

COMPUTER-ASSISTED CURRICULUM
MANAGEMENT SUPPORT SYSTEM

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John Llewellyn Bristol
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This is to certify that the
thesis entitled

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MANAGEMENT SUPPORT SYSTEM

presented by

John Llewellyn Bristol

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ABSTRACT

COMPUTER-ASSISTED CURRICULUM MANAGEMENT SUPPORT SYSTEM

by

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Problem

Laws require that a high school education should be available to all students. In some states, legislation requires this education regardless of the ability or handicap of the child.

In order to fulfill this requirement, comprehensive public high schools offer courses for a variety of student ability levels and interests. These courses are offered in an attempt to meet the needs of the students, and to help them develop to their maximum and to become useful adults in society.

By offering many courses and through individualized student counseling, the high schools attempt to help students select those courses most appropriate to their needs. Little is done, however, in using the objective data typically available in most high schools in an effort to make the curriculum responsive to the needs of students.

Description of Study

The purpose of this study was to develop a system that would allow the curriculum to respond as a variable to the needs of students. To achieve this, curriculum assessment and problem sensing elements were designed to help curriculum specialists manage the instructional program.

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The system identifies the objective data available in schools and shows how it can be processed to produce useful information to the curriculum planner. Information about how well students succeed in courses, what teachers are best able to provide successful learning experiences for students of given characteristics, and how teacher grading practices compare to other teachers and administrative expectations are provided. The potential of the system is then demonstrated by processing data through the computer and analyzing the output.

Findings

A system has been developed to process objective data typically available in high schools to assist curriculum specialists in their evaluation and management function. Through the use of computers, the system provides rapid retrieval and processing of data to the user. CACMSS, using objective data, provides information pertinent to the following questions:

1. What courses best serve the needs of students?
2. What teachers best serve the needs of students?
3. How well do courses serve the students for whom they were designed?
4. How well are students served by a given course?
5. What students are best served by a given course?
6. How does a teachers grading practice compare to other teachers and administrative expectations?

COMPUTER-ASSISTED CURRICULUM
MANAGEMENT SUPPORT SYSTEM

By

John Llewellyn Bristol

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Chapter I

Purpose and Design of the Study

Americans place great importance on education. Gardner (1960) explains this interest when he wrote, "Education is important in any modern society. But a society such as ours, dedicated to the worth of the individual, committed to the nurture of free, rational and responsible men and women, has special reasons for valuing education. Our deepest concerns impel us to foster individual fulfillment. We wish each one to achieve the promise that is in him (P. 81)."

Comprehensive High Schools and Data Processing

State laws have mandated free education for all, and local high schools have responded by developing a variety of programs to achieve that goal. Both the state and local schools are responsible for America's system of public education today and they continue to be a viable force in expanding educational opportunities. "By legislation, the citizens of the United States have made universal education available to all youth through the high school years, and in many states they have made attendance compulsory to eighteen years of age (Wiles and Patterson, 1959, P. 2)."

The State of Illinois only recently approved legislation that requires all communities to provide free junior college education to all interested students, either by operating a local junior college, or paying the tuition of all members of the community who choose to take courses

in any state supported junior college in Illinois. Other legislation requires the public schools to provide education to handicapped students until they reach the age of 21 (Illinois Journal of Education, 1968).

Comprehensive High Schools

"The comprehensive high school has become the typical secondary school (Alexander, 1967, P. 46)" in the United States. These schools provide learning opportunities for all normal adolescents, ranging from the barely educable to the gifted. "Its purpose is to enable each pupil (a) to develop to his greatest potential for his own success and happiness and (b) to make a maximum contribution to the American society of which he is a part (Gilchrist, 1962)."

Large numbers of courses are offered in the comprehensive high school designed to serve the variety of needs represented in its student body. One such high school district in the Chicago suburban area offers over 150 different courses, many of which are presented on three different ability levels, to the 8,000 students served by the district.

Gilchrist (1962) also states that "individualized education is a characteristic of the comprehensive high school (P.32), " and strong guidance programs assist students in their decisions about goals, abilities, and program development. In comprehensive high schools in the Chicago suburban area, it is common to have student counselor ratios of less than 300 to 1, in addition to specialized psychological services for students with unique psychological or social needs.

Computerized Data Processing

Computers are capable of performing the recordkeeping functions which have seriously limited counselors in providing full service. Wrenn (1962) states that from two-thirds to three-fourths of a counselor's time should be spent in counseling students and consulting with teachers, administrators, and parents. That counselors spend time doing other tasks was told by Gold (1962), who indicated that 46 per cent of his time was spent on clerical activities. He states that "A counselor must find the means of reducing his extraneous activities if his training is to be utilized to the optimum degree (pp. 68-70)." Computers now are being used to maximize utilization of the professional skills of trained counselors. To perform this function, computers are being programmed to process student data, making a variety of information on students easily and rapidly accessible.

Among the processes now performed by computers in many high schools throughout the country are the following:

1. Student scheduling
2. Attendance accounting
3. Report card printing
4. Cumulative records
5. Management reporting
 - 1) Failure lists
 - 2) Attendance summaries
 - 3) Grade distributions
6. Test correction and evaluation.

Retrieval of any information previously filed, such as grades, test scores, and course schedules can be an instantaneous procedure. An example of the kind of data available through an information retrieval system is shown in the funding application of the Integrated Educational Information System (IEIS) of Southeastern Michigan (See Appendix A). As listed in the IEIS system, major classifications of data include:

1. Pupil personnel
2. Computer enriched curriculum
3. Financial management
4. Staff personnel
5. Facilities and equipment.

With a system like IEIS, educators can retrieve quickly and easily the data available in the system pertinent to their particular needs. They can also efficiently produce the kind of reports typically developed and distributed by school systems, such as grade reporting, permanent records, and financial reports. A counselor's use of a computer system is explained in the CVIS report (1967), describing a pilot project at Willowbrook High School, a secondary school in West suburban Chicago (See Appendix B). In this application, student records can be recalled and projected onto a cathode ray tube (TV-type screen), including grades, test scores, attendance records, and personal data. Space available in the school's courses can also be recalled. The following six major areas of information are available in Willowbrook's system:

1. Recall of student records

2. Vocational information
3. Educational information
4. Decisions of counselees
5. Daily messages
6. Student programs.

Relating Data to Curricular Planning

A representative model of a system for approving new or modified courses, hereafter called a course approval system (See Appendix C) illustrates that when a proposal is written, it must be approved by the department involved, the high school's department chairmen, the principal, a district curriculum committee consisting of teachers, union representatives and administrators, then the district superintendent, and finally, the board of education.

A teacher in business education following this process will fill out a proposal form (see Appendix D) for a vocational typing course to submit for approval. Included in the proposal form is a brief description of the proposal, including objectives of the course, what is currently available in the curriculum relating to the idea, the need for such a course, the schedule required for implementation, the cost required to implement the course, and finally, how the proposal will be evaluated. After sufficient explanation, the course may be approved by the board of education.

At this point, the school makes the course available to the students to elect as they need. Pupil personnel specialists, when plan-

ning courses with students, will think of and describe this course (using the teacher's description contained in the proposal) as one in which non-college bound students can profit and succeed using the normal criteria of grading as the standard for such success. Curriculum administrators, when reviewing the course offerings available to non-college bound or vocationally oriented students, will include this course as one offered by the school for this type of student.

The reason for the acceptance, existence, and use of a course is generally based on the initial defined purpose for the course. Other than isolated information, little feedback relative to whom the course is serving and to what degree the course is serving the students for whom it was designed is available.

Need

Students as well as professionals are beginning to voice their dissatisfaction with the way courses and content are being presented. A student is quoted as saying, "The main thing that's taught us in school is how to be good niggers, obey rules, dress in our uniforms, play the game, and NO, Don't be UPPITY! Oh, we're trained in 'democratic process' -- we have our student governments -- they can legislate about basketball games and other such meaningful topics. Don't mention the curriculum -- they'll tell us what to learn. Oh, we can express our complaints in the school newspaper -- but the principal says what gets printed and don't embarrass the school's reputation. Not only are we forced to attend school in the first place, we have to carry I.D. cards

at all times, walk on the right side of the hall, and if the teacher doesn't want us to, we can't even take a ____ (Pileggi, 1969, p. 561)!" Muirhead, while U.S. Deputy Commissioner of Education, stated, "... students want -- and I think they ought to have -- participation in helping to improve the curriculum (Today's Education, 1969, p. 26)."

The curriculum should not only be responding to comments like these, but a system that continually evaluates the information already available in the school should also be in operation to determine the degree to which the curriculum is serving the needs of all students and to make this information known to those concerned with design, coordination, and evaluation of curriculum.

The following four major dimensions should be considered when curriculum is being developed and evaluated:

1. Breadth of course content to meet the diverse needs and interests of students
2. Variety of levels of instruction to insure appropriate learning experiences for students in the curriculum
3. Accommodation to fitting within the fiscal constraints of the district
4. Accommodation to the constraints of faculty and staff abilities.

Programs related to counseling and computer implementation represent an effort on the part of schools to help students utilize and adjust to the curriculum. They represent little in effort to change

curriculum to meet the needs of the students. If provided with the ability to recall data rapidly about students and course openings, counselors can better help students make decisions. In these systems the curriculum is generally conceived as constant and the students as the variable. Consequently, much help is given to those working with students, so the best possible decision can be made considering the curriculum offerings as they exist. Test scores and past academic performance are used by counselors and administrators in placing students into existing courses and ability levels. Students having difficulty with one course are encouraged to take another course to find success. Little attention has been given to the improvement of curricular design and of related counseling services that could follow from additional uses of data already on file. Additional uses are possible through high-speed information processing.

Information generally available in computer information retrieval systems remains virtually untapped in assessing the degree to which the curriculum is serving student needs. Unfortunately, the curriculum and the needs of students tend to coexist rather than dynamically interacting with one another.

To clarify the meaning of certain key words used in this paper, the following definitions should be understood:

1. Student needs

Student needs refers to the concern of schools to provide students with course content that will be of concern or interest to students. This content should

be taught at a level appropriate to the ability of the student so that he can succeed in the course.

2. Success

Success is satisfactory performance in terms of criteria held by the teacher and the student. This thesis assumes that it is represented by the grades received in courses.

3. Curriculum

Curriculum is the school's array of course offerings and their presentation by teachers through varied instructional methods.

4. Curricular management

Three basic elements comprise curricular management. First, decisions must be made concerning the courses to be offered along with teacher and student assignment to them. The second is working with teachers to help them improve their effectiveness, and finally, the decisions concerning the manner in which courses are taught.

Proposed System

The system being proposed is designed to provide data already in computer files to help individuals who design and evaluate curriculum. While the system provides important information to curriculum planners, it should be considered only as another source of information rather than a total system for curriculum assessment. Curriculum planners will be able to receive two kinds of information:

1. Grade distributions showing the degree to which courses and teachers are serving the needs of students (as evidenced in choices made by students and in terms of their successes in chosen courses).
2. Comparison of grade distribution showing where differences exceed user-determined tolerances.

Three assumptions relative to the proposed system are necessary:

1. Curriculum

Instructional experiences should be designed and offered to provide meaningful learning experiences for all students, regardless of their levels of ability or degrees of handicap in preparing them for a useful role in society.

2. Data Relating to Curricular Decisions

Much data currently available in the school would be useful to those individuals who are in a position to evaluate and develop curriculum. Such data include test scores, academic grades, and course objectives.

3. Data Relating to Individual Student Decisions

Much data already available in the school, if properly evaluated, would be useful to students in making decisions related to the election of courses appropriate to their needs.

Evaluation Techniques

Other fields have used various techniques to assess the value of

a particular idea or item in view of accomplishing specific goals. In market research, for example, segments of the public are sampled to determine the feasibility and potential of a particular product. Products are then offered for sale with specific goals in mind or not offered at all. In addition, products currently marketed are constantly evaluated to determine further markets as well as to assess trends.

System Design

The communication model shown in Figure 1 will be used by the Computer-Assisted Curriculum Management Support System (CACMSS). Using this model, a flexible, computer-based curriculum management support system will be developed capable of assisting school curriculum specialists (one who designs, coordinates, and evaluates curriculum) in their management and evaluation role. Data flows from the faculty, administration, and board of education directly into the data base, and information flows from the data base through the CACMSS to the users as requested. In providing this assistance, information related to students, teachers, administrative expectations, research, and course objectives will be integrated in such a way that the effectiveness of the courses in meeting student needs can be assessed. Trends related to the many variables will be mechanically evaluated, and identification of significant changes will be noted.

The flow of data through the system is shown in Figure 2. Data about students, faculty, and administrative expectations is stored in a data base, and reports for students, faculty, and the administration is produced by CACMSS.

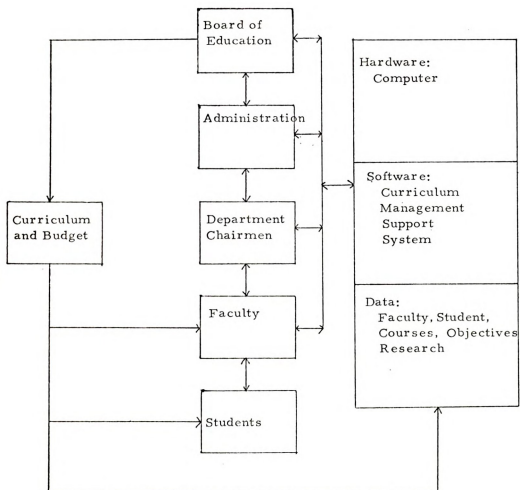


Figure 1. Curriculum Management Support System; communication model showing flow of information.

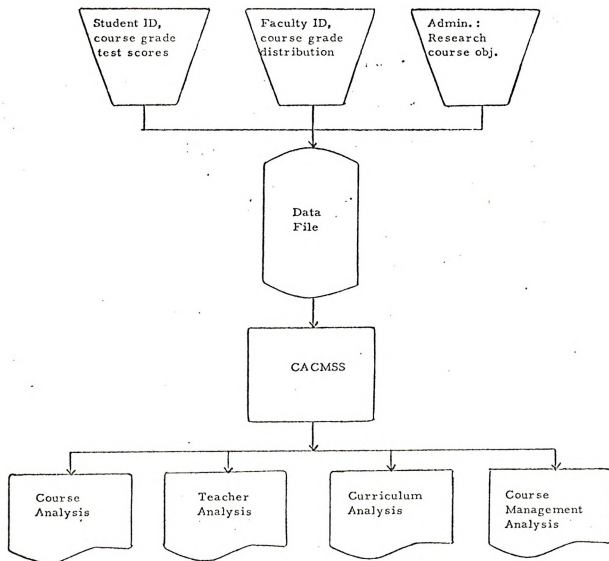


Figure 2. Computer Assisted Curriculum Management Support System: flow of data through system.

In this study, a computer-based information system will be developed to provide curriculum specialists with information currently available in the typical school but not easily accessible or formatted in a useful manner. The kinds of information available include:

1. Data on students, including courses elected, standardized test scores, grade point averages, and grades received;
2. Data on teachers, including courses taught, students taught, and grades issued; and
3. Administrative data, including course offerings, past grade distributions, expected grade distributions, and research predicted grade distributions.

Summary

Secondary schools are charged with a significant task that can be accomplished only by effectively using available resources. Information routinely filed within administrative functions of the school is one such resource which must be effectively used.

Despite the introduction of computers into the educational environment, little if any relationship between school data and decisions being made by curriculum specialists has been established. As a result, the effectiveness of the instructional experiences in serving student needs is virtually unknown and techniques remain unidentified.

Little is being done in the school to make curriculum responsive to the needs of students. Instead, the curriculum is viewed as a constant, with students being the variables. Data bases are a detached third

factor with little if any influence on the other two.

The purpose of this study is to design a computer system that can be used to assess the degree to which the students are being successfully served by the curriculum and to monitor trends to identify situations that need the attention of curriculum specialists.

Plan for Dissertation

In Chapter II the areas of computer innovation most related to effective use of information in education will be reviewed. The Computer Assisted Curriculum Management Support System, designed to provide pertinent information to curriculum specialists from stored data, is described in Chapter III. In Chapter IV, the input and output capabilities of CACMSS will be shown, along with a demonstration of how the output can be useful to curriculum specialists. The final Chapter (V) will discuss proposed computer configurations and applications in the secondary school.

Chapter II

Basis in Other Development and Research Studies

Today's technical era requires that words be used carefully and appropriately to insure clear communication. In an area like computer technology, it is even more important that words be used precisely and accurately. Persons who are only generally familiar with a subject too often use words inaccurately to describe activities and functions related to the subject.

This problem is most evident in the field of data processing. "Computer," for example, is often used in reference to any data processing machine which utilizes punched cards as input. Similarly, "IBM" is used sometimes to mean data processing cards, a computer, or when modifying "card" to mean punched card.

Two uses of the computer in education which have had considerable recognition are computer assisted instruction (CAI) and computer managed instruction (CMI).

Computer Assisted Instruction

CAI, as conceptualized by Norman Bell (1968), contains four modes of operation:

1. Tutorial

In this mode, materials are prepared and sequenced for students to follow and are programmed into the computer using a language such as Coursewriter. Students receive the materials to be learned from the terminal and give their responses to questions using the terminal.

If the student answers correctly, he is given another problem or concept. If he gives the wrong answer, he will be asked to respond again, given a new but similar problem, or branched back to earlier material that supposedly taught the concept to him.

The student who has no control of the sequence he must follow is taken at the computer's rate through the material. This mode is commonly known as "drill and practice."

2. Inquiry

Although similar to the one described above, the inquiry mode gives the student some control of the instructional process. Materials are prepared as indicated above, but the student is given two options:

- A. Control the amount of drill they wish on a particular concept.
- B. Control the sequence of instruction in such a way that if he feels the need to review the instructional phase related to a particular concept more than once, he may do so. In addition, should he at any time want to refer to the instructional phase, he has the option to do so.

3. Simulation

Simulation involves programming the computer to enable students to discover what would happen if variables are manipulated. One illustration of this is the program in a



personal loan situation. The student sets the amount, time, and interest rate, and the computer will indicate the amount of interest that would be paid under those conditions. The student can then alter the variables to see what happens under differing circumstances.

4. Problem Solving

Problem solving differs from those above in that the student must write his own program (algorithm) to solve a particular problem. The computer becomes the student's tool in solving problems of interest or concern to him such as solving a particularly complex algebraic problem. The student may also write a simulation program applicable to studying some concept in which he has particular interest.

Another use of the computer in instruction is teaching students how to operate data processing equipment. In this application, the computer is the object of instruction. Students using the computer as the object of instruction are taught how to turn it on, where and in what sequence to place the input data, and how to operate the processing and output equipment. Students learn not only how to program the computer, but also how to operate the computer using programs already developed.

Computer Managed Instruction

CMI has two major applications:

1. Managing Individual Learning Activities

When the computer is used to manage individual learning

activities, information about the student's learning patterns and instructional options available are fed into it. Based on this information, the computer programs the student through the learning experiences most related to their interests and needs. As the student progresses, test scores are added to the data file, and updated programs for the students based on the new data are created. CMI differs from the CAI tutorial mode in the area of instructional materials. In CAI the material is programmed into the computer while in the management mode, external (traditional) learning materials, such as books, films, etc. are used by the student. The computer programs the use of these materials for each student based on his past knowledge and future goals. Thus, the instructional materials are identified by the computer; they are not provided directly to the student through the computer.

2. The curriculum management application provides curriculum managers with the type of information they need in making decisions relative to course development. Included in the type of material available to them is information related to students, teachers, facilities, materials, and financial resources.

Computer Managed Instruction Projects

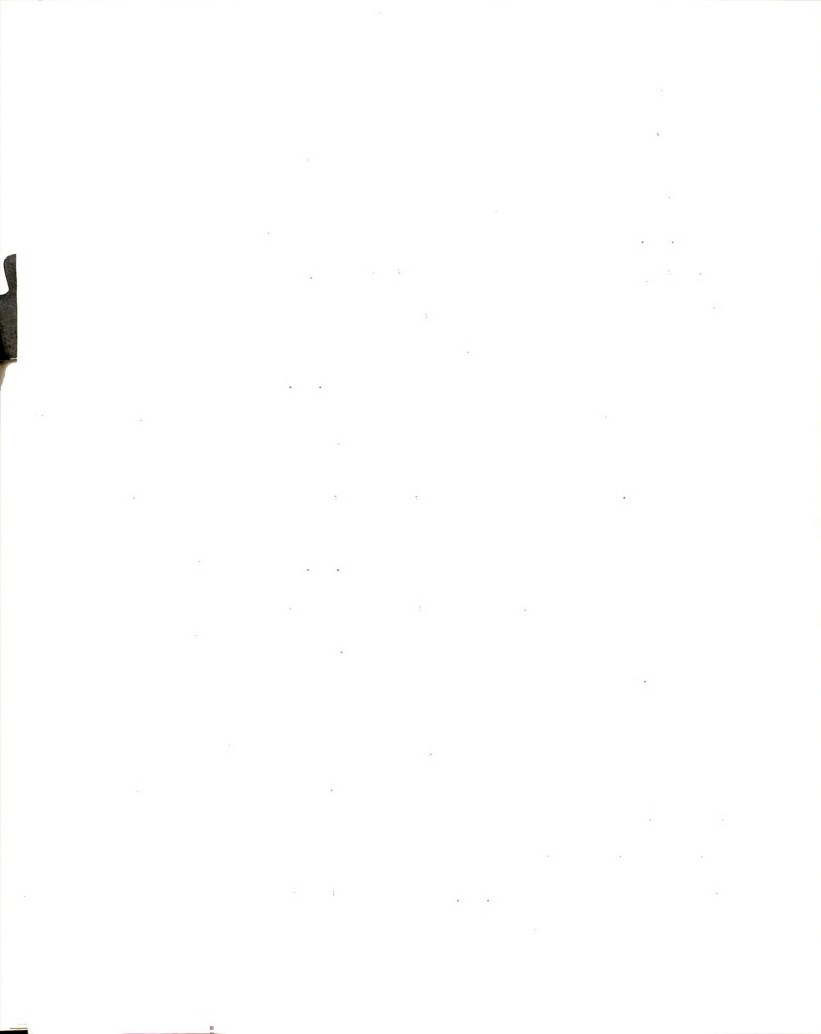
Descriptions of computer managed instruction projects which relate to the proposed system follow:

Instruction Prescription System: A System
for Individualized Learning (Moncreiff &
Swanson, 1968)

"One of the most significant changes occurring in the American Education System is the increased emphasis on individualized instruction (p. 1)." Many techniques are being explored to achieve this individualization, including computer assisted instruction. Although this technique is useful for many applications, "Computer Assisted Instructional materials are almost nonexistent and hardware costs currently prohibit mass acceptance of conversational applications (p. 1)."

A solution to the problem that Moncreiff and Swanson cite may be found in a non-conversational computer application called instruction management. This is when "teachers, students, instructional materials, and computers interact in such a way that both the participants and the available resources function more efficiently (p. 1)." By analyzing information about students, curriculum, and resources, these systems can prescribe for individual students or groups the appropriate learning situations.

The instructional management system is designed mainly to support independent study programs. It is capable of recording and analyzing large amounts of data for each student. Based on the analysis, it prescribes learning that enables the student to learn "as fast as he can while satisfying learning and retention criteria established by instructional material developers (p. 2)." The system's ability to give regular and remedial prescriptions relieves the teacher of this role in teaching

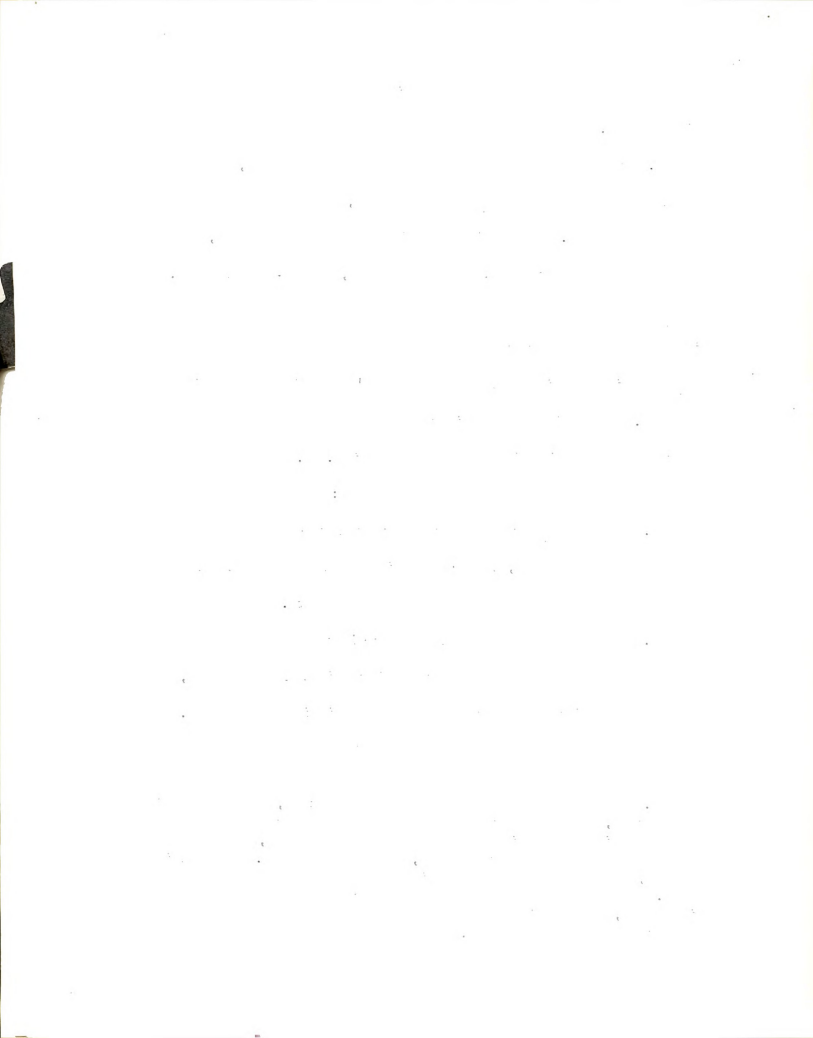


and allows the teacher to spend more time working with the students on their projects. It also provides the student with specific help when he needs it. Since "over-isolation" of the student is possible, the system schedules group lectures and other activities, such as student conferences and group projects. To provide experiences for fast learners, the system can give extra prescriptions, group seminars, and other activities. The instructional management system relates the structure of the material being taught to relevant student characteristics by processing student and curriculum information so that each student's learning opportunity is maximum. "Learning opportunity is the amount of time a student spends attending to appropriate instructional stimuli (p. 3)."

Targets set by system planners include:

1. Where materials used in the instructional process change less than 20%, the system will produce 200% of the former total learning opportunity for all students.
2. Where the materials used in the instructional process change 80% (at 2 times the existing instructional cost), the learning opportunity for the class will increase 1000%.¹

1. These statements were made by the author, and may be difficult to understand, I interpret them to mean that normally a school changes their instructional materials at the rate of 20% per year, which means a textbook would be used for five years, and then replaced. Under this structure, a 200% learning opportunity could be created by use of their system. If a school could change 80% of its instructional material during a given year, a 1000% increase of learning opportunity could be realized through the use of their system.



The system involves five basic operations:

1. Pretesting

This test determines student readiness for the new learning situation. The student's test performance will be evaluated against entry criteria, and his prescription will be based on the finding.

2. Prescription of Educational Objectives

When a student registers for a learning situation, his pre-test is evaluated, and he is given a prescription varying in depth and sophistication based on the test evaluation.

3. Post-testing

This test measures the degree to which the objectives of the learning program have been achieved by the student.

4. Assignment of Prerequisite Prescriptions

After analyzing the student's pretest score, a prerequisite is prescribed as needed, and that portion of the post-test relating to the prescription determines achievement after completion of the prescription. If the student passes the post-test, no further testing is needed before the student proceeds with the next prescription. If students after several tries do not pass the test on the prescriptive material, the teacher is called. The teacher decides at this time what should be done.

5. Assignment of Remedial Prescription

When the student does not show sufficient achievement on the post-test, material designed to meet this need is prescribed. A post-test is then given to determine the achievement.

A feature of this system is that it can provide the learner with a catalog of learning programs and prescriptions. From them, the student can select the experiences he desires.

A flowchart of the Instruction Prescription System is shown in Appendix E.

Curriculum Management by Computer:
An Aspect of Computer Managed Instruction
(Vinsonhaler et al., 1968)

The system described by Vinsonhaler applies CMI to college curriculum improvement. It integrates curriculum analysis to provide the "communication essential to continually adapt the curriculum to changing student and faculty needs (p. 1)."

The word management refers to decisions designed to accomplish the following:

1. To maximize educational goals (to enhance the probability that students will select courses they are interested in)
2. To lower educational costs
3. To reduce faculty turnover rate
4. To attract more effective students.

To achieve this, curriculum decision makers need information gathered directly from the people involved, unfiltered through other people or committees. A curriculum management system "should be a means for continually refining and adapting the curriculum to achieve specified objectives (p. 3)." Emphasis in the system is placed on availability of information and open communication channels to all concerned.

A communications model for curriculum management is based on the following:

1. The academic community is a restricted communication system with a common language.
2. The main elements of communication are descriptions of educational objectives.
3. The major objective of curriculum management is to maximize the educational satisfaction by helping community members (faculty, administrators, and students) achieve their educational objectives.

A traditional communications model applicable to curriculum management is developed (Appendix F). This model shows the linear relationships that occur, with the student at the bottom of the figure and between him and the dean, various levels including teachers, department curriculum planning committees, department chairmen, and the college curriculum planning committee. Since communication occurs primarily between personnel at different levels, for instance, between the students and the dean, it is often subject to distortion and loss.

Specifically, two problems are noted:

1. Message Reliability

Message reliability refers to the problem of the message not reaching its intended receiver. Assuming a message has a 50% chance of transmission, a student has a 50% chance of having his message reach his instructor. If the message must go through the instructor to another person, the chance of getting there is $.50 \times .50$, or, $.25$, since it must go through the instructor. The solution to this problem is to provide multiple/direct channels of communication.

2. Message validity

The problem referred to here is the effect a message has on the receiver. Validity is determined by the extent that the receiver understands the objective of the sender. The solution to the message validity problem is to provide a standardized language for messages.

A theoretical model for automated curriculum management is designed in this study (Appendix G). Through this system, the major problems are resolved insofar as the information file is accessible to all members of the community and a standard language is used in the data file. The system has three components:

1. Hardware (computer facility)
2. Software (computer programs for information retrieval and file maintenance)

3. Data (information relevant to curriculum decisions).

An application of this system was "UDEANS: The University Deans' Information System (p. 11), " a program in the School of Social Work at the College of Social Science at Michigan State University.

To implement the system, a standard method of stating educational objectives was studied, with students, faculty, and administrators compiling the list of objectives. Faculty and students then scored themselves on a 5 point "interested/not interested" scale for all listed objectives. The list consisted of subject areas, attitudes, and professional skills.

A flowchart showing how the system operates is in Appendix H. Input to the system contains data records for students, faculty, and courses. Each of these records must contain identification and the UDEANS profile of educational objectives. Other data, such as salaries and course costs can also be placed into the file.

Data records¹ for students, faculty, and courses contain an abstract (record) number, name and identification of person or course, and the interest relevancy on the following:

1. Juvenile Delinquency
2. Family Services
3. Day Care Centers
4. Adoption
5. Child Welfare

1. See Appendix I.

6. Teaching Emotionally Disturbed Children
7. Mental Health
8. Child Clinic
9. Work with Adolescents
10. Work with Blind, Handicapped.

The UDEANS system creates reports for students, teachers, and administrators.

1. For students

A personalized catalog of courses and a directory of faculty members listed in order of their similarity to the students interest profile.

2. For instructors

A personalized catalog of courses and a directory of students in order of their interest similarity to that of the teachers.

In addition, a special summary of group interests can be generated, for instance, for a class of students scheduled in his course.

3. For administrators

- A. Instructor Placement Analysis

By placing courses to be taught into the system, a report for each course can be generated identifying faculty in order of similarity of interest.

- B. Curriculum Review Analysis

Educational interest profiles (scattergrams) can be

generated for students, faculty, and courses. These reports show the interests of the users and the producers of education, as well as the specific interests being addressed in the curriculum being offered.

C. Program Planning and Budgeting

A report showing the available courses related to a given objective, as well as the faculty members interested in them. If it were available in the record, a dollar extension could also be shown.

D. Course Enrollment Predictions

The system can generate a report showing the number of students who have indicated they plan to take a course but as yet have not taken it. From the group so identified, an abstract for each student can be generated, showing student name, level in school, and courses planned. Using this data, the demand for particular courses for a given year can be estimated with a higher degree of accuracy than is currently the case.

Conceptualization of PPBS and Data-Based Educational Planning (Eidell & Nagel, 1970)

This project initially builds on the black box model of organization. Although input and output are described in this model, how the input is used in process is unknown. Thus the title black box. By incorporating time into this model, an administrator may increase the input (spend

more dollars) for a given program, and then in time check to see if the output changed, with no regard for how the process was altered through increasing the input. A final modification was then made which opened the black box, and the process as well as the input and output was known.

A systems model for decision making was introduced as described by Brissey, Fosmire, and Hill (p. 8). In this model, two types of data are identified:

1. Designative

Information about the actual situation

2. Appraisive

Information about the desired situation.

Using the model, a comparison is made between the two types of data, designative and appraisive, and discrepancies are identified. Finally, based on the identified discrepancies, a prescription for reducing the discrepancies is described.

Using the above concepts, a system is developed for data-based planning (Appendix J). The model shows three key parameters, designative and appraisive information, and planning. Using these three parameters for input, process, and output, a planning process evolves. Actual input is compared to desired input, and detection of discrepancies and prescriptions is generated. The same is done for the process and output categories. By placing the actual and desired information for the three areas into a data base, feedback can be generated to the planner to aid in his planning activity.

Summary

In summary, CAI refers to programs in which the computer is used in the instructional process, while CMI refers to the use of the computer in evaluating and prescribing instruction.

Two of the three CMI projects described in this chapter deal with the placement of students into appropriate instructional situations. In one, students are tested and placed according to their performance in the instructional module most appropriate for their needs. In the other, the interests of students are matched with those of the faculty and the objectives of courses, with students being apprised of those instructional situations most appropriate to their interests.

The third project was the development of a model to compare the difference between the actual and optimum levels of the three elements of any instructional program: input, processing, and output.

Chapter III

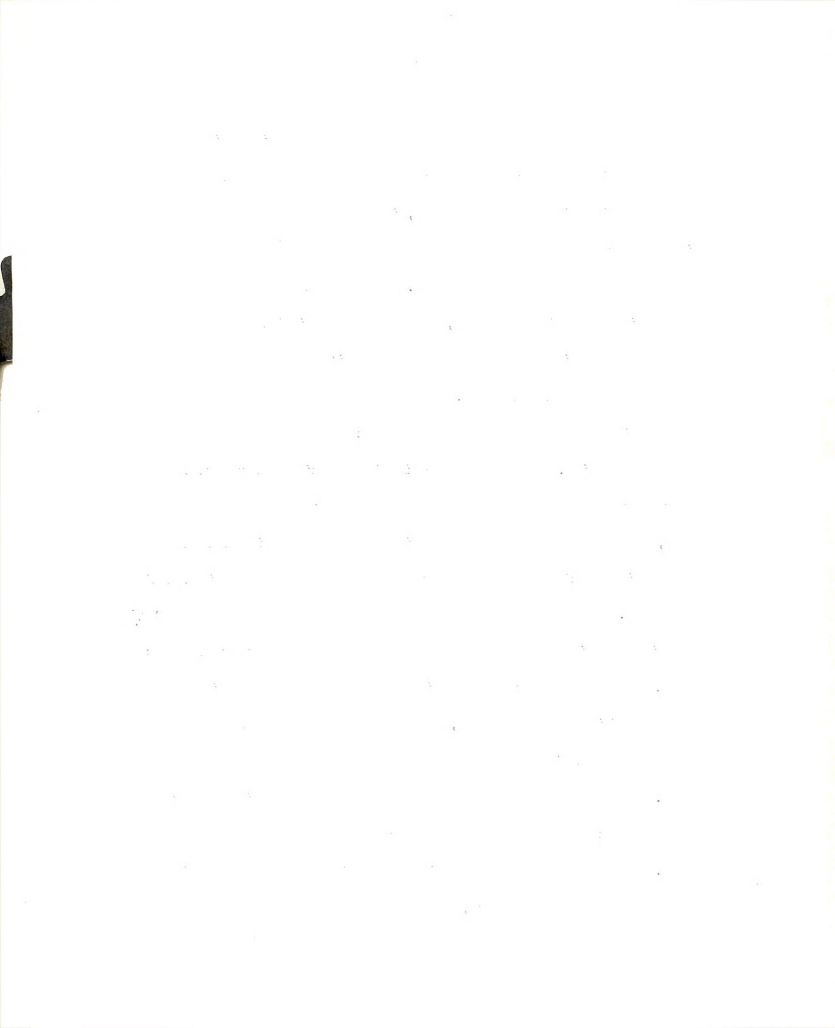
Concept and Design of the System

If it is true that the curriculum in public schools is designed and offered to provide a meaningful learning experience for all students regardless of their abilities or handicaps, it is also true that for this to be possible to any degree a system is necessary to help determine how well the needs of the students are being met. Because students have different levels of ability and diverse needs, curriculum specialists need to know how students are being challenged and how curricular offerings in their school are meeting student needs.

Two important elements of such a system are curriculum analysis and problem sensing. They would provide information relative to the degree to which teachers and courses are serving the varied needs of students, and a management system which would provide identification of potential instructional problems arising during the period of instruction (school year).

Five questions need to be answered relative to the first element:

1. What courses in the curriculum serve students of given abilities and interests, and how successful are the students in the courses?
2. Are some teachers better able to provide learning experiences to students of given characteristics than other teachers?
3. How well do courses designed for given student populations serve those students, as well as other students taking the courses?



4. To what degree are the needs of all students in the school being met?
5. What students are best served by a given course?

The second element, management of the instructional program, should provide an efficient system for identification of potential problems in the curriculum that may be arising during the school year. The following four questions should be answered by the system:

1. Have the grades of students in a course changed substantially from a previous marking period?
2. Are the grades given by a particular teacher in a course substantially different from those given by other teachers of the same course?
3. Are the grade distributions in a particular course substantially different from those of the department in which the course is given (e.g., English, science, etc.)?
4. Does the course grade distribution substantially differ from the grade expectations of administrators and supervisors?

Much objective data on students' abilities and needs currently exist in schools, and if made available in a useful and timely manner, it would be helpful to evaluating their school curriculum. Through the use of CACMSS (Computer-Assisted Curriculum Management Support System), currently available data can be rapidly processed to provide information

relevant to the above questions.

Communications Model

Managers of the school curriculum need to establish a communication model allowing all of the major factors and participants in the educational community to communicate or interact with one another in a meaningful way. Major factors such as data records on students and faculty, course objectives, along with actual outputs and financial resources must be available in a useful form to teachers, administrators and school board members. The proposed communication model used in this study (Figure 3) is a revised version of the model developed by Vinsonhaler for college curriculum management (Vinsonhaler et al., 1969).

The proposed model offers a number of unique facilities to the high school board of education and professional staff. First, the information files become accessible to faculty and staff. This feature allows discussions to be held with all professional participants available to the data being used. Another feature is the potential for interaction between the various people and data in the system. The final dimension is the provision available to all users of not only finding specific data located in the files, but also ordering the data in a sequence which will provide meaningful information to them.

The implementation of this communication model is possible through the use of a computer system, which consists of three major components:

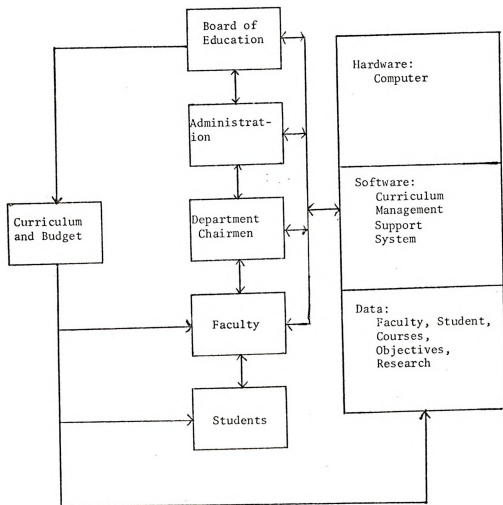


Figure 3. Curriculum Management Support System: communications model showing flow of information.

1. Hardware

The system is designed to utilize a computer to perform the required search, sequencing and data processing functions of the system. The computer used in this study was a 16 K IBM 1401.

2. Software

This component (CACMSS) consists of programs written in autocoder which make the processing of the data by the computer possible.

3. Data

Included in the data file is information about students, faculty, and administratively determined expectancies.

Design of the System

CACMSS has three major components: input, processing, and output. They are discussed separately. The flow of data through the system is shown in Figure 4. Data concerning students, teachers, and administrative expectancies are contained in a data base. Requests for information are processed through CACMSS, and the needed reports are generated for the requesting faculty member or administrator.

Input

Input into the system includes student information typically available in most high schools: student identification number, standardized test scores, past academic experience and grades, and identification and grades for courses currently being taken by the students. Input information about

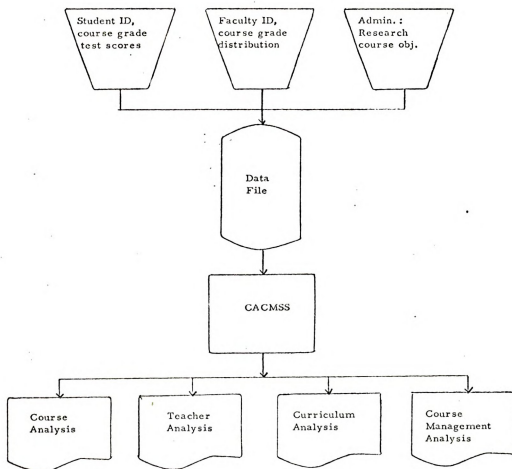


Figure 4. Computer Assisted Curriculum Management Support System: flow of data through system.

faculty includes their identification, courses taught, and grades given to students.

Administrative input includes grade distribution expectancies, which may be derived individually or through research, course objectives in terms of students being served, and past teacher, course, and departmental grade distributions.

Processing

The processing component is a group of computer programs which allow input into the system to be efficiently and flexibly processed into user-desired outputs. Student abilities and grades received are used as the basis for comparison and evaluation. Grades are understood by students to indicate how well they have learned the contents of a course. It follows that one way to evaluate the curriculum is to study student success using the grades students receive.

By mechanically comparing actual course grade distributions with those given previously, by other teachers in the same course, by the department as a whole, and with those determined by administrative and supervisory expectations, areas of substantial deviation can be efficiently located. After such identification, studies can be made to determine causes and develop recommended changes.

Output

Two general types of outputs are available through the use of the system: curriculum analysis and problem sensing.

Curriculum Analysis. This option allows the user to group students by their standardized test percentile scores, intelligence test scores, and grade point averages, and to receive grade distributions for each group. Four types of reports can be generated by using the curriculum analysis option:

1. Course analysis

Reports are generated to show how many and what groups of students are served by a given course, and the degree of success the students experienced. In doing this, the students are grouped by their grade point average, I.Q. score, or achievement test percentile scores, and grade distributions showing the number and percentage of students receiving each grade. (Figure 5 shows the system flowchart for this option).

2. Instructional analysis

Through the use of this option, an analysis can be made not only of how well a course may be serving the needs of various groups of students, but also how well teachers of these courses are serving student needs. Not only then does the system order students by course and student characteristics, but also within each student group by the teacher teaching the course. Grade distributions for each student grouped by teacher are then printed. (Figure 6 shows the system flowchart for this option).

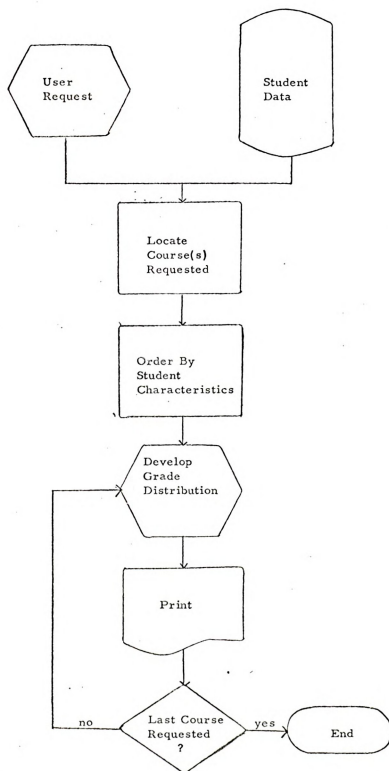


Figure 5. System flowchart: course analysis, by student characteristic.

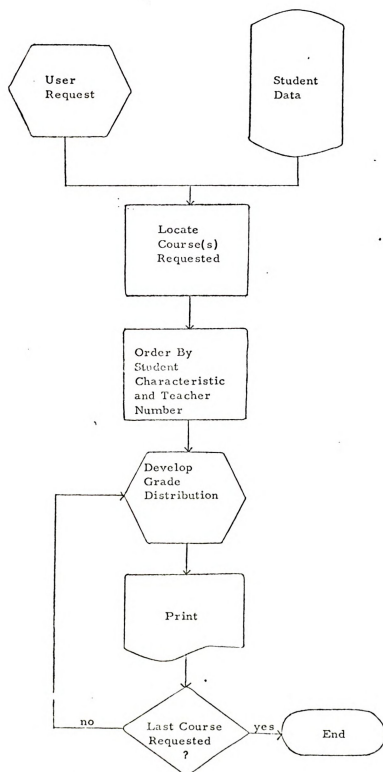


Figure 6. System flowchart: course analysis by teacher and student characteristic.

3. Teacher analysis

This option permits the user to group a teacher's students by their abilities, and to receive grade distributions for each of the identified categories. Analysis of this output provides the curriculum specialist with the success patterns of various groups of students with a particular teacher.

(Figure 7 is a system flowchart for this option). Analysis of teacher performance can also be assessed by using the instructional analysis program described earlier. That program permits a comparison among teachers teaching the same course to the same ability group of students.

4. Total curriculum analysis

Reports available to curriculum specialists using this option help determine what courses in the curriculum provide successful learning experiences to students with given abilities. Information generated by this option shows all the courses in which a particular type of student is matriculated, and the grade distribution for each so identified course for these students. (Figure 8 is a system flowchart for this option).

Problem Sensing. The problem sensing outputs provide information concerning the degree to which a course or teacher's grade distribution compares to previous distributions, departmental grade distributions, and administratively determined distributions. When the

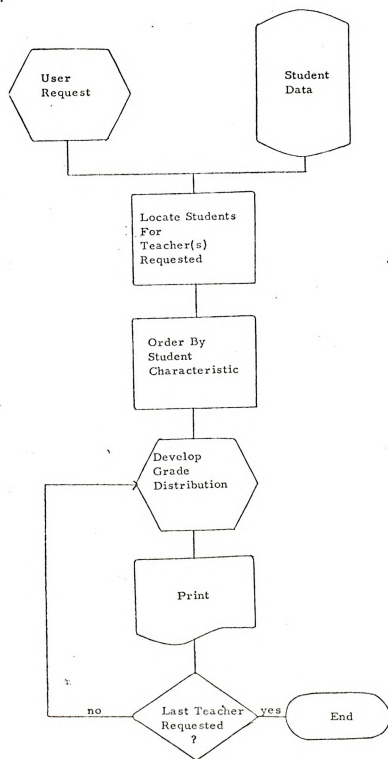


Figure 7. System flowchart: teacher analysis.

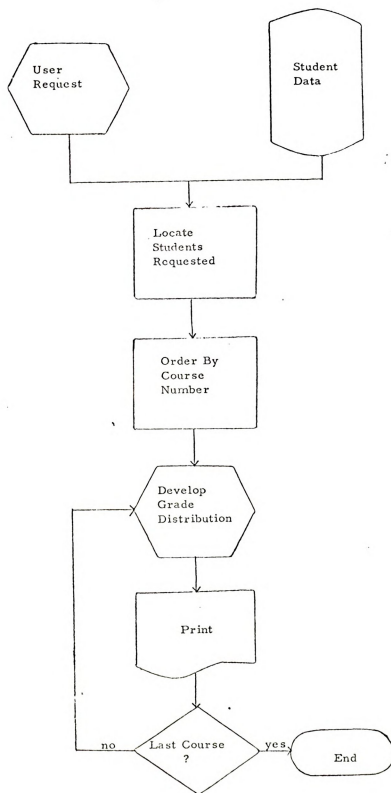


Figure 8. System flowchart: curriculum analysis.

actual distribution varies beyond the limits considered appropriate by the user, the distribution is printed along with the distribution to which it was compared, and an asterisk identifies the location of differences considered inappropriate by the user. The level of variance considered appropriate can be set by the user. (Figure 9 is a system flowchart for this option).

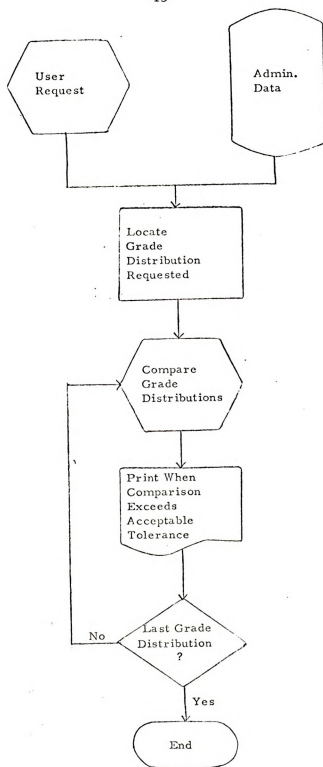


Figure 9. System flowchart: problem sensing.

Chapter IV

Application of the System

CACMSS was designed to make objective data normally found in the typical high school available to curriculum specialists in a form useful to them in making decisions. Rather than providing a regular series of outputs to be made available to potential users, this system puts the user in control of the output. By using this system, decision-makers dealing with specific problems or areas of the curriculum can request information they deem pertinent. Reports are not only rapid, but they are also specifically addressed to the users' perceived needs. The input used in this system and the output available are discussed separately.

Catalog of Data: Input

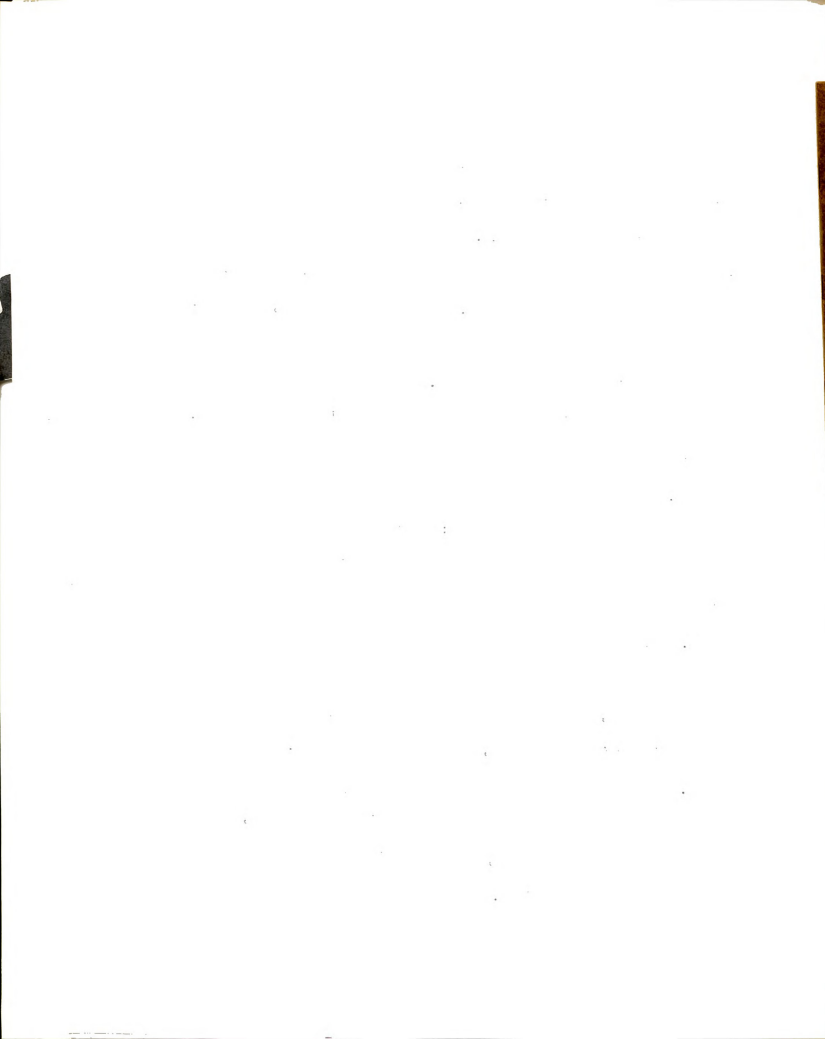
The system is designed to utilize the following three types of input:

1. Student data

Data in this category include standardized test scores, grades received in past courses, student identification number, and year of graduation.

2. Faculty data

In this category are teacher identification numbers, courses being taught, and grade distributions for all marking periods.



3. Administrative data

Data in this category include expectancies of grade distribution for specific courses, course and departmental grade distributions, course and departmental objectives, and research information, such as predicted grades for certain classes.

Catalog of Data: Output

The outputs from the system are divided into two general categories. The first category is curriculum assessment and refers to outputs generated by processing data related to the curriculum to determine where and how well specific groups of students are being served.

The output from this category can help determine:

1. What courses students of given abilities take, and how well they succeed in them
2. What level of success is achieved by students for whom special courses have been designed, and how well others taking the course succeed
3. Which teachers provide the most successful learning experiences to students of given abilities.

The second category is problem sensing. It refers to outputs generated by comparing information contained in the system to identify those situations where acceptable variations have been exceeded.

Through the use of this category, teacher grading practices are evalu-

ated against their past practices, departmental and course averages, as well as administrative expectancies.

Demonstration

The output available through the use of CACMSS is shown by processing data through the system. Questions pertinent to those involved in curriculum planning will be answered in demonstrating the output and its potential.

Input

To demonstrate the system, the following information was taken from the Science department of a comprehensive high school and placed in a data bank for processing:

1. Student
 - A. Student identification number
 - B. Year of graduation
 - C. Stanford Achievement Test percentile scores
 1. Paragraph meaning percentile
 2. Spelling percentile
 3. Language percentile
 4. Arithmetic computation percentile
 5. Arithmetic concepts percentile
 6. Arithmetic applications percentile
 7. Social studies percentile
 8. Science percentile

- D. Otis Quick Score intelligence quotient
 - E. Courses taken
 - 1. Identification number
 - 2. Grades
 - 3. Teacher identification number
 - F. Grade point average
2. Teacher
- A. Identification number
 - B. Identification number for courses taught
 - C. Six-week and semester grade distributions
3. Administrative
- A. Course identification number
 - B. Grade distribution expectations
 - C. Course grade distributions
 - D. Departmental grade distributions

The grade point average used in this study is determined in a school where grade points are assigned as follows:

A = 5 (in honors course)

A = 4

B = 3

C = 2

D = 1

F = 0

Outputs for Curriculum Assessment

By processing data through CACMSS, the following five questions asked by those involved in course planning and evaluation will be answered. Due to programming characteristics, the output may be difficult to interpret without explanation. In the row of figures after "PERCENTILE" on the Tables, a decimal point appears that should not be interpreted. Under the row headings in tables 1 - 3 and 7 - 9, the three digit number that appears alone refers to teacher or course numbers, while the student category is identified by a brief description and an equals sign. In tables 10 through 13, "Master" refers to the criteria against which grade distributions are being compared. The first column of numbers identify the course number, while the second column identifies the teacher number.

What courses in the curriculum serve students of given abilities and interests, and how successful are the students in the courses?

Three searches were made in the science department for students, one for those with a grade point average of 1.0 - 1.9, one for those with an Arithmetic Computation test percentile score of 50 - 59, and finally, for students with an I.Q. score of 90 - 99.

The output for the first group, based on grade point average, is shown in Table 1. Three science department courses, 700 Biology, 707 Basic Biology, and 715 Second Year Biology have students of this category in attendance. Of the 60 students in these courses, 58% received D and F grades, while only 5% received grades above a C.

Courses 707 and 715, supposedly designed for the low achieving student, show no significant difference in the success of low achieving students (1.0 - 1.9 grade point average) than course 700, one designed for the average achieving student (3.0 - 3.9).

Table 2 shows the five courses, 700 Biology, 703 Honors Biology, 707 Basic Biology, 715 Second Year Biology, and 728 Honors Chemistry taken in the science department by students with an Arithmetic Computation subtest percentile score of 50 - 59. Of the 24 students included in this category, 75% received grades of C or above. From the number of students taking courses, it is evident that the majority of the students with this level of ability are not taking science department courses, while at the same time those who are seem to be succeeding.

The 23 students in science courses with intelligence quotient scores of 90 - 99 is shown in Table 3. Forty-three per cent of these students are receiving D or F grades in the three courses they are taking 700 Biology, 703 Honors Biology, and 707 Basic Biology. Note that only Biology courses are taken by this category of student, and that the highest level of success is found in Basic Biology. Sixty-seven per cent of those taking Regular Biology received grades of D and F.

By applying this analysis to other departments or the entire course curriculum, it is possible to determine the success pattern of students in other courses or the entire curriculum of the school.

How well do courses designed for given student populations serve those students, as well as other students taking the courses? In order to

TABLE 1
Course Grade Distribution for Students With a 1.0-1.9 Grade Point Average Taking Science Department Courses

Student Category COURSE NO.	A	B	C	GRADES D	F	W/P	W/F	PASS
700 PERCENTILE	.00	.03	.11	.17 .52	.12 4	.00	.00	.00
707 PERCENTILE	.00	.09	.41	.10 .45	.05 1	.00	.00	.00
715 PERCENTILE	.00	.00	.40	.2 .60	.00 3	.00	.00	.00
GRADE POINT=1 PERCENTILE	.00	.05	.37	.30 .50	.08 5	.00	.00	.00

NOTE.--Disregard all the decimal points in the table.



TABLE 2

Course Grade Distribution for Students with Test Percentile Scores of 50-59 Taking Science Department Courses

Student Category COURSE NO.	A	B	C	GRADES D	F	W/P	W/F	PASS
700 PERCENTILE	1 .07	4 .27	6 .40	3 .20	1 .07	.00	.00	.00
703 PERCENTILE	.00	1 1.00	.00	.00	.00	.00	.00	.00
707 PERCENTILE	.00	.00	3 1.00	.00	.00	.00	.00	.00
715 PERCENTILE	1 .33	.00	.00	2 .67	.00	.00	.00	.00
728 PERCENTILE	.00	1 .50	1 .50	.00	.00	.00	.00	.00
T PERCENT=5 PERCENTILE	2 .08	6 .25	10 .42	5 .21	1 .04	.00	.00	.00

NOTE.--Add a "0" to the right of all "T PERCENT numbers." Disregard all decimal points in the table.

TABLE 3

Course Grade Distribution for Students with I.Q. Scores of 90-99 Taking Science Department Courses.

Student Category COURSE NO.	GRADES							
	A	B	C	D	F	W/P	W/F	PASS
700								
PERCENTILE	.00	.00	.33	.50	.17	.00	.00	.00
703								
PERCENTILE	.00	.00	1.00	.00	.00	.00	.00	.00
707								
PERCENTILE	.00	.31	.31	.38	.00	.00	.00	.00
I.Q. = 9								
PERCENTILE	.00	.22	.35	.39	.04	.00	.00	.00

NOTE.--Add a "0" to the right of all I.Q. scores, and a "1" to the left of all numbers between 0 and 5. Disregard all decimal points in the table.

offer courses to meet the needs of all students, courses are often grouped for given student ability levels, or specially designed for a particular group of students. The above question is directed to determine the effectiveness of such courses in attracting and providing students with successful learning experiences for whom they were designed as well as for all students taking the course.

Basic Biology is a course designed for the low achieving student. Table 4 shows the output generated for this course based on student grade point average. A review of the output shows that students with low achievement characteristics, grade point averages between 0 and 1.9 do not succeed at a high level in this course, with over 50% of these students receiving D and F grades. Approximately 90% of the students with 2.0 - 2.9 grade point averages received C or above grades. Thus, low achieving students do not succeed well in the course, while higher achieving students, for whom the course was not designed, do achieve well.

Table 5 shows the output generated for the biology course designed for average students based on student achievement subtest percentile scores in Arithmetic Computation. The results show that average students, those with percentile scores between 60 and 80, do achieve at a high level in the course.

Students in the same biology course were grouped by intelligence quotient scores to produce the output shown in Table 6. Again, it can be seen that the average students, scores 100 to 120, for whom the course was designed do achieve at an appropriate level.

TABLE 4

Basic Biology Grade Distributions Grouped by Student Grade Point Average.

Student Category	GRADES							
	A	B	C	D	F	W/P	W/F	PASS
GRADE POINT=2 PERCENTILE	1 .11	3 .33	4 .74	1 .11	.00	.00	.00	.00
GRADE POINT=1 PERCENTILE	.00	2 .09	10 .43	10 .43	1 .04	.00	.00	.00
GRADE POINT=0 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00

NOTE.-- Disregard all the decimal points in the table.

TABLE 5

Biology Grade Distributions Grouped by Student Test Percentile Score.

Student Category	GRADES							W/P	W/F	PASS
	A	B	C	D	F					
T PERCENT=9 PERCENTILE	3 .25	4 .33	4 .33	1 .08	.00			.00	.00	.00
T PERCENT=8 PERCENTILE	1 .13	6 .75	1 .13	.00	.00			.00	.00	.00
T PERCENT=7 PERCENTILE	.00	.00	3 .75	1 .25	.00			.00	.00	.00
T PERCENT=6 PERCENTILE	2 .25	2 .25	3 .38	1 .13	.00			.00	.00	.00
T PERCENT=5 PERCENTILE	1 .07	4 .27	6 .40	3 .20	1 .07			.00	.00	.00
T PERCENT=4 PERCENTILE	.00	1 .17	2 .33	2 .33	.00		1 .17	.00	.00	.00
T PERCENT=3 PERCENTILE	2 .20	.00	3 .30	4 .40	.00		.00	.00	.00	.10
T PERCENT=2 PERCENTILE	.00	1 .08	5 .42	4 .33	2 .17		.00	.00	.00	.00
T PERCENT=1 PERCENTILE	.00	3 .33	3 .33	2 .22	1 .11		.00	.00	.00	.00
T PERCENT=0 PERCENTILE	.00	.00	2 .29	4 .57	1 .14		.00	.00	.00	.00

NOTE.--Add a "0" to the right of all "T PERCENT" numbers. Disregard all decimal points in the table.

TABLE 6

Biology Grade Distributions Grouped by Student Intelligence Quotient Score.

Student Category		A	B	C	GRADES			F	W/P	W/F	PASS
I.Q.= 3	1	1	2	1							
PERCENTILE	.20	.20	.40	.20			.00	.00	.00	.00	.00
I.Q.= 2	3	12	7	4			1				
PERCENTILE	.11	.44	.26	.15			.04	.00	.00	.00	.00
I.Q.= 1	4	7	14	8				1			1
PERCENTILE	.11	.20	.40	.23			.00	.03	.00	.00	.03
I.Q.= 0		1	7	6			2				
PERCENTILE	.00	.06	.44	.38			.13	.00	.00	.00	.00
I.Q.= 9			2	3			1				
PERCENTILE	.00	.00	.33	.50			.17	.00	.00	.00	.00
I.Q.= 8							1				
PERCENTILE	.00	.00	.00	.00			1.00	.00	.00	.00	.00

NOTE.--Add a "0" to the right of all I.Q. scores, and a "1" to the left of all numbers between 0 and 5. Disregard all decimal points in the table.

Are some teachers better able to provide learning experiences to students with given characteristics than other teachers? To answer this question, students in the biology course designed for average students were grouped by grade point average, Arithmetic Computation subtest percentile scores, and intelligence quotient. In addition to the above groupings, each student category was further broken down by teacher number.

Table 7 shows the output based on student grade point average. While no highly unusual grading differences can be observed, it does appear that teachers 150 and 280 do provide somewhat less successful learning experiences to the student with 1.0 to 1.9 grade point average than do the other teachers, although such an observation doubtlessly needs more data before it can be assumed correct.

Students were grouped by subtest percentile scores in Table 8. While the information again is not precise, it does appear that students below percentile score 20 do not experience much success with teacher 280.

The output in Table 9 was generated by grouping students according to their intelligence quotient scores. An analysis of these data does not show any substantial difference between the success of students with the various teachers.

To what degree are the needs of all students in the school being met? By using the system demonstrated in Tables 1 - 3 on the total course curriculum and covering all possible student criteria characteristics,

TABLE 7
Biology Grade Distribution Grouped by Student Grade Point Average and Teacher Number.

Student Category & Teacher No.	A	B	C	GRADES D	F	M/P	W/F	PASS
010 PERCENTILE	.00	2 .67	1 .43	.00	.00	.00	.00	.00
150 PERCENTILE	.25	2 .50	1 .25	.00	.00	.00	.00	.00
250 PERCENTILE	.50	1 .00	1 .50	.00	.00	.00	.00	.00
330 PERCENTILE	.67	2 .33	1 .00	.00	.00	.00	.00	.00
405 PERCENTILE	.50	1 .00	1 .00	.00	.00	.00	.00	.00
470 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
GRADE POINT=3 PERCENTILE	.33	5 .40	4 .27	.00	.00	.00	.00	.00
010 PERCENTILE	.00	1 .20	1 .20	2 .40	.00	.00	.00	.20
150 PERCENTILE	.00	6 .46	6 .46	1 .08	.00	.00	.00	.00
250 PERCENTILE	.00	1 .25	3 .75	.00	.00	.00	.00	.00
330 PERCENTILE	.33	2 .17	3 .50	.00	.00	.00	.00	.00
405 PERCENTILE	.00	1 .50	1 .50	.00	.00	.00	.00	.00
470 PERCENTILE	.10	4 .40	3 .30	2 .20	.00	.00	.00	.00
GRADE POINT=2 PERCENTILE	.08	3 .35	14 .43	5 .13	.00	.00	.00	.03

NOTE.--Disregard all the decimal points in the table.

TABLE 7 (cont'd).

Student Category & Teacher NO.	A	B	C	GRADES D	F	N/P	W/F	PASS
010 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
150 PERCENTILE	.00	.00	.25 2	.50 4	.25 2	.00	.00	.00
240 PERCENTILE	.00	.00	.00	.50 2	.50 2	.00	.00	.00
330 PERCENTILE	.00	.20 1	.20 1	.60 3	.00	.00	.00	.00
405 PERCENTILE	.00	.00	.67 4	.33 2	.00	.00	.00	.00
470 PERCENTILE	.00	.00	.44 4	.56 5	.00	.00	.00	.00
GRADE POINT#1 PERCENTILE	.00	.03 1	.33 11	.52 17	.12 4	.00	.00	.00
330 PERCENTILE	.00	.00	.00	.00	1 1.00	.00	.00	.00
GRADE POINT#0 PERCENTILE	.00	.00	.00	.00	1 1.00	.00	.00	.00

NOTE. --Disregard all the decimal points in the table.



TABLE 8
 Biology Grade Distribution Grouped by Student Test Percentile Score and Teacher Number.

Student Category & Teacher No.	A	B	C	GRADES D	F	M/P	N/F	PASS
010 PERCENTILE	.00	1 1.00	.00	.00	.00	.00	.00	.00
150 PERCENTILE	1 .33	1 .33	1 .33	.00	.00	.00	.00	.00
280 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
350 PERCENTILE	1 .50	1 .50	.00	.00	.00	.00	.00	.00
405 PERCENTILE	.00	1 1.00	.00	.00	.00	.00	.00	.00
470 PERCENTILE	1 .25	.00	2 .50	1 .25	.00	.00	.00	.00
T PERCENT=9 PERCENTILE	3 .25	4 .33	4 .33	1 .08	.00	.00	.00	.00
010 PERCENTILE	.00	1 1.00	.00	.00	.00	.00	.00	.00
150 PERCENTILE	.00	2 .67	1 .33	.00	.00	.00	.00	.00
230 PERCENTILE	1 1.00	.00	.00	.00	.00	.00	.00	.00
330 PERCENTILE	.00	1 1.00	.00	.00	.00	.00	.00	.00
405 PERCENTILE	.00	1 1.00	.00	.00	.00	.00	.00	.00
T PERCENT=8 PERCENTILE	1 .14	5 .71	1 .14	.00	.00	.00	.00	.00

NOTE.--Disregard all the decimal points in the table.

TABLE 8 (cont'd).

Student Category & Teacher NO.	A	B	C	GRADES D	F	M/P	M/F	PASS
150			1					
PERCENTILE	.00	.00	1.00	.00	.00	.00	.00	.00
310			1	1				
PERCENTILE	.00	.00	.50	.50	.00	.00	.00	.00
405			1					
PERCENTILE	.00	.00	1.00	.00	.00	.00	.00	.00
† PERCENT=7			3	1				
PERCENTILE	.00	.00	.75	.25	.00	.00	.00	.00
610			1	1				
PERCENTILE	.00	.33	.33	.33	.00	.00	.00	.00
220			1					
PERCENTILE	.00	.00	1.00	.00	.00	.00	.00	.00
330	2							
PERCENTILE	1.00	.00	.00	.00	.00	.00	.00	.00
470			1					
PERCENTILE	.00	.50	.50	.00	.00	.00	.00	.00
† PERCENT=6	2	2	3	1				
PERCENTILE	.25	.25	.38	.13	.00	.00	.00	.00

NOTE.--Disregard all the decimal points in the table.

TABLE 8 (cont'd).

Student Category & Teacher NO.	A	B	C	GRADES D	F	W/P	W/F	PASS
010 PERCENTILE	.00	.00	.50	1 .50	.00	.00	.00	.00
150 PERCENTILE	.00	.3	.20	1 .00	.20	.00	.00	.00
260 PERCENTILE	.00	.00	1.00	2 .00	.00	.00	.00	.00
330 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
405 PERCENTILE	1 1.00	.00	.00	.00	.00	.00	.00	.00
470 PERCENTILE	.00	1 .25	.50	1 .25	.00	.00	.00	.00
T PERCENTILE	.07	4 .27	.40	3 .20	1 .07	.00	.00	.00
010 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
150 PERCENTILE	.00	1 .50	.50	.00	.00	.00	.00	.00
260 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
405 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
T PERCENTILE	.00	1 .20	.40	2 .40	.00	.00	.00	.00

NOTE.--Disregard all the decimal points in the table.

TABLE 8 (cont'd).

Student Category & TEACHER NO.	A	B	C	GRADES D	F	M/P	W/F	PASS
010 PERCENTILE	.00	.00	.00	.00	.00	.00	.00	1 1.00
150 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
310 PERCENTILE	.50	.00	1 .50	.00	.00	.00	.00	.00
405 PERCENTILE	.00	.00	1 .50	1 .50	.00	.00	.00	.00
470 PERCENTILE	.00	.00	1 .33	2 .67	.00	.00	.00	.00
T PERCENTILE	.11	.00	3 .33	4 .44	.00	.00	.00	1 1.1
150 PERCENTILE	.00	.00	2 .40	2 .40	1 .20	.00	.00	.00
260 PERCENTILE	.00	1 .50	.00	1 .50	.00	.00	.00	.00
310 PERCENTILE	.00	.00	1 .50	.00	1 .50	.00	.00	.00
405 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
470 PERCENTILE	.00	.00	1 .50	1 .50	.00	.00	.00	.00
T PERCENTILE	.00	.68	5 .42	4 .33	2 .17	.00	.00	.00

NOTE.--Disregard all the decimal points in the table.

TABLE 8 (cont'd)

Student Category & TENURE NO.	A	B	C	GRADES D	F	W/P	W/F	PASS
150 PERCENTILE	.00	.33 1	.33 1	.33 1	.00	.00	.00	.00
250 PERCENTILE	.00	.00	.00	.00	1 1.00	.00	.00	.00
300 PERCENTILE	.00	.50 1	.00	.50 1	.00	.00	.00	.00
400 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
470 PERCENTILE	.00	.50 1	.50 1	.00	.00	.00	.00	.00
PERCENTILE	.00	.33 3	.33 3	.22 2	1 1.1	.00	.00	.00
150 PERCENTILE	.00	.00	.50 1	.50 1	.00	.00	.00	.00
250 PERCENTILE	.00	.00	.00	.00	1 1.00	.00	.00	.00
300 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
400 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
470 PERCENTILE	.00	.00	.00	2 1.00	.00	.00	.00	.00
PERCENTILE	.00	.00	2 1.29	4 1.57	1 1.14	.00	.00	.00

NOTE.--Disregard all the decimal points in the table.

TABLE 9
Biology Grade Distribution Grouped by Student Intelligence Quotient Score and Teacher Number.

Student Category & Teacher No.	GRADES						
	A	B	C	D	F	M/P	W/F
010							
PERCENTILE	.00	.00	.00	1.00	.00	.00	.00
340							
PERCENTILE	.50	.00	1.00	.00	.00	.00	.00
400							
PERCENTILE	.00	1.00	.00	.00	.00	.00	.00
470							
PERCENTILE	.00	.00	1.00	.00	.00	.00	.00
1.00 = 3							
PERCENTILE	.20	1.00	.40	.20	.00	.00	.00
010							
PERCENTILE	.00	.75	.75	.00	.00	.00	.00
110							
PERCENTILE	.00	.50	.38	.00	.11	.00	.00
200							
PERCENTILE	.33	1.00	.33	.00	.00	.00	.00
330							
PERCENTILE	.25	.50	.00	.25	.00	.00	.00
400							
PERCENTILE	.33	.33	.33	.00	.00	.00	.00
470							
PERCENTILE	.00	.20	.20	.60	.00	.00	.00
1.00 = 2							
PERCENTILE	.11	.44	.26	.15	.04	.00	.00

NOTE.--Add a "0" to the right of all I.Q. scores, and a "1" to the left of all numbers between 0 and 5. Disregard all decimal points in the table.

TABLE 9 (cont'd).

Student Category & Teacher NO.	A	B	C	GRADES			F	W/P	W/F	PASS
				D	E	F				
010 PERCENTILE	.00	.00	.00	1	.50	.00	.00	.00	.00	1 .50
150 PERCENTILE	.08	.31	.30	3	.23	.00	.00	.00	.00	.00
280 PERCENTILE	.00	.00	.67	2	.33	.00	.00	.00	.00	.00
350 PERCENTILE	.50	.00	.23	1	.25	.00	.00	.00	.00	.00
405 PERCENTILE	.00	.00	1.00	2	.00	.00	.00	.00	.00	.00
470 PERCENTILE	.09	.27	.36	4	.18	.03	.09	.00	.00	.00
1.00 = 1 PERCENTILE	.11	.20	.40	8	.23	.00	.03	.00	.00	1 .03
010 PERCENTILE	.00	.00	.50	1	.50	.00	.00	.00	.00	.00
150 PERCENTILE	.00	.00	.00	.00	.00	1.00	.00	.00	.00	.00
200 PERCENTILE	.00	.00	.50	1	.50	.00	.00	.00	.00	.00
340 PERCENTILE	.00	.20	.40	2	.20	.1	.00	.00	.00	.00
405 PERCENTILE	.00	.00	.33	2	.67	.00	.00	.00	.00	.00
470 PERCENTILE	.00	.00	.67	2	.33	.00	.00	.00	.00	.00
1.00 = 0 PERCENTILE	.00	.06	.44	7	.38	.13	.00	.00	.00	.00

NOTE.--Add a "0" to the right of all I.O. scores, and a "1" to the left of all numbers between 0 and 5. Disregard all decimal points in the table.

TABLE 9 (cont'd).

Student Category & TEACH NO.	A	S	C	GRADES D	F	N/P	N/F	PASS
150 PERCENTILE	.00	.00	.00	2 1.00	.00	.00	.00	.00
200 PERCENTILE	.00	.00	.00	.00	1 1.00	.00	.00	.00
400 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
470 PERCENTILE	.00	.00	.00	1 1.00	.00	.00	.00	.00
150 PERCENTILE	.00	.00	1 1.00	.00	.00	.00	.00	.00
I.Q. = 7 PERCENTILE	.00	.00	2 .33	3 .50	1 .17	.00	.00	.00

NOTE.--Add a "0" to the right of all I.Q. scores, and a "1" to the left of all numbers between 0 and 5. Disregard all decimal points in the table.

an analysis could be made applicable to this question. The output would show what courses each group of students takes, and their success levels in them.

Curriculum Problem Sensing

The problem sensing element of the system is related mainly to the ongoing management of the instructional program, although certain types of research could be accommodated through its use. Supervisors are concerned that the students receive instruction that is appropriate to the abilities and needs of the students. In order to locate courses where the students' needs may not be continually met, a system to identify potential problem areas is needed.

To generate the output, teacher grade distributions are compared with previous ones, department and course distributions, and those representing administrative expectations. When a substantial grade deviation occurs, three lines are printed showing the teacher number, the grade distributions compared, and an asterisk below the column(s) in which the variation(s) occurred. The output from this element will be shown as it is used to answer one of four basic questions, and will be discussed in the context of the question.

Have the grades of students in a course changed substantially from a previous marking period? Teacher semester grade distributions were compared with their first six weeks' distribution (Table 10). An analysis of Table 10 shows that students in teacher 10's course 700 received substantially fewer C grades and more D grades at semester

time versus the first 6 weeks. In teacher 150's course 700 just the opposite occurred.

Are the grades given by a particular teacher in a course substantially different from those given by other teachers of the same course?

To generate the output to answer this question, the average semester grades given by all teachers is compared to that of each individual teacher. Table 11 shows the output for teachers whose grades varied substantially from the average. In course 700, teacher 10 gave fewer C's and more D's, while teacher 280 did the opposite in the same course. In course 600, teacher 200 gave substantially more F's than the other teachers.

Are the grade distributions in a particular course substantially different from those of the department in which the course is given (e.g., English, science, etc.)? Teacher grade distributions for each course taught are compared with the departmental distribution. Table 12 shows those teachers and courses varying substantially from the department average. In course 700, teacher 280 gives more C's and fewer B's and D's while in course 728, teacher 555 gives substantially more A's and B's and fewer C's and D's.

Does the course grade distribution substantially differ from the grade expectations of administrators and supervisors? Table 13 shows the output generated by comparing actual grades given by teachers in given courses to the expectations of supervisors. Teacher 10 in course 700 gave substantially fewer A's and C's, and more D's, while teacher 280 in the same course gave fewer A's but more C's. In course 600,

TABLE 10

Semester Grade Distribution by Teacher in a Course Deviating Significantly From the First Six-Weeks' Distribution (called "Master")

Category	Course & Teacher No		Grades						
	A	B	C	D	F	w/p	w/f	Pass	
MASTER TEACHER	700 010 008	017 034	031 008	000 000	000 000	000 000	000 000	000 000	
	700 010 008	013 023	041 008	000 002	002 002	*			
MASTER TEACHER	700 150 009	019 016	033 018	000 000	000 000	000 000	000 000	000 000	
	700 150 008	024 034	022 011	000 000	000 000	*			
MASTER TEACHER	700 330 008	028 030	014 016	000 000	000 000	000 000	000 000	000 000	
	700 330 015	029 036	015 002	000 000	000 000	*			
MASTER TEACHER	700 405 012	010 035	020 010	010 000	000 000	000 000	000 000	000 000	
	700 405 015	015 044	018 002	000 000	000 000	*			
MASTER TEACHER	725 235 010	010 028	010 000	000 000	000 035	000 000	000 000	035	
	725 235 021	017 010	010 000	000 000	000 039	*			

TABLE 11

Semester Grade Distribution by Teacher in a Course Deviating Significantly from that
Course's Semester Grade Distribution (called "Master")

Category	Course & Teacher No.	Grades									
		A	B	C	D	F	w/p	w/l	Past		
MASTER TEACHER	700	009	020	038	023	005	000	000	001		
	700	010	008	013	023	041	008	000	002	002	
				*							
MASTER TEACHER	700	009	020	038	023	005	000	000	001		
	700	280	006	011	064	006	008	002	000	000	
				*							
MASTER TEACHER	723	011	018	009	011	003	001	001	001	043	
	723	235	021	017	010	010	000	000	000	039	
				*							
MASTER TEACHER	600	002	012	030	040	014	000	000	000	001	
	600	155	008	017	035	030	005	000	000	002	
					*						
MASTER TEACHER	600	002	012	030	040	014	000	000	000	001	
	600	200	000	005	034	032	028	000	000	000	
						*					
MASTER TEACHER	600	002	012	030	040	014	000	000	000	001	
	600	210	000	013	024	050	011	000	000	000	
					*						
MASTER TEACHER	604	009	031	038	020	000	000	000	000	000	
	604	210	006	027	034	031	000	000	000	000	
					*						
MASTER TEACHER	604	009	031	038	020	000	000	000	000	000	
	604	290	013	040	046	000	000	000	000	000	
					*						
MASTER TEACHER	620	001	011	026	034	022	001	001	001	001	
	620	200	000	011	032	017	035	000	000	002	
					*						
MASTER TEACHER	620	001	011	026	034	022	001	001	001	001	
	620	210	000	004	013	045	027	000	004	000	
				*							

TABLE 12

Semester Grade Distribution by Teacher in a Course Deviating Significantly from the Departmental Grade Distribution (called "Master")

Category	Course & Teacher No		Grades						
	A	B	C	D	F	w/p	w/f	Pass	
MASTER TEACHER	700	012	022	032	018	003	001	001	001
	700	010	008	013	023	041	008	000	002
MASTER TEACHER	700	012	022	032	018	003	001	001	001
	700	280	006	011	064	006	008	002	000
MASTER TEACHER	700	012	022	032	018	003	001	001	001
	700	405	015	015	044	018	002	000	000
MASTER TEACHER	700	012	022	032	018	003	001	001	001
	700	470	008	021	035	029	001	000	000
MASTER TEACHER	725	012	022	032	018	003	001	000	008
	725	235	021	017	010	010	000	000	039
MASTER TEACHER	725	012	022	032	018	003	001	000	008
	725	120	005	018	009	011	005	002	045
MASTER TEACHER	728	012	022	032	018	003	001	000	008
	728	555	034	046	012	004	000	002	000
MASTER TEACHER	600	006	014	030	028	008	001	001	008
	600	095	000	011	028	047	011	000	000
MASTER TEACHER	600	006	014	030	028	008	001	001	008
	600	200	000	005	034	032	028	000	000
MASTER TEACHER	600	006	014	030	028	008	001	001	008
	600	210	000	013	024	050	011	000	000

TABLE 12 (cont'd).

Category	Course & Teacher No.	Grades						
		A	B	C	D	F	w/p	w/f Pass
MASTER	604	006	014	030	028	008	001	001 008
TEACHER	604 210	006	027	034	031	000	000	000 000
			*					
MASTER	604	006	014	030	028	008	001	001 008
TEACHER	604 290	013	040	046	000	000	000	000 000
			*	*				
MASTER	620	006	014	030	028	008	001	001 008
TEACHER	620 200	000	011	032	017	035	000	000 002
				*	*			
MASTER	620	006	014	030	028	008	001	001 008
TEACHER	620 210	000	004	013	045	027	000	004 000
			*	*	*	*		

teacher 95 gave substantially fewer A's and B's, but more D's, while teacher 200 in the same course also gave fewer A's and B's, but more D's and F's.

Summary

CACMSS was developed to help school personnel more effectively evaluate and manage the school curriculum. By rapidly providing information to them pertinent to questions they are continually facing, using data typically available in a school, CACMSS is able to improve their effectiveness. Chapter IV shows how the system can be applied in answering a number of these questions. Chapter V will discuss the selection of computers to support the system, along with potential applications and anticipated problems.

TABLE 13

Semester Grade Distribution by Teacher in a Course Deviating Significantly from the Administrative Expectation Distribution (called "Master")

Category	Course & Teacher No.	Grades						
		A	B	C	D	F	w/p	w/f Pass
MASTER TEACHER	700	020	020	040	010	010	000	000
	700	010	008	013	023	041	006	000
MASTER TEACHER	700	020	020	040	010	010	000	000
	700	150	008	024	034	022	011	000
MASTER TEACHER	700	020	020	040	010	010	000	000
	700	280	006	011	064	006	008	000
MASTER TEACHER	700	020	020	040	010	010	000	000
	700	470	008	021	035	029	001	000
MASTER TEACHER	725	010	020	040	010	000	000	000
	725	235	021	017	010	010	000	000
MASTER TEACHER	725	010	020	040	010	000	000	000
	725	120	005	018	009	011	005	002
MASTER TEACHER	728	060	030	010	000	000	000	000
	728	555	034	046	012	004	000	002
MASTER TEACHER	600	020	030	035	010	005	000	000
	600	095	000	011	028	047	011	000
MASTER TEACHER	600	020	030	035	010	005	000	000
	600	155	008	017	035	030	005	000
MASTER TEACHER	600	020	030	035	010	005	000	000
	600	200	000	030	034	032	028	000

TABLE 13 (cont'd).

Category	Course & Teacher No.	Grades						
		A	B	C	D	F	w/p	Pass
MASTER TEACHER	600	020	030	035	010	005	000	000
	600	210	000	013	024	050	011	000
MASTER TEACHER	604	050	040	010	000	000	000	000
	604	210	006	027	034	031	000	000
MASTER TEACHER	604	050	040	010	000	000	000	000
	604	290	013	040	046	000	000	000
MASTER TEACHER	620	010	015	040	030	005	000	000
	620	200	000	011	032	017	035	000
MASTER TEACHER	620	010	015	040	030	005	000	000
	620	210	000	004	013	045	027	000



Chapter V

Proposed Configuration

The Computer-Assisted Curriculum Management Support System (CACMSS) was developed as an example of the use of high speed data processing to better utilize data in the evaluation and management of a high school curriculum. It was designed to use data such as test scores and course grades, which are generally available in all schools, in its support of curriculum evaluation and management functions.

Applications

CACMSS can be applied to three general areas related to curriculum:

1. Evaluation of how well various courses and teachers provide successful learning experiences for students
2. Determination of the degree to which course grade distributions differ from those of past teacher, departmental, course, or administrative expectancies
3. Cost-effectiveness studies such as those related to Program Planning Budgeting Systems.

Computer Alternatives

In assessing computer needs related to CACMSS, the following should be considered:

1. Level of implementation desired

Two basic decisions must be made by a school planning to utilize CACMSS:

- A. Do they wish to implement the evaluation, management, or both features of the system?
- B. How much data do they wish to have available for use by the system?

The size of the computer data base and memory necessary to implement the desired system can be determined from a school's answer to the above two questions.

Should a school decide to use both parts of CACMSS, a data base must be developed to support the system. Included in the data is student information such as grades and test scores, teacher information like past and current grade distributions, departmental grade distributions, and administrative grade distribution expectations. If only the evaluation feature is selected, then the need for data such as administrative grade distribution expectations would not be needed, thus reducing the data base requirements.

Depending on the school's decision related to the second question, the amount of each of the above data base elements can be determined. For instance, a school may only wish to utilize total achievement scores versus the many subtest scores which may also be available. Again, they may decide to utilize only certain of the test scores available, thus deciding to use scores from the Stanford Achievement Test but not from the Scholastic Aptitude Test (SAT).

2. Time requirements on reports

Two types of computer processing applications can be used to support CACMSS. For those applications requiring immediate answers to questions about the curriculum as they arise, an on-line system must be considered.

An example of such an application is one in which the school research section wants the ability to ask questions about courses or students in the process of doing their normal daily functions. To support this need, a terminal must be tied to the data base and capable of processing data through the use of CACMSS.

Another application is one that can be supported through batch-processing. An example of this type of application is one in which a study of a particular department is needed, and the results will be analyzed to determine certain information. In such an application, the computer can search the data and provide the required data in written form to the user for evaluation. The data can be placed into the system, processed, and then removed to make space for further data. Under most circumstances, batch-processing requires less storage and processing space, and a less sophisticated computer for processing.

3. Use of current computer equipment

Since many schools already have computer equipment available, a basic question is whether the available equipment is capable of supporting CACMSS. Depending on the equipment and desired application, CACMSS may be supported effectively with minor or perhaps no modifications at all. However, when this is being considered, alternative approaches, such as time-sharing, should be evaluated. Through the use of time-sharing, the level of implementation and mode may be greatly enhanced without adding a significant amount to the cost.

4. Financial constraints

Most schools today face substantial economic difficulties. Because of this, a great interest in a system such as CACMSS may exist to insure the application of funds for those activities of highest priority. However, for the same reason, money for such activities may be quite limited. A study of potential costs for such a system shows that \$5 per student would be sufficient to implement the system, including computer and consulting help. This figure is based on a school of 2,000 students, and includes computer storage and operation costs of \$2,900, system design and implementation of \$2,700, and \$4,400 for evaluation of output. This figure represents no more than

.5% of the per pupil cost of the average high school (and far less than that in many), which is well within the figure generally recommended for research in the school.

With the financial crisis in education, it is readily evident that only those programs which are sufficiently high in their priority and cost-effectiveness will remain in the curriculum. Programs not meeting these conditions must be altered or dropped. CACMSS provides a means to identify those variables necessary in making such decisions.

Reactions to the System

The potential of CACMSS in supporting the management of a school is extremely broad. Most obvious is its use in conjunction with a PPBS system where at any time an administrator can see how well his money is being used in serving specific student needs. He may wish then to compare his finding with other student populations, to see if it represents a trend for all students, or just for some. This kind of information would allow him to analyze situations while they still exist, with the possibility that remedial action can be taken to improve the student's situation immediately. Current approaches to management at best show what happened, but little can be done to help those students who were in the situation as it occurred.

Problems Related to System Implementation

Problems related to the implementation of CACMSS are many. One major problem is that administrators and teachers who are unfamiliar with the management potential of such a system are immediately threatened by it.

Another problem relates to the popular notion that people in our society are identified as mere numbers, and immediately associating all computerized systems as the reason for this. The concept of helping students learn through individualization of the curriculum with the use of computers is neither understood nor accepted by most educators today.

A third problem is cost. While many administrators and boards of education may agree that management of schools must be improved, the re-allocation of funds to achieve improvement may prove difficult. Research of any nature is nearly non-existent in today's schools and little money is currently budgeted for this activity. To allocate funds for research, money may have to be taken from operational programs, which most administrators are reluctant to do.

A lesser problem exists in regard to the type of computer configuration needed to support CACMSS. Because of the criticism they may receive for not selecting an adequate computer initially, schools may be reluctant to change computers or add time-sharing to support their application. Instead, they may choose an application supportable by their computer, but not meeting their specific needs. Worse yet, they may choose not to implement CACMSS at all to avoid criticism.

Finally, the whole notion of test scores and grades may not be acceptable to school professionals as a way of evaluating and managing the instructional program. While they may not have alternatives for either, they still may be slow to accept the concept of CACMSS as one they should use in their schools.

Approach to Use of CACMSS by Curriculum Specialists

Curriculum specialists can use CACMSS in a number of ways as they work with teachers. One such use is working with teachers on their grading practices. Tables 7 to 9 could be interpreted as meaning that one teacher grades harder or easier than another. By showing a teacher how his grading varies from other teachers, he may more clearly recognize the need for modification of his procedures. Also useful in such conferences is the information contained in Tables 10 to 12. These reports show how a teacher's grades vary either from his own previous grades, those given in the same course by other teachers, or in the department as a whole. Again, such variation may point out the need for modification of a teacher's grading procedure.

A second use is one related to teacher grading in comparison to identified expectations. For instance, a curriculum specialist may expect that a certain grade distribution would be appropriate for a given course. When that expectation is deviated from substantially, he may desire to discuss the difference with the teacher. The conference may prove that adequate reasons exist for the deviation, or that a change in teacher or administrator grading expectations is appropriate.

Security Safeguards and Rights

By making the data described in CACMSS available to teachers, administrators, and board members, the problem of security of files immediately is identified. To solve these problems, adequate data base security must be designed to insure that the file is not modified inappropriately either by choice or error. This can be achieved by allowing only certain types of manipulation of data to be achieved by given users, each of whom would have his own number.

Teachers may be very concerned about the manner in which the data generated by CACMSS will be used. Should they become greatly threatened by its potential use in evaluating their performance, they may negotiate to limit its use in this regard.

Other Data Usable by the System

CACMSS was developed not only to use achievement and intelligence test scores in grouping students, but other objective data as well can be used. Other data that may be of value would be student interest and vocational test scores, biographical data, and course objectives. Not only can grades be used as indicators of success, but also the results of tests or other objective criteria, such as vocational placement and earnings, and college success. With minor programming changes, all the above could be used in looking at student success.

Summary

Today, more than at any previous time, the need to better evaluate and manage the school curriculum is recognized not only by administrators but also by school board members and communities. Lack of sufficient money to support education is becoming a growing problem, along with increasing demands by students and the community to add courses or to modify the priorities of a district.

To respond to these demands, it is necessary to be able to determine which courses and teachers are successfully serving the needs of students, and which students are not being provided with successful learning experiences. Under a Program Planning Budgeting System, it is important to determine the cost-effectiveness of various programs, and one major dimension of such analysis is how well courses are providing successful learning experiences to the students for whom they were designed.

CACMSS provides school district personnel with the ability to utilize currently available data in making these types of evaluations. For this reason, it would seem appropriate for all schools to utilize such a system as they prepare their programs and budgets in response to the needs of the students and communities they serve.

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BIBLIOGRAPHY

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APPENDICES

APPENDIX A

IEIS Data Base

1. Pupil Personnel

a. Census

- | | |
|-------------------------------------|----------------------------------|
| 1. Analysis of census tracts | 4. Mobility studies |
| 2. Age and grade distribution | 5. Analysis of school attendance |
| 3. Analysis of handicapped children | 6. Updated records |

b. Permanent Records

- | | |
|--|--|
| 1. Achievement record of grades, credits, and honor point averages | 6. Correlation of test and grade results |
| 2. Analysis of courses taken | 7. Item analysis |
| 3. Test scores | 8. Profiles |
| 4. Ranking by grade | 9. Updated records |
| 5. Ranking by test results | |

c. Guidance Records

- | | |
|---------------------------------------|-----------------------|
| 1. Health records | 6. Attendance |
| 2. Activities and interest | 7. Evaluation |
| 3. Work experience | 8. Counseling records |
| 4. Environmental factors | 9. Updated records |
| 5. Education and vocational interests | |

d. Student Activities

- | | |
|----------------------------|-------------------------------|
| 1. Library card | 4. Student council activities |
| 2. Locker assignment | 5. Co-curricular activities |
| 3. Athletic classification | 6. Updated records |

2. Computer Enriched Curriculum

- | | |
|-------------------------|------------------------|
| a. Vocational Education | c. General Education |
| b. Business Education | d. College Preparatory |

3. Financial Management

- | | |
|-----------------------------|--------------------------------|
| a. Appropriation Accounting | h. Debt Retirement Funds |
| b. Budgetary Accounting | i. Building and Site Funds |
| c. Accounts Payable | j. Revolving Funds |
| d. Payroll | k. Analysis for Administration |
| e. Inventories | l. Transportation |
| f. Property Accounting | m. Updated Records |
| g. Student Activities | |

4. Staff Personnel

- | | |
|----------------------|--------------------------------|
| a. Payroll | g. Extra curricular activities |
| b. Certification | h. Assignments |
| c. Classification | i. Courses taught |
| d. Academic training | j. Health record |
| e. Specialties | k. Attendance records |
| f. Work experience | l. Updated records |

5. Facilities and Equipment

- | | |
|--------------|--------------------|
| a. Property | c. Inventories |
| b. Buildings | d. Updated records |



APPENDIX B

Counselor Use of the System



COUNSELOR USE OF THE SYSTEM

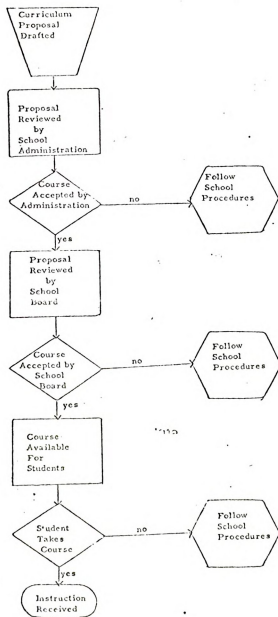
Each of Willowbrook's eleven full-time counselors has a cathode ray tube terminal in his office. While the system is an on-line decision-making experience for the student, it is an information-retrieval system for the counselor. The purpose in our development in this area is to make educational and vocational information as well as information about students readily and quickly available to counselors so that all of this data can be brought quickly to bear upon a counseling situation. This should: 1) save valuable counselor time so that it can be appropriated to functions which cannot be done by a computer, and 2) provide for the counselor a larger bank of data about occupations, students, and educational institutions than he can possibly store in his own memory.

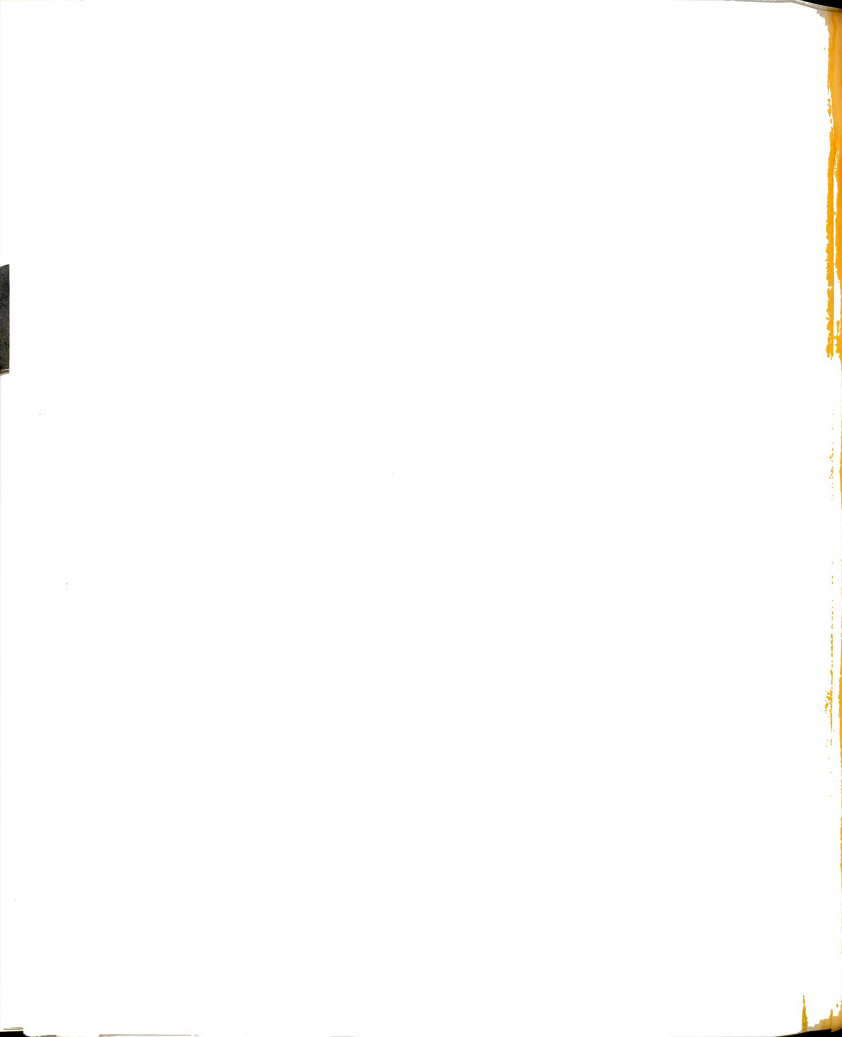
The following functions are available at counselor terminals:

1. Recall of student records. The counselor types in the social security number of any one of his counselees in order to recall the record. The counselor may "roll" through all sections of the record or may go directly to any section of it by typing in the appropriate code word. Available sections are:
 - Personal data (including health and referral information)
 - 8th grade test data
 - 10th grade test data
 - Kuder interest inventory
 - National Merit-ACF scores
 - College Board-PSAT scores
 - Composite testing compared to rank in class
 - Courses, grades and credits by year
 - Courses, grades, and credits by department
 - Attendance and tardiness record
 - Extra-curricular activities record
 - Current schedule of student with ability to make on-line schedule changes
 - Current space available in all courses offered in curriculum.
2. Vocational information—The counselor can recall the 50-word definition of any of the more than 400 occupations in the system or the 300-word occupational brief in "rolling" displays.
3. Educational information—The counselor can recall the summary of information about any one of the 450 colleges in the system, the local technical and specialized schools, and the programs at College of DuPage.
4. Decisions of counselees—The counselors can recall the pattern of students' vocational exploration on the system and the decisions made by the student about type of college preferred.
5. Daily messages—The system can be used for inter-departmental communications, such as current jobs available for students, deadlines, scholarship information, etc.
6. Student programs—The counselors can also recall the scripts available to students, either for demonstration purposes or to help a student who may need special help in the making of decisions.

APPENDIX C

Procedure for Curriculum Approval and Implementation





APPENDIX D

Curriculum Proposals

Department Business
Division Central
Originator Smith
Date 10/15/69

I. Proposal:

A. Brief Description: Offer 1 year of vocational typing. The course will emphasize business applications for typing, with employment as a prime goal.

B. Objectives (in behavioral form):

- 1) Students will type 60 words per minute in 1 year.
- 2) Students will format business letters using 2 diff. styles.

II. Situation: (What is currently going on in our school relative to this proposal)

At the present time, no course is offered in typing.

III. Need: (Why this idea should be incorporated into our program--cite research when available)

- A. Over x number of typists are needed yearly in the job market
- B. 30% of our students enter vocations after high school
- C. Locally, the demand for graduates with typing skills outnumber 2 - 1 the number of candidates we have available
- D. Students unable to succeed in college preparatory courses should have this course available

IV. Implementation: (How idea will be incorporated into our program)

(A) Timing:

Short term: Offer 2 sections next year to seniors only and note the student interest and motivation

Long term: Based on the evaluation of the 1st year program, offer the course to any junior or senior

(B) <u>Budget:</u>	(30 typewriters @ \$125 each	\$3750.
	(30 tables @ \$70 each	2100.
Short term: (60 Textbooks @ \$5 each		300.
	(1 Teacher (2 per.) @ \$2000 per.	4000.
Long term:		\$10,150.

As needed to meet the demand.

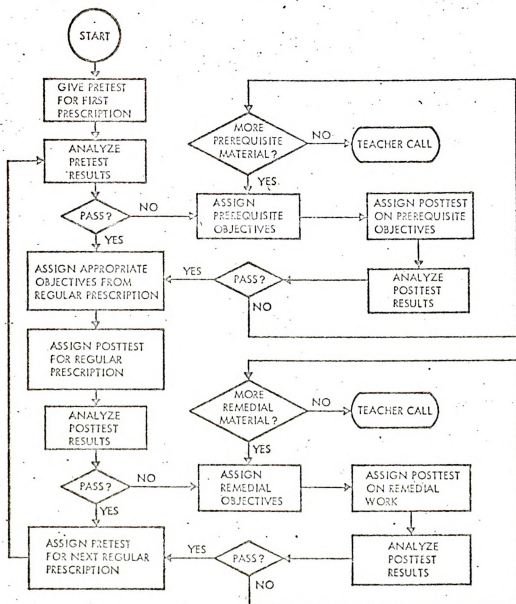
V. Evaluation of proposal: (How will success of the project be assessed?)

- 1) Number of students electing the course
- 2) Success of the students in the course
- 3) Employment of these students
- 4) Teacher evaluation of course
- 5) Student evaluation of course

APPENDIX E

Basic Instruction Prescription Procedure

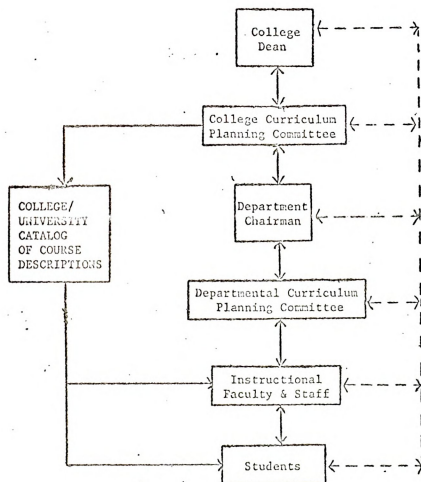
IBM Confidential



APPENDIX F

Curriculum Management by Traditional Methods: The Linear Communications System Model

The model assumes that the curriculum (universe of educational activities) is based upon the utilities assigned to a specific set of educational objectives. Communication is restricted to the exchange of utilities and educational objectives among faculty, students, and administrators.



($\longleftrightarrow$) Denotes traditional
Communication lines
for educational
objectives

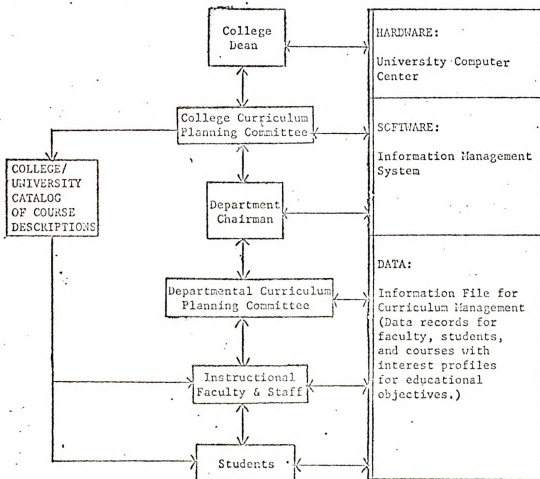
($\cdots\cdots\cdots$) Denotes probable failures
in communicating educational
objectives



APPENDIX G

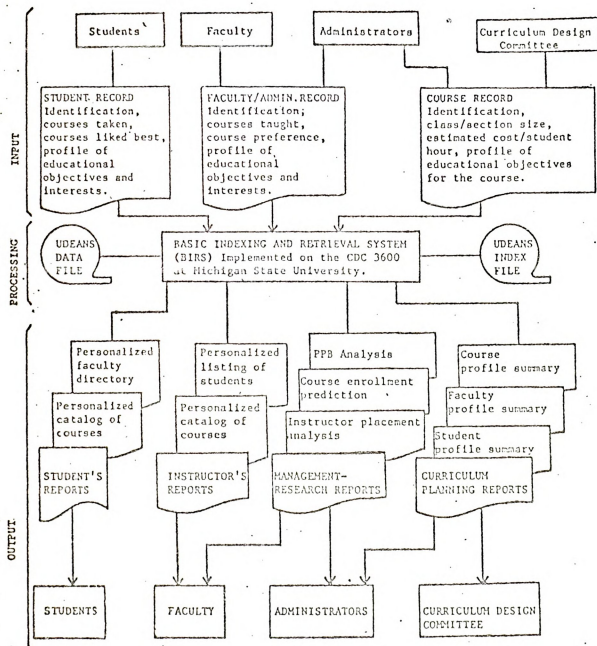
Curriculum Management by Automated Methods: The Parallel Communications System Model

The computer-based model is an obvious extension of the traditional curriculum management system. The computer is used to create an information file containing basic data about educational objectives as specified by students, faculty, and curriculum committees. The information file permits the direct exchange of educational objective valuation among all members of the academic community.



APPENDIX H

Curriculum Management with Udeans: The University Deans' Information System



APPENDIX I

Udeans Data Records

UDEANS STUDY

ABSTRACT 53

*TYPE FACULTY
 *NAME XXXX, B.
 *SS NUMBER XXXX
 *PROFILE
 JUVENILE DELINQUENCY=2
 FAMILY SERVICES=2
 DAY CARE CENTERS=5
 ADOPTION=3
 CHILD WELFARE=3
 TEACHING EMOTIONALLY DISTURBED CHILDREN=0
 MENTAL HEALTH=0
 CHILD CLINIC=3
 WORK WITH ADOLESCENTS=4
 WORK WITH BLIND, HANDICAPPED=0

UDEANS STUDY

ABSTRACT 1

*TYPE STUDENT
 *NAME XXXX, D.
 *STUDENT NO. XXXX
 *UNDERGRADUATE COURSES 433, 434, 467, 367, 228, 428
 *PROFILE
 JUVENILE DELINQUENCY=5,
 FAMILY SERVICES=3,
 PSYCHIATRIC SOCIAL WORK=5,
 ADOPTION=5,
 CHILD WELFARE=5,
 TEACHING EMOTIONALLY DISTURBED CHILDREN=2,
 MENTAL HEALTH=5,
 CHILD CLINIC=3,
 WORK WITH ADOLESCENTS=5,
 WORK WITH BLIND, HANDICAPPED=2,

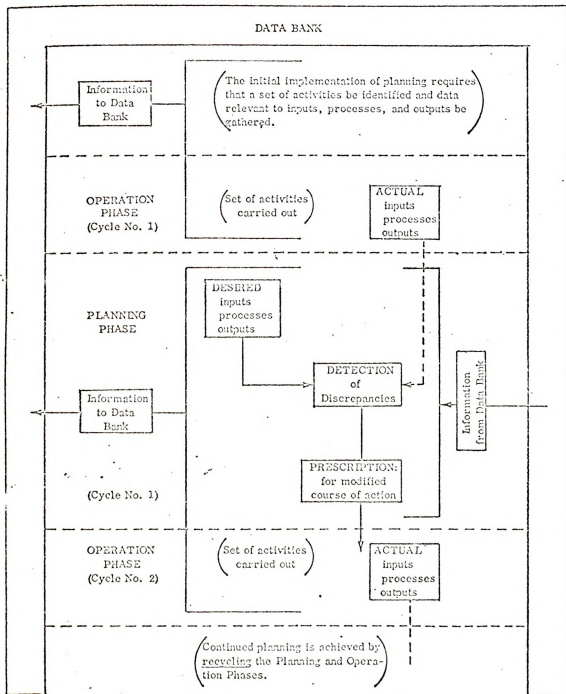
UDEANS STUDY

ABSTRACT 58

*TYPE COURSE
 *NAME 813
 *PROFILE
 JUVENILE DELINQUENCY=3
 FAMILY SERVICES=1
 PSYCHIATRIC SOCIAL WORK=5
 ADOPTION=0
 CHILD WELFARE=0
 TEACHING EMOTIONALLY DISTURBED CHILDREN=5
 MENTAL HEALTH=4
 CHILD CLINIC=2
 WORK WITH ADOLESCENTS=3
 WORK WITH BLIND, HANDICAPPED=0
 GERIATRICS=0
 CORRECTIONS=3

APPENDIX J

A Dynamic Model of the Planning Process











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