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THE EXPANDED USE OF DATA PROCESSING EQUIPMENT IN THE LOS ANGELES COLLEGES, AN INFORMATIONAL REPORT OF THE DIVISION OF COLLEGE AND ADULT EDUCATION, LOS ANGELES CITY SCHOOLS.

BY- WARBURTON, T. STANLEY LOMBARDI, JOHN
LOS ANGELES CITY SCHOOLS, CALIF.

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A STUDY OF THE POTENTIAL APPLICATIONS OF DATA PROCESSING EQUIPMENT AND SERVICES IN THIS MULTICAMPUS DISTRICT SHOWED THAT USES COULD BE DIVIDED INTO THREE CLASSES--(1) ADMINISTRATION AND SERVICES, INCLUDING DECISION MAKING, PROCESSING, COMMUNICATING, AND SUMMARIZING, (2) DIRECT AND INDIRECT SERVICES TO FACULTY MEMBERS, AND (3) INSTRUCTION. TO PROVIDE FOR THESE APPLICATIONS, A PLAN IS OUTLINED WHICH PROVIDES FOR (1) AN INFORMATION AND SERVICES UNIT AT EACH COLLEGE, INCLUDING A SMALL TO MEDIUM SIZE COMPUTER EQUIPPED WITH DIRECT ACCESS STORAGE DEVICES AND REMOTE INQUIRY TERMINALS, (2) AN INSTRUCTIONAL LABORATORY UNIT AT EACH COLLEGE, AND (3) A CENTRAL COORDINATING UNIT, CONSISTING OF A STAFF OF TECHNICALLY TRAINED CLASSIFIED EMPLOYEES TO PROVIDE SUPPORT FOR THE OPERATIONS AT THE INDIVIDUAL COLLEGES. FINANCIAL CONSIDERATIONS, BUDGETARY PROPOSALS, AND INSTALLATION SCHEDULES ARE PRESENTED. (WO)

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AN INFORMATIONAL REPORT OF THE DIVISION OF COLLEGE AND ADULT EDUCATION

LOS ANGELES CITY SCHOOLS

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Dr. Ralph Richardson, President
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James Edward Jones
Charles Reed Smoot
Dr. Hugh C. Willett

SUPERINTENDENT OF SCHOOLS
Jack P. Crowther

by . . . . . T. Stanley Warburton
Associate Superintendent

John Lombardi
Assistant Superintendent

presentation . . . . . Lloyd Cadbury
Tabulating Coordinator
College Office

UNIVERSITY OF CALIF.
LOS ANGELES

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Los Angeles, California

April 28, 1966

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I N T R O D U C T I O N

This is a report of a study which has been conducted by the staff of the College Office into the potential uses of Data Processing equipment and techniques in the Los Angeles Junior Colleges. The study was started two years ago as a result of the increasing number of requests by instructional departments and administrative offices for data processing equipment and services. We felt it was necessary to prepare a comprehensive coordinated policy regarding the use and acquisition of this expensive equipment.

This report is divided into five chapters:

I. A survey of the data processing needs of the College District;

II. An examination of the present "state of the art" of data processing equipment and techniques;

III. A District Data Processing Plan;

IV. An analysis;

V. Costs.

An integral part of this study was a survey conducted to determine the areas of need in the instructional departments and the administrative offices of the colleges. This survey was conducted by Lloyd Cadbury of the College Office with Andrew A. Burgoyne and Miss Linda Nillson of the International Business Machines Corporation. We wish to express our appreciation for the whole-hearted cooperation of the members of the instructional, administrative and clerical staffs whose participation in many meetings and interviews made this study possible.

I. A survey of data processing needs of the College District

In this chapter we shall discuss the findings of the survey described in the Introduction. Since almost a full year was spent conducting the survey, it is obvious that only the highlights can be touched upon in this brief report. The chapter is subdivided into three sections:

A. Administration and Services
B. Faculty
C. Instruction

A. Administration and Services

In this section we shall be referring to the duties, problems, and needs of the administrative and service offices of the colleges. These include the offices of the President and the Deans of Instruction, Admissions, Educational Services, Evening Division, Student Personnel; and such services as counselling, library, audio-visual, health, book store, student body finance, and placement.

All offices perform four basic functions: decision making, processing, communicating, and summarizing. Each of these is described below.

1. Decision making
   a. Routine Routine, automatic decisions not requiring administrative judgment. (Has the student dropped below 12 units? Has the classroom been filled to its maximum capacity? Has the equipment budget for the Chemistry Department been exhausted? Is this projector being used at 11 o'clock next Tuesday?)

   b. Administrative Decisions requiring administrative judgment. (Should this student be called in for counselling? Should we open another section of this course? Should we transfer funds from the Art Department to the Chemistry Department?)

2. Processing The filing, recording, and information retrieving functions. (File the student's transcripts in his folder. Record the student's attendance on the attendance ledger. Record classroom capacities on the room inventory ledger. Post the date a book was withdrawn from the library. Find the student's grade in English 1. Find the amount of money budgeted to the Chemistry Department. Find the name and address of the student who withdrew the library book a month ago.

3. Communicating

a. Input Information received in the office from a student, faculty member, another office, outside agency. (Applications for Admission. Petition to add a class. Funds allocated to the college for supplies. Requests for names and addresses of all incoming Freshmen. Notification that a class has been filled to capacity. Notification that a class has been discontinued.)

b. Output Information sent from the office to a student, faculty member, another office, outside agency. Note that many items which are output from one office become input in another office. (Names and addresses of all incoming Freshmen. Notification that a class has been filled to capacity. Notification that a student is no longer eligible to participate in varsity athletics. Notification that a student has an overdue library fine. Notification that the supply budget has been exhausted. Attendance reports, Class Rosters. Student Grade Reports. Physical inventory reports.)

c. Internal Information sent from one person to another in the same office. (This candidate for graduation has dropped a course. This student has moved out of the Los Angeles Junior College District. Transfer $500 from the Art to the Chemistry account.)

4. Summarizing The compiling and summarizing of reports from data filed in the office. (Attendance reports. Enrollment statistics. Classroom utilization analysis. Grading statistics. Budgetary analysis. Book utilization reports.)

Although the above functions are listed separately for the purpose of definition, it is obvious that they are interrelated. Also, and this is of paramount importance when considering the adoption of a data processing system, a decision or report initiated in one office often has a major effect on the work of several other offices. In almost all of the offices in which we held interviews it was felt that some of these functions already had broken down or were in imminent danger of doing so. The reason is, of course, that our institutions are very large and complex. This not very original observation should need no further comment, but perhaps for those not intimately involved in the daily operation of our colleges we should cite the following two examples. First, in a college of 15,000 students if the clerical staff is asked to perform a task which involves the scanning of each student's record for one minute it will take more than six man-weeks to complete the task.

Second, although it is frequently assumed that work load and staff requirements increase in a direct ratio to one another, this is not true. Consider these factors inherent only in a large organization: (1) Elaborate file maintenance procedures are necessary. (2) The time it takes to find a record (access time) becomes a major factor in the time it takes to complete a task. (3) Time consuming written and verbal inter-desk, inter-unit, and inter-office communications are required. (4) Files must often be duplicated to allow more than one person at a time to use a record. (5) Various levels of supervision are necessary to ensure a smooth flow of work. (6) Special files must be maintained as indexes, tracers, and logs. To summarize: In a manual/clerical operation, as the work load increases the poorer becomes the ratio of cost to performance, and it is evident that any system we propose should improve this ratio.

The following outline lists some of the tasks which were presented to us by the staff members we interviewed. It is not a definitive list but it is illustrative of the wide variety of applications we found. The items vary greatly in complexity and scope. Some with deceptively short titles, such as "Preparation of District, State, and Federal reports" consume many man-years of work at each college each semester.

<u>Admissions Office</u>:

Rapid and automatic access to student's current record

Elimination of manually updated study lists

Work in progress reports for the transcriptunit

Lists of probationary students

Lists of Honor Students

Automatic notification to the proper person or office when a student's status changes (graduation clerk, veteran's clerk, bursar's office, interdistrict relations office, draft board, immigration office, etc.)

Athletic eligibility lists

Student population analyses

Calculation and preparation of District, State, and Federal reports (attendance, enrollment, University and State College eligibility, student origin, etc.)

Statistics to aid in enrollment predictions

Rapid preparation of student grade reports and cumulative records

Calculation and posting of cumulative grade point averages

Assistance in determining eligibility for graduation

Techniques for speeding up registration procedures

Automatic scheduling of students into classes

Preparation and maintenance of class waiting lists, and notification to students of class vacancy

Automatic checking of course prerequisite requirements

Automatic checking that the program a student has selected contains no time conflicts

Methods for determing meaningful criteria for the establishment of registration priorities

Automatic preparation of permits to register

Automatic maintenance of flagged student file

Preparation of address labels for various mailing lists

Reduction of the number of records which must be manually filed

Automatic maintenance of files for students residing outside of the Los Angeles College District

Maintenance of files of students' high school and previous college records

Studies on the causes of student drop-outs

Automatic transmission of transcripts and student information from one college to another

Counselling Office:

Rapid and automatic access to students' current record

Rapid and automatic access to students' high school and previous college record

Rapid and automatic access to entrance test results at the time a student is counselled

Automatic notification when a student's grades indicate he needs counselling

Automatic notification when a student drops a course prescribed by a counsellor

Statistical analyses to assist counsellors in guiding students into proper curricula (Analyses of causes of failure and success; correlations of high school grades, entrance test results, college performance, and success after graduation)

Reduction of clerical filing and record maintenance routines

Offices of Instruction and Evening Division:

Preparation and printing of Schedule of Classes

Assistance in preparation of the College Catalog

Automatic maintenance of and rapid access to a master room assignment schedule

Techniques to provide optimum room utilization (requires knowledge of room capacity, type of seating, darkening facilities, special equipment, etc.)

Prevention of conflicts in room scheduling

Prevention of conflicts in the preparation of faculty assignments

Automatic maintenance of and rapid access to a master faculty file to include current classes assigned, credential information, etc.

Calculation and preparation of District, State, and Federal reports (Instructor load, room utilization, faculty statistics, etc.)

Assistance in determining what new courses and curricula industry and other community agencies think we should be offering

Assistance in predicting enrollment in specific courses or subject areas

Student grade distributions

Automatic preparation of notices to the proper offices and faculty members when classes are filled or discontinued, when changes are made in faculty or room assignment, and when new classes are opened

Automatic receipt of notices when class enrollments are either above or below established norms

Assistance in determining students' needs for courses and curricula which are not now being offered.

Office of Educational Services:

Maintenance of and rapid access to budgetary accounts by departments including equipment, replacement, alterations and improvements, supplies, and printing

Assistance in the preparation of the annual budget request

Assistance in the preparation of personnel time records and payroll reports

Automatic preparation of reports on budgetary balances to each department

Maintenance of and rapid access to various physical inventories: (1) by classroom (number of seats, type of seating, audio-visual equipment, etc.), (2) by department (equipment), (3) by staff member (keys issued)

Access to room utilization records

Correlations of statistics for designing new buildings and facilities

Calculation and preparation of District, State, and Federal reports

Maintenance of inventory in faculty supply rooms

Automatic ordering techniques for stock items.

Library:

Circulation including the checking in and out of books and automatic records maintenance

Assistance in book cataloging

Automatic notification to students when books are overdue

Automatic fine billing

Assistance in the preparation of lists of appropriate books and periodicals for the use of various instructional departments

Assistance in the ordering of books and periodicals

Assistance in taking inventory

Statistics on book utilization to assist in decisions on future purchases

Preparation of an overall catalog of books in all college libraries

Assistance in the location of books which are to be put on reserve, and the notification to the borrowers of these books to return them.

Health Office:

Maintenance of students' health record

Notices to appropriate departments and offices listing the names of students not cleared to participate in physical education

Notices to students to report for health examination

Preparation of lists to be sent to high schools for obtaining health records

Listing of students whose health records indicate the need for periodic medical examination.

Student Body Office and Bookstore:

Maintenance of inventory of equipment owned by the Student Body

Assistance with preparation of Student Body payrolls

Assistance with maintenance of Student Body accounts

Assistance with the receipts and disbursements of "out of state" tuition

Access to projected enrollment figures to assist in the planning of textbook orders

Immediate notification to the book-store when new classes are opened or existing ones are cancelled.

Audio-Visual Office:

Preparation of film catalogs

Inventory of Audio-Visual equipment

Assistance with the scheduling of equipment/films, etc.

Coordination with the central Audio-Visual Data Processing unit to eliminate manual procedures and prevent duplication of effort.

General Services:

Campus telephone directories

Faculty and staff address lists

Maintenance of a variety of mailing lists.

Office of Student Personnel:

Rapid access to student record for the purpose of determining eligibility to student government offices, clubs, honors, student activities, etc.

Automatic preparation of mailing lists

Automatic maintenance of files pertaining to student parking permits

Assistance in student elections

Maintenance of alumni lists

Calculation and preparation of District, State, and Federal reports

Assistance in notifying students of activities in which they have expressed an interest

Assistance in the selection of candidates for scholarships

Listing for various student groups (choir, orchestra, clubs, etc.). The names of those students who have expressed an interest in these activities.

B. Faculty

Services requested by members of the instructional staff fall into two categories. First are the direct services--those which are performed directly for an instructor. Examples would include the printing of rosters; preparation and grading of tests; notification of departmental budget status; lists of library books or films in a given subject field; printing of door cards; assistance in the preparation of reports on attendance, grades, etc. This list could continue almost indefinitely, and many of the items on it would seem insignificant in themselves, but we found that with a few notable exceptions much of an instructor's non-teaching time is in fact spent attending to a myriad of these "insignificant" details. The desire for assistance in the preparation and grading of tests was mentioned by almost all of the instructors to whom we talked because:

1. it is extremely time consuming;
2. it is the method by which an instructor can judge the student's grasp of the material he has presented;
3. it is a method by which an instructor can evaluate his own performance in presenting his material.

As much concern was expressed about short weekly quizzes as about mid-term and final examinations. Following are some of the suggestions we received.

Score tests automatically.

Print lists of test results in order of rank.

Print lists of test results in alphabetic sequence for posting in the roll book.

Print lists of tests in student ID number order (and without the name) for posting in the class room.

Print item analyses of all test questions and responses.

Print item analyses of test questions and responses for the top third, the middle third, and the lowest third of the class.

Using item analysis and statistical techniques list the test questions in descending order of validity.

Return test results and analyses to instructor within 24 hours.

The second category, consists of those indirect services mentioned in Section A above, the effects of which are immediately reflected in the classroom. Some examples cited are:

1. Prevent a student from enrolling in a course without the required prerequisite.

2. Balance class sizes.

3. Prevent a student from enrolling in a course he has repeatedly dropped.

4. Provide better predictions of class sizes to enable the book store to order enough text books.

C. Instruction

The impact the "computer revolution" is producing in our society is reflected by the effect it is starting to have on the courses and curricula in our junior colleges. Exactly what effects this revolution will have on our social and economic life is still the subject of lively and heated debate both in and out of the academic community, but that its effect will be profound is no longer questioned.

The survey team met with the Deans of Instruction and the Department Chairmen of all seven colleges, and through the department chairmen we distributed a questionnaire form to the instructional staff. A copy of the form is included at the end of this report. We received responses from 203 faculty members representing 48 subject fields. Although the sampling is too small to provide a detailed statistical analysis, it is nevertheless informative to look at some of the results.

Question 4a asks if they would like to have applications in their subject area demonstrated on data processing equipment. Fifty percent of the instructors responded affirmatively; thirty percent indicated they didn't know; and twenty percent responded negatively. Those who responded positively represented 35 of the 48 subject areas. In only five subject areas were all responses negative.

Question 4b asks if they would like their students to have lab time using the equipment. The instructors were almost evenly divided among the three categories; affirmative, don't know, negative. Those answering affirmatively represented 25 of the 48 subject areas. In only six areas were all responses negative.

Question 5 asks: If you do not anticipate that all the data processing needs of your students will be met by instruction in your own department, would you encourage students to take generalized data processing courses taught outside your department? One-hundred-eight instructors representing 35 subject areas indicated they would encourage students to take such courses. Twenty-one instructors responded that all needs should be supplied within their own departments. Thirty instructors indicated they saw no need for data processing courses. Forty-three

instructors were undecided.

More than fifty instructors indicated they wanted to discuss their ideas with the interviewing team by answering question 7.

Below is a list of some of the 35 subject areas mentioned, illustrated with applications:

Agriculture (feed blending, soil analysis)
Aircraft (design of engines and airframes)
Business (many areas)
Biology (cell research, genetics, ecology)
Commerical Art (automatic drawings and "original" design)
Drafting (automatic drafting from design specifications)
Electronics (computer design and maintenance, circuit design)
Engineering (structural design, flight simulators)
Foreign Languages (automatic translators)
Law (library information retrieval)
Library Science (circulation, cataloging, information retrieval)
Machine Shop (numerically controlled machine tools)
Mathematics (many areas)
Medicine (automatic diagnosis, research on the causes of disease)
Meteorology (automatic weather mapping, long range forecasting)
Nursing (medical and hospital records)
Printing (automatic typesetting)
Physics (many areas)
Police Science (criminal records, automatic identification systems)
Psychology (tests and measurements)
Sociology (survey analyses)
Transportation (traffic simulators, traffic signal control, flight path control, ticket reservations)

To supplement the information provided by our own instructional staffs we read extensively in trade and education journals, attended seminars, and discussed data processing problems with representatives of industry. As was to be expected in such a rapidly growing field there were widely divergent opinions as to exactly what training the junior colleges should provide. There was uniform agreement, however, that the junior colleges should provide it! And there was general agreement on the types of training we should be offering. Our conclusions follow:

First, it is evident that we shall be training two types of students: (a) those who plan to make a career of operating, programming, and designing data processing systems, and (b) those who plan to use data processing equipment as a tool in their chosen fields.

Second, we shall need to provide equipment in laboratories to give students the necessary "hands on" training. Just as automobile driving cannot be learned by reading text books, computer operation cannot be learned from machine manuals. It is apparent that many, but not all of our students will need this type of training.

Third, we shall need to provide equipment on which students' programs and problems can be tested and run. It is impossible to determine if a student's program is correct without testing it on a computer. This facility is needed by many students now, and will be needed by many more in the immediate future.

Fourth, we shall need to provide equipment on which students can actively participate in classroom demonstrations of applications in their subject fields. These demonstrations, combined with appropriate course material, will enable a student to determine early in his career whether he is interested in pursuing the data processing aspects of his field.

II. An Examination of Data Processing Equipment and Techniques

In this chapter we shall very briefly discuss new developments in the field of computer technology which affect equipment utilization in the Junior Colleges. A basic knowledge of computers and data processing techniques is assumed.

1. Increased internal speeds. More decisions and computations can be made in a given period of time -- between 10,000 and 50,000 per second.

2. Inexpensive direct access storage devices. These are, in effect, an extension of the computer's central storage unit. Records are stored magnetically on coated metal disks, or short plastic strips. The amount of information that can be stored (from 8 to 400 million characters) and the cost of storage (from $\frac{1}{2}$ cent to $1\frac{1}{2}$ cents per 200 character record per year) depend on the type of storage device utilized.

3. Faster access time to records stored in the computer. (10 records can be found in a file, updated, and returned to the file in one second.)

4. "Inquiry terminals." These devices enable a person (in the computer room or in a distant location) to "look up" a record stored in the computer and have the record displayed for visual reference.

5. New programming languages. These enable programmers to prepare computer instructions faster than has been possible in the past. (Programming has long been one of the most time-consuming, and therefore expensive, obstacles confronting organizations converting to computer systems. Although this hurdle has by no means been entirely overcome, it is now economically feasible to program a relatively complicated job even if it is to be run only a few times.)

6. New supervisory programs. These programming packages, supplied by the computer manufacturer, monitor the over-all flow of work passing through the computer and ensure optimum utilization of computer facilities.

They also perform many "housekeeping" functions, greatly simplifying the tasks of the programmer and computer operator.

7. Lower cost. For the past several years the cost/performance ratio has been steadily improving and it can reasonably be expected to improve more in the years to come.

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III. The District Data Processing Plan

In this chapter we shall describe a comprehensive plan for the utilization of data processing equipment designed to meet the needs outlined in Chapter I. The structure of the plan is tripartite, (see Table 1) consisting of the following units:

1. Information and Services Unit. These units, installed at each college will be in operation throughout the college day. Each unit will be administered and staffed by personnel of the college it serves. Management, some programming, and operation of the units will be provided by classified employees under the direction of the college administrative staff. The equipment installed in each unit will consist of a small to medium size computer equipped with direct access storage devices, remote inquiry terminals, and the usual card handling and printing facilities. It will operate under control of a supervisory program of the type described in Chapter II. Identical machine configurations will be installed in each college except for those variations necessitated by differences in size. These units are designed to provide the following four services described in Chapter I.

A. The testing and running of student programs and problems.

B. Classroom demonstrations of data processing applications.

C. Faculty services.

D. An "Information System" for the college administrative offices.

The term "Information System" is a relatively new data processing term which refers to a data management technique made possible by the modern computer's ability to store large quantities of data, and to retrieve the stored data very rapidly. It provides the following facilities.

A. Most of the major files of the college can be stored in the computer.

B. New source data need be fed into the computer only once. All appropriate files are automatically and simultaneously up-dated.

C. Information stored in the computer is available to any office which needs it and can be retrieved easily using new, simplified programming techniques.

D. Correlations and cross checking between files can be done accurately and at electronic speeds.

E. Reports requiring data from several files can be prepared automatically.

Lest it be thought that utopia has arrived, we should point out that preparing a large file (such as a library catalog) for entry into the computer is still a tremendous clerical task; and although all organizations aim toward the "total" information system, it is unlikely that any but the most affluent will ever achieve the goal.

2. Instructional Laboratory Unit. These units, installed at each college will be in operation throughout the college day, and they will be under the direction of the instructional staff of the college. The plan imposes only one design criterion on these units. They will have to provide all the "hands-on" training described in section C of Chapter I. This means that as new curricula, applications, and courses are developed, there are virtually no restrictions which will prevent the instructional staffs from selecting the equipment best designed for laboratory use.

3. Central Coordinating Unit. This unit will consist of a staff of technically trained classified employees assigned to the central College Office. Its functions will be:

A. To provide systems design and programming support for the College Information and Services Units.

B. To act as a coordinating agent for those applications which are common to all colleges.

C. To perform a liaison function between the central administrative staff and college personnel in matters pertaining to data processing.

D. To maintain a library of applications, programs, demonstrations, and related information for use of the college staffs.

E. To assist in the preparation of data processing budgets, and the selection and ordering of equipment.

F. To serve on district and state committees the work of which is affected by, or will affect, data processing activities.

G. To assist, if requested, all college personnel in the design of new service applications and demostration packages.

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IV. An Analysis

This chapter will present a brief analysis of the merits of the plan outlined in the preceding chapter.

1. The instructional staff is provided maximum freedom in deciding on the type of equipment they need in the Laboratory Units. No restrictions (on time equipment) are imposed by the necessity of performing administrative and service functions.

2. Similarly, the equipment in the Information and Services Units can be tailored exactly to the jobs they are to perform. These will be production shops designed to perform the many service and administrative functions at high speed. They are also admirably suited to the two instructional tasks we have assigned them.

3. The advantages of having a separate Information and Services Unit on each campus are many.

a. The scheduling of services to be provided <u>for</u> the college staff can be decided <u>by</u> the college staff.

b. Since it takes as long to give a class demonstration on a large machine as it does on a small one, dividing the equipment among six units will decrease the amount of "production time" lost. Also, of course, there are no student transportation problems involved.

c. Inquiry terminals are less expensive and faster if they do not require connection to a common carrier (telephone) line.

d. Since, at present, the most flexible, economical, and prevalent medium of communication between man and machine is the tabulating card, processing them on campus eliminates a tremendous transportation problem.

e. Providing 24-hour service for test scoring, student program running, etc., (without a prohibitively expensive system) is practical only if the equipment is located on campus.

f. Job scheduling is immensely less complicated. Changes in the work load of one college have no affect on that of any other. No problems are presented as the District builds new colleges. Large complex systems require very sophisticated programming support. It is very easy with such systems just to skim the cream off the top of the work load, performing only the large-volume jobs. Those smaller, but equally time consuming jobs, tend to be left largely untouched.

g. There is enough work to be done at each college to justify separate units.

4. The plan provides an optimum personnel policy.

a Those functions which can best be performed by a centralized staff will be the responsibility of the Central Coordinating Unit. Possessing skills different from those required by the personnel employed in each college, the central staff will provide common services for all colleges.

b. The staffs of the Information and Services Units will be responsible for the operation of the equipment, job scheduling, and the preparation of the programs necessary to produce desired reports. These are properly the functions of those who are in direct daily contact with the personnel for whom the work is being done. Also, these functions are at a level to make it both possible and desirable to recruit the staff from the present tabulating classifications. Not only is this valuable in providing opportunities for personnel promotion, but it will provide the units with staffs who already have years of experience in processing college records.

c. The staffing of the Laboratory Units can be decided by the instructional departments solely on the basis of educational considerations. Also, faculty members can be freed of most of the chores of program testing if they so desire.

d. Since the entire system is designed to be relatively "unsophiscated" fewer high level programmers will be needed than would otherwise be the case.

This will also permit some of the programming problems to be assigned to advanced students as class projects.

5. The plan is commensurate with the present state of the data processing art. Also, it is specifically designed to avoid dead ends. We have anticipated that those techniques which are still too costly or too experimental for our use will become more and more available to us. These include "Computer Assisted Instruction", extensive real-time applications, high speed data communications, and a massive centralized data bank. These will all act as enhancements of and can readily be adapted to the present system design.

V. COSTS

This chapter will be primarily concerned with the costs of establishing the Information and Services Units at six colleges and the Central Coordinating Unit. Costs of the Laboratory Units will be discussed briefly at the end of the chapter.

The establishment of the units proposed will require substantial budgetary increases over a period of the next two fiscal years. The costs are of two types, non-recurring and recurring.

1. Non-recurring costs. These are one-time charges necessary for the conversion.

a. Supplies and printed forms. New plates must be prepared when we convert our tabulating cards and other forms for use by the new equipment. The total cost of $8000 will be needed in the first year.

b. Equipment. Disc packs, files, storage cabinets, desks.

1st year	$31,400
2nd year	14,300
Total	45,700

c. A and I. Raised flooring, increasing capacity of Air Conditioning units, room alterations at three colleges. The total cost has been estimated at between $75,000 and $100,000, and it will all be needed the first year.

2. Recurring costs. These are the equipment lease and salary costs which continue from year to year. They are summarized in Table 2. The explanatory notes below refer to the figures in this table.

a. "Present costs" include the rental of equipment and the salaries of the IBM tabulating units which are now part of the Admissions offices of the six colleges. Also included is the salary of the Tabulating Coordinator assigned to the Division of College and Adult Education.

b. The new salary costs are for the positions listed in Table 1.

c. Annual cost per college -- (the total cost of the college units plus the central unit divided by six)

Present cost	$ 48,000
Proposed cost	$ 142,000

The proposed cost is approximately three times the present cost.

d. Hourly cost per college. This is a figure commonly used in the evaluation of data processing costs. It was computed as above, taking into account one additional factor. One of the existing units is now operating two shifts, whereas all the proposed college units will be operating two shifts.

Present cost	$ 19
Proposed cost	$ 36

The proposed cost is approximately 1.9 times the present cost.

e. The equipment costs of our units will be between 50 and 55 percent of those charged non-college installations. Equipment manufacturers give substantial discounts or "Educational Allowances" to institutions of higher education.

f. The increase shown for the second year represents almost entirely the full years costs of equipment and salaries for which we will have committed ourselves during the latter part of the first year. Therefore, it will not be possible to reduce this request below the figure stated.

3. Questions and answers. In this section we shall answer some of the most frequently asked questions pertaining to the costs of operating a data processing system.

a. Will these systems reduce clerical costs? Not at first because:

(1) Many college offices are only marginally staffed at present.

(2) One of the purposes of the proposed systems is to free the present staff of routine chores, and thus give more time to serve students, faculty, and administrators.

(3) Clerical help will have to be recruited from the existing staff to prepare data for use by the data processing systems.

However, the number of new clerical positions needed in the future should be significantly reduced.

b. Will cash savings ever equal expenditures? No, almost certainly not. This is an area in which it is particularly easy to manipulate statistics. In spite of the eventual reduction of the need for additional clerical help, and the ability to prepare such expensive publications as the Schedule of Classes, it is unlikely that our cash savings will ever exceed 75 or 80 percent of our expenditures. The data processing budget is certain to increase in the future as new techniques (such as computer assisted instruction) become feasible. We have no "product" on which profit and loss can be measured, and therefore we know of no meaningful way to place a dollar value on most of the services we have described in the first chapter.

c. Will Federal financing be available to defray part of the cost? It is possible that because of the instructional tasks being performed Federal assistance can be sought. However, this is a long range proposal and we feel it should be evaluated on the assumption that the District will pay the entire cost. Once we have embarked on this plan it would be extremely difficult to retract at some future date when outside funds were no longer forthcoming.

4. Conclusion. We have attempted to be both complete and candid in tne evaluation of costs. This proposal is the first major change in data processing philosophy the District has presented in the last fifteen years. We feel it is comprehensive, flexible, and economical and that it should serve the District for some years to come.

Determination of the costs of the college Laboratory Units is a task which must be left to the instructional staffs, but it is vital that these costs be considered an integral part of our overall plan. Our estimate is that these units will require an annual budget of $200,000 to $300,000 within the next five years.

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TABLE 1

LOS ANGELES CITY JUNIOR COLLEGE DISTRICT

DATA PROCESSING UNITS

LOCATION	COLLEGE		DIVISION OFFICE
UNIT	Information and Services Unit	Laboratory Unit(s)	Coordinating Unit
EQUIPMENT	Small/medium computer and associated unit record equipment	Math/Sciences oriented equipment and/or Business oriented equipment and/or numerical control equipment	None
STAFF*	1 Manager 1 Asst. Manager (Eve.) 2 D. P. Operators 2 Keypunch Operators	To be determined by college instructional staff	1 Data Systems Coordinator 1 Asst. Data Systems Coord. 2 Programmer Analysts 1 Intermediate Clerk Typist

*Positions subject to review by the Personnel Commission.

TABLE 2

EQUIPMENT LEASE AND SALARY COSTS

	Present Costs			1966-1967 (1st Year)			1967-1968 (2nd Year)		
	Lease	Salaries	Total	Lease	Salaries	Total	Lease	Salaries	Total
ollege nformation nits	105,000	172,800	277,800	188,100	194,400	382,500	566,000	236,000	802,000
entral oordinating nit	---	11,000	11,000	---	31,900	31,900	---	49,500	49,500
otal	105,000	183,800	288,800	188,100	226,300	414,400	566,000	285,500	851,500
crease over present costs				83,100	42,500	125,600	461,000	101,700	562,700
crease over 1966-1967 costs							377,900	59,200	437,100

TABLE 3

INSTALLATION SCHEDULE

October 1966	Assign 1 new keypunch position at each college Unit
October 1966	Assign the positions of Data Systems Coordinator, Assistant Data Systems Coordinator, Programmer Analyst, Intermediate Clerk Typist at the Central Coordinating Unit
March - June 1967	Install computers in the College Information and Service Units
July 1967	Assign the positions of College Data Systems Manager, Assistant College Data Systems Manager, 2 Data Processing Operators at each College Information and Service Unit
July 1967	Assign an additional Programmer Analyst position at the Central Coordinating Unit

LOS ANGELES JUNIOR COLLEGE DATA PROCESSING SURVEY

Many faculty members have expressed a desire to use Data Processing equipment (computers, punched card machines, etc.) as an instructional tool in teaching their classes. This survey is an attempt to discover the extent of this interest. Please check the appropriate boxes. Ignore the numbers beside the boxes; they are for coding purposes only. RETURN THE COMPLETED FORM TO YOUR DEAN OF INSTRUCTION AS SOON AS POSSIBLE. Thank you.

1. Check your college: East Los Angeles ☐ (1) Harbor ☐ (2) City ☐ (3)
Metropolitan ☐ (4) Pierce ☐ (5) Trade-Tech ☐ (6)
Valley ☐ (7)

2. What is your subject field? _____
(If you teach in more than one subject area, please use a separate form for each.)

3. Are you now teaching and do you plan to teach any Data Processing in your department?

	NOW		PLAN
a. Extensively -- including setting up new courses.	☐	(1)	☐
b. Fairly extensively -- including major changes in some existing courses	☐	(2)	☐
c. Some -- including the introduction of some Data Processing concepts in existing courses	☐	(3)	☐
d. Little	☐	(4)	☐
e. Don't know yet	☐	(5)	☐
f. None	☐	(6)	☐

4. If Data Processing equipment is made available, will you want to use it? (Please answer both a. and b.)

a. I would like to have applications in my subject area demonstrated to students:

1. Extensively	☐	(1)
2. Some	☐	(2)
3. A little	☐	(3)
4. Don't know yet	☐	(4)
5. None	☐	(5)

b. I would like my students to have lab time using the equipment:

1. Extensive amount of lab time	☐	(1)
2. Some lab time	☐	(2)
3. A little lab time	☐	(3)
4. Don't know yet.	☐	(4)
5. None	☐	(5)

c. If there are other areas of use you foresee, please add your comments on the back of this sheet, and check here . . ☐ (1)

5. If you do not anticipate that all the data processing needs of your students will be met by instruction in your own department, would you encourage students to take generalized Data Processing courses taught outside your department?

a. Yes -- several courses, including programming . . .	☐	(1)
b. Yes -- a few courses, including concepts and applications	☐	(2)
c. Yes -- an introductory course	☐	(3)
d. No -- all needs should be supplied within my own dept.	☐	(4)
e. No -- no need for Data Processing courses	☐	(5)
f. Undecided as yet	☐	(6)

6. Please check any areas of Data Processing experience you have had which have proven valuable to you in teaching your subjects. (Check all that apply.)

a. Have planned Data Processing Systems . . . . . ☐ (1)
b. Have worked with Data Processing equipment . . . . . ☐ (1)
c. Have used Data Processing in research . . . . . ☐ (1)
d. Have taken Data Processing courses . . . . . ☐ (1)
e. Other _____ . . . . . ☐ (1)

7. If you have some ideas you would like to discuss with the interviewing team check here . . . . . ☐ (1)
and print your name _____ (Within the limitations of time we will try to see as many of you as possible. If we are deluged with responses, obviously we won't be able to see you all!)

8. Comments. If you have any comments you would like to add, check here . . . . . ☐ (1)
and write on the back of this sheet.