptitude and achievement test scores. As these data become part of the information system and the general intelligence of the administration and the instructional leadership of the schools, instructional opportunities for the total range of students will be improved. In the past three years, courses in data processing, auto mechanics, hospital attendant, as well as advanced placement courses in the academic areas, have been added to the curriculum.

There have been glimmers of success from efforts to develop a computer monitoring program that will eliminate the hours and hours of counselor time involved in the review of student plans and programs. Hopefully, counselors visualize a day in the not-too-distant future when the bulk of counselor time will be devoted to professional counseling efforts to help students to consider career alternatives, to explore the criti-

cal choice-points in decision making, and to develop a better understanding of their own values and directions.

When this day comes, perhaps the computer will be handling the bulk of the clerical activities that now enmesh counselors. On that happy day, counselors may even be able to say, "We spend most of our time counseling."

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