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ABSTRACT

CAMPUS is composed of 4 basic elements. The central element is a computer-based simulation model that is designed to estimate the resource implications of alternative administrative and educational plans and policies. A planning, programming and budgeting system is used to integrate the simulation model into the formal planning and budgeting processes of the institution. A master planning system is used to interpret the long-range academic and administrative plans of the institution into their implications for physical planning. An integrated management and planning information system is used to support the 3 other elements of CAMPUS. This report discusses (1) the development of CAMPUS; (2) the adaptation of CAMPUS to health sciences educational planning, and other developments; (3) CONNECT/CAMPUS, a computer-based college management system; and (4) what the model can and cannot do in terms of general problems, finance, space planning, enrollment, academic planning, teaching methods, and staff planning. The report includes numerous charts and tables. (AF)

THE DEVELOPMENT AND IMPLEMENTATION OF CAMPUS A COMPUTER-BASED PLANNING AND BUDGETING INFORMATION SYSTEM FOR UNIVERSITIES AND COLLEGES

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A. THE CHALLENGE TO EDUCATIONAL ADMINISTRATORS

During the past few years, increasing public aspirations for further education, along with inflation, have caused government expenditures on education to increase at a rate far in excess of the increase in G.N.P. Many educators and planners have warned of an impending "crisis" in educational financing if the recent trend is permitted to continue.

Traditionally, it has been assumed that any improvement in educational service is worthwhile, and that as such, it should be supported financially from public funds. However, modern government financial management under a program planning and budgeting system dictates allocation of resources among the many services such as education, health, welfare, highways, etc., in proportion to their relative priorities. Consequently, it is now apparent that educational administrators must, in turn, consider their own priorities and alternate means of reaching desired goals.

Unfortunately, traditional methods of educational management have not provided educational administrators with the planning data required for this new challenge. Bundy states the problem as follows:

> But what is much more serious is that with the tools now available they cannot really prove

> their case. They simply do not have the facts and figures they need. Let me emphasize that I do not say that the facts and figures do not exist -- I say only that they do not have them. They do not have them for the simple and fundamental reason that as a class neither colleges nor universities, public or private, large or small, old or young, have ever made it their business to learn and to tell the whole story of their resources and their obligations, their income and their expenses, their assets and their debts, in such a way that the public can fully and fairly judge their economic position. [1]

B. A WAY TO MEET THE CHALLENGE

CAMPUS [2] is a system designed to help colleges and universities to gain the maximum educational advantage from the resources which are put at their disposal. Equally, it will help them demonstrate to the public and to government that their needs are real and truly justified.

For over six years now the members of the Systems Research Group have been working on the development of new tools to aid educational administrators. CAMPUS has evolved during this

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1 Bundy, McGeorge, "Advice to Educators: Be Candid About Your Money Problems", Think, Jan - Feb 1968, p.32

2 CAMPUS - Comprehensive Analytical Methods for Planning University Systems. See "A New Tool for Educational Administrators" A Report to the Commission on the Financing of Higher Education by Richard W. Judy and Jack B. Levine, University of Toronto Press, 1965

time. As shown in Figure 1, CAMPUS is composed of four basic elements. The central element is a computer-based simulation model that is designed to estimate the resource implications of alternative administrative and educational plans and policies. A planning, programming and budgeting system is used to integrate the simulation model into the formal planning and budgeting processes of an institution. A master planning system that uses the model and extends its output is incorporated to interpret the long range academic and administrative plans of the institution into their implications for physical facilities. The system is also designed to support the architectural design function by relating the academic programs to detailed requirements for physical facilities. An integrated management and planning information system is used to support the other three elements of CAMPUS. It should be emphasized that this information system is not intended to meet day-to-day control and operating needs, but can, by itself, produce much useful and relevant information on past performance.

C. THE DEVELOPMENT OF CAMPUS

The work to develop the system began in 1964 in conjunction with the Bladen Commission Study on the Financing of Higher Education in Canada. A project was carried out to assess the feasibility of building a simulation model of the University. Using the College of Arts and Science at the University of Toronto, a pilot study was undertaken to assess the conceptual specification and data requirements of such a model. The results of this work were published in a report to the Commission on the Financing of Higher Education entitled A New Tool for Educational Administrators. In it, Richard Judy and Jack Levine concluded that: "Experience gained ... indicates that the construction of a systems simulation model for a ... university is a feasible undertaking ... the ... project revealed the existence of ample data scattered in various quarters of the university. The data, if gathered into a coherent analytical structure, could greatly assist planners and decision-makers ... within ... universities, the simulation model should improve the efficiency of resource allocation and raise the quality of future planning".

The concepts that were developed in the course of the pilot project looked promising and the University of Toronto asked SRG to set up a permanent group, the Office of Institutional Research, to operationalize the concepts and implement them for the University as a whole. SRG personnel were responsible for organization, staffing and consulting technically to the Office during its development phases. This initial attempt to implement CAMPUS was anything but a complete success. Problems encountered ranged from political and organizational ones in attempting to institute a new way of planning and budgeting to technical ones concerning the design of the simulation system and the available computer facilities. These experiences laid the groundwork through actual experience for the future evolution of the technical and implementation work on CAMPUS.

D. THE ADAPTATION OF CAMPUS TO HEALTH SCIENCES EDUCATIONAL PLANNING

Beginning in late 1966, SRG analysts were commissioned by the Senior Coordinating Committee for Health Sciences Education in Ontario to develop models that could be used in planning for the expansion of the University of Toronto's Health Sciences complex. Government policy necessitated an expansion of the Medical Faculty from 175 to 250 medical students per year. In conjunction with this increased enrolment a number of other factors were to be considered:

- The change from a departmental to an organic systems curriculum
- The allocation of students to various teaching hospitals
- The effect of reducing the number of teaching hospitals or specializing them
- The impact of altering basic parameters, such as teaching group sizes and teaching methods

The Systems Research Group established a team of systems analysts, operations researchers and programmers with a Medical Doctor as Director under the Vice-President of Health Sciences in a group called the Health Sciences Functional Planning Unit (HSFPU). A system of CAMPUS models that is oriented towards health sciences was developed to deal with various parts of the problems of planning in a health sciences complex in order to evaluate questions such as those mentioned above. Figure 2 outlines the relationship of the models. The following is a brief description of each of the main models involved in the medical version of CAMPUS:

1. UGEDUC - The Undergraduate Education Model

   This model accepts descriptions of the undergraduate teaching program and produces the resource requirements needed to sustain that program.

2. TRANEE - The Specialty Training Model

   This model accepts specifications of the medical specialty training program and produces reports on the requirements for staff teaching hours and teaching patient hours needed.

3. STAFF - The Medical Staff Model

   This model accepts statements of teaching staff hours for the undergraduate and specialty training programs from

UGEDUC and TRANEE. It also accepts constraints concerning staff policy objectives of the departments and staff time profiles. These inputs are submitted to a linear programming model which produces statements of the numbers of staff required to meet the various constraints while minimizing on a number of possible objective functions including staff numbers and the academic salary costs.

4. CIRCUS - Calculation of Indirect Resources and Conversion to Unit Staff

This model accepts statements of staff requirements from the linear programming STAFF model and produces reports on teaching and research space, other related indirect resource requirements and dollar costs.

5. PRIMER - Patient Record Information for Medical Education Requirements

This model accepts information on patient contact hour requirements from the undergraduate and specialty training programs, data on the "generation" of patients by the community and other patient care information. These data are combined with medically determined constraints on patient care and their ability to sustain teaching exposure. As output the model calculates the numbers of patients and teaching beds required to sustain the various programs.

6. CIPHER - Calculation of Patient and Hospital Education Resources

This model computes various patient and patient-care related indirect resource requirements and dollar costs including teaching beds and other teaching hospital resources.

Figures 3 and 4 show some sample analyses that have been run on the impact on staff contact hours with medical undergraduates over the thirty-six weeks of the academic year of increasing enrolment and changing the curriculum. Three different cases were run as shown and from the three departments, Medicine, Paediatrics and Surgery, one sees a very marked difference in the impact of the change in curricula on requirements for staff time. Figures 5 and 6 show the impact of the changes on requirements for ambulatory patients and hospitalized patients.

This type of analysis has been an integral part of the curriculum planning decisions and has led to the development of curriculums that are both desirable from an educational point of view and feasible and efficient from a resource use one.

E. FURTHER DEVELOPMENT OF CAMPUS

In 1966, the Ford Foundation gave a grant of $750,000.00 to the University of Toronto to do basic research on the CAMPUS techniques. This provided an opportunity to consolidate the technical lessons that had been learned over the first three years, and to experiment with new possibilities.

Beginning in January 1969, Systems Research Group undertook a pilot project to develop operational cost simulation and planning models at three of the Colleges of Applied Arts and Technology in Ontario. These models and the data needed to support them, have been developed and are now operating. The three colleges participating in the study were selected as representative of the total system of colleges in the province.

The colleges share the basic aim of training their students in one, two and three year terminal programs in the Applied Arts, Business, Data Processing and Engineering Technology, so that they will be employable within their community upon completion of their program. The colleges are also highly involved in extension and manpower programs, likewise serving the immediate needs of their respective communities. Now in their third year of operation, the colleges are charged with planning in very uncertain environments. Their daytime enrolments range from less than 1,000 to 7,000 at the largest college. Efforts to predict enrolment for the coming years have been at best tenuous, yet all the colleges are now in the process of building permanent physical facilities to accommodate 1,000 to 10,000 students.

The task is complicated not only by uncertain enrolment, but equally by fluctuations in the students' demand for various types of programs. New programs are constantly being proposed and operating programs being considered for deletion as their popularity wanes. Many other problems exist because of uncertainties and many decisions have yet to be made. Admissions standards have to be re-examined in view of current extremely high attrition rates. Teaching methods are under experimentation to determine suitable class sizes and examine use of team teaching, audio-visual equipment, closed circuit television lectures. Staffing policies and decisions have yet to be made in many cases and college financing is also still under discussion. The colleges are acting together to work out a suitable formula financing scheme.

The project, sponsored by the Ontario Department of Education, had the primary objectives of assessing the potential benefits from the application of these systems simulation techniques to the problems of community colleges and equally, of determining exactly what would be involved in a widespread implementation in the twenty colleges throughout the province.

The pilot study was completed at the end of 1969 and an assessment of its success was carried out by the participating colleges, the Ontario Department of Education and the Systems Research

Group. The result was virtually unanimous agreement that the CAMPUS system is useful and necessary for all twenty Colleges of Applied Arts and Technology in Ontario.

The decision was made to proceed in implementing the system, with certain modifications and extra features added to it. The implementation is now in progress.

The basic components of the system will remain, but will be modified as required. The major extensions on the pilot study are as follows:

1. Modify, improve and further generalize the CAMPUS computer programs, communication systems, reporting and analytical capabilities to serve the needs and peculiarities of all the colleges.

2. Expand the CAMPUS system so that its information sub-system includes additional data, specifically, in the student and staff areas.

3. Develop an agreed upon hierarchy of information security for each college for each type of information. Develop and implement computer programs that can effect the security system.

4. Develop a set of computer programs and procedures for developing province-wide statistics that can be used by the Department of Education and the colleges. This will include providing an information planning and budgeting capability for dealing with questions concerning the group of colleges as a whole.

5. Develop procedures for arriving at an equitable and defensible formula financing system, budget submission procedures and comparative system-wide information, using the information system that has been created.

It is this operational and tested system which forms the basis of CONNECT/CAMPUS, a means of making available to colleges and universities the systems that have evolved.

F. CONNECT/CAMPUS

CONNECT/CAMPUS is a computer-based college management system which can quickly and economically perform analyses on historical, current and planning data. The system comprises a series of computer routines or modules that are assembled according to the tasks the user requests. These tasks can vary in complexity from a simple retrieval of historical data to ten year simulations of all aspects of college operations.

The system has been designed to enable a non-technical user to make full use of its capabilities. The user requests all tasks through English based verbal commands irrespective of the complexity of the computer's operation.

A schematic of the total system is illustrated in Figure 7. The system is broken into two main areas: (1) a user system that is completely conversational and (2) a technical system. The top portion of the diagram describes the user system, the part of CONNECT/CAMPUS with which the user interacts. This routine transmits information on what the user wants to do to the system modules. The bottom portion outlines the actual systems modules or routines. Many of these routines are optional in that the execution of specific user requests may only use a limited number of them. For example, a request for a report on historical data would use only the REPORT GENERATOR and INFORMATION SYSTEM.

1. The Interactive Prompter and Security Systems

This routine is the interface between a CONNECT/CAMPUS user and the actual operating programs. A user converses with this program by creating input commands which are transmitted to the operating routines.

Before access to the system is allowed, a user must pass a series of "security" points. He must have a valid sign-on code; he must be cleared as an individual to access the system; he must know the security code for that particular college. The last two codes can be changed to ensure the continuing security of the system. These codes also allow the college to define specific portions of the system to which each individual may have access. For example, one individual may have access only to space data while another could access salaries and another full budgetary data.

The prompter can operate in either of two modes: (1) it can gradually guide a user from a general area of interest to him to the specification of a particular task. It does this by a series of questions requiring a one word response, (2) it can accept immediate task specification from an experienced user. In both cases, the computer scans user responses for key-words for comparison to a keyword catalogue. The position of a word in the catalogue denotes the task or, at least, which area to proceed to next. The keyword commands are arranged in a hierarchical structure proceeding from the general to the specific. Figures 8, 9 and 10 are samples of the kinds of interactive dialogue that occur.

Once the user begins outlining a task his responses are placed in a file that is used later for input to the processing routines. These user responses are compared with keyword catalogues and data in the information system to ensure that the task specification is complete. A simulation task file would not be considered complete until the user had supplied all of the necessary information such as years to be simulated, file security codes, etc., and the prompter had verified these.

Since the interactive prompter converses in an English language mode with immediate responses, a non-technical user can quickly and effectively perform analyses with no knowledge of the computer system and little knowledge of its capabilities. The interactive prompter operating in an instructional mode takes time, but as a user becomes more experienced he has the option of bypassing tedious conversations and immediately specifying a complete task.

The information is collected by the system on how it is being used. This information provides the basis for adapting the design to make it easier to use and more efficient. The prompter will serve as the user documentation of the system and can be obtained in hard copy form at any time.

2. The CONNECT/CAMPUS Input Routines

These routines ensure that data to be deposited in the information system are both logical and correct. All input data are preceded by three verbal commands. Before any data are edited they are sorted by these commands to ensure maximum efficiency in processing. In other words, the routine processes and edits similar data together rather than randomly.

Once data have been sorted they are edited according to several criteria:

- College parameters (i.e. salaries, teaching loads, class sizes, etc., do not exceed college defined minimums and maximums).
- Data fall within system limits.
- Logical checks (i.e. the organizational structure is complete, salaries are attached to specific staff types, etc.).

In order to ensure efficiency in input coding and editing, the input routines operate on an "exception" basis. That is, the user can put in a complete set of data or only additional data where exceptions occur from a basic set already stored. For instance, if staff hiring policies are the same for all departments the user would only fill out one coding sheet for one general department and specify that this be applied to all departments unless overridden later.

The data requirements of the system are comprehensive but not overbearing. They fall into four categories:

Description of the Structure of the College

. organizational structure
. academic structure
. physical structure

Present Inventories Of

. space
. staff
. student

Present Decisions and Policies

. staffing
. space used
. administrative procedures
. academic procedures

Future Plans and Suggested Changes

. academic
. administrative

3. The Information System

The information system is the heart of CONNECT/CAMPUS. All data are deposited in and can only be accessed through the information system.

The information system provides the user with a series of routines or tools for retrieving or storing information concerning a "subject". The information is stored in files that are kept in core or disk or other random access device. The system automatically adjusts to the core size of the computer system and access frequency to optimize on-line/off-line storage. As more data is added to an existing college information system the routine would examine the relative frequency of access of all data elements and possibly reallocate storage.

Data are stored according to subject or keyword at the end of a logical path. The path itself comprises a series of keywords which describe the data; therefore, the user does not have to know complex codes to access data but only need know the keywords. In fact, a user does not have to specify a complete path, only enough keywords to uniquely define that path. Thus, if a user wanted to access all academic staff salaries the keywords STAFF, ACADEMIC, SALARIES, would be sufficient. The keywords STAFF, SALARIES alone would not be sufficient since they do not define a unique path. If the user wanted to access only salaries for full professors his keyword request would be STAFF, ACADEMIC, FULL PROFESSOR, SALARY.

The paths and keywords are college specified in that the information system allows the college to add or change both path structure and actual data elements stored. Thus the data in the information system could vary from minimal planning data to a complete management information system. The absolute size of the system is limited only by the number of random access devices available at the computer installation.

The "subject" storage mode is an important aspect of the information system design. This concept vastly increases efficiency as long as the task is analysis rather than retrieval of individual student files. If a student file system is used to perform analysis such as distributions by program and age a subject file is superior. If it is used to access only information on a series of individuals, individual storage is superior. The CONNECT/CAMPUS information system will automatically invert files from a subject to an individual system upon request.

4. <u>The Simulation Model</u>

The main CONNECT/CAMPUS planning tool is a simulation model that is capable of representing a specific institution under different academic and administrative plans and policies.

The CAMPUS planning model represents a significant advance in planning capabilities. The model contains no built-in biases since it is "data defined". It is not limited by the size of the institution or the level of aggregation of planning requirements which are automatically assembled according to user requests from the interactive prompter. Only those routines necessary for desired analysis are included.

The cost center structure is a vital part of the simulator. Cost centers are defined as any points in the organization which supply resources for teaching or other purposes and for which reports are desired. All cost centers must be related to each other in a tree-like structure. At the lowest level of detail a cost center could vary from a department or sub-department, to libraries, cafeterias, or aggregations of these in addition to reporting points such as the total college.

In addition, a budget structure can be defined as well as virtually any program structure. Costs can be obtained by level and type of student, level and type of activity (WICHE discipline costing), by organization unit (traditional budget format) and for the cost of producing a degree. The costing methodology can be specified by the user. It can vary from direct activity or subject costing to arbitrary allocation of administrative costs. In addition to average cost, marginal costs can also be calculated. This involves the cost of changing from one set of circumstances to another, i.e. the impact of an increase in enrolment and of adding or dropping academic programs.

The simulation model is also flexible with respect to time horizons. A time period can be defined to be as short as one week, although the usual time period is a semester. The degree of detail of the output of the simulation depends on the user definition of this time period and of an activity.

An activity is defined as any academic or administrative event that takes place within an institution and consumes resources. A user could define an activity as an individual course offering or possibly as a group of courses at a higher level of aggregation. Student counselling, health service delivery and examinations could also be defined as activities.

The experimental capabilities are extensive and require no programming and in many cases very little additional data. For example, the statement "INCREASE TOTAL ENROLMENT + 10% 1970-1975" would increase the enrolment over the planning figure in the data in the system. "DELETE THE MODERN LANGUAGE PROGRAM 1973" would cause the modern languages program to be dropped in the simulated year 1973. Figure 11 contains a sampling of the kinds of experiments that can be carried out.

5. Subsidiary Analysis

These subsidiary analyses include space routines which take simulation output in terms of rooms and square feet and convert these to building projects and architectural specifications; subsidiary costing routines enabling the user to structure his costs according to standard costing criteria such as WICHE programs; architectural design routines capable of producing detailed construction cost estimates; information on the best timing and composition of construction projects; the affinity of one space type to another and numerous other architectural design analyses; and formula financing analyses.

6. Statistical Analyses

A standard set of statistical packages is included here:

- Multiple Regression
- Exponential Smoothing
- Complete BMD Package

Information on the information systems, both historical and simulated, can be analyzed using these routines.

All output from the three analytical routines is deposited in the information system under keyword paths. The user can then report on and analyze this data merely by using the report generator. Since the CAMPUS planning output is part of the information system the user can easily request reports which compare past situations to simulated plans. There is also no need to obtain reports immediately as the results of analyses can be stored and called back at a later date.

7. The Report Generator and Analytical Modules

The CONNECT/CAMPUS report generator routines enable the user to structure his own reports rather than choose from a menu of predefined and perhaps unsuitable reports. The report generator retrieves data from the information system and assembles and analyzes them according to user requests. Since the user has access to his complete data base he can easily structure reports covering any time span or any number of different elements.

8. CONNECT/CAMPUS Input Data Requirements

All input data for CONNECT/CAMPUS must pass through a series of input and editing routines before being placed in the information system. A series of commands indentifies the data contained in each input record and calls in the appropriate edited segments. Once the data have been edited the "clean" data are placed in logical paths in the information system according to these commands.

The data can be entered directly from machine processable records in another information system, from formatted cards or in free format from terminals; in each case they must be converted by routines which insert commands and format it to match the user defined CONNECT/CAMPUS data structure. This data formatting also aids in producing a series of input reports which converts the data to easily readable report formats.

Each report is cross-referenced to an input record on which the data are entered according to a system of command levels. Reference should be made to Table 1, a schematic of input data reports as they relate to the input command level structure of the model.

All input data falls under the level one command, INPUT. At level two the data is subsummed under thirteen verbal commands, each dealing with a specific category of information; SPACE, STAFF, SERVICE, REVENUE and so on. At level three, data are further particularized through a numeric command within each category. Each coding sheet or input record is designed to accept the data required at one level three command.

Tables 2, 3, 4, 5, 6, 7 and 8 are samples of the INPUT reports on space information.

9. <u>An Analysis of a Shift in Enrolment Patterns</u>

SRG College is a 7,500 student institution which is expected to grow to about 12,000 students by 1974. The college is divided into three schools of major disciplines: Arts, Science, Business. In the current year the majority of students are enrolled in the Science and Business schools. The registrar and admissions officer predict a major shift away from the

Sciences towards Arts; Figure 17 illustrates forecasted student population by major discipline or school. Student population in Arts will increase from 2,000 in 1970 to almost 5,000 in 1974; Business from 2,800 in 1970 to about 3,600 in 1974, and the enrolment in Science will level off at 3,000 students in 1970 and 1971 and then begin to decline by 2,000 by 1974.

Assuming these enrolment forecasts and constant unit costs (no inflation or salary increases), the planning officer has used the CAMPUS model to calculate both operating costs and space requirements. Figure 18 illustrates total operating costs and cost per student in major disciplines. It can be seen that a more than doubling enrolment in the Arts discipline has resulted in a cost per student drop by about 30%, while a drop in the Science discipline by about one-third resulted in a cost per student increase of about 25%. Figure 19 illustrates total costs for all disciplines broken out by direct and indirect costs.

Although total costs remain almost constant for the first few years and actually drop in 1974, the amount of the operating cost decrease is surprisingly small given that there is a strong shift towards Arts, and Arts is assumed to be much less expensive than the Sciences.

Figure 20 illustrates total space requirements for the next five years. First analysis shows that there will not be a space shortage until 1973 and that this shortage will not be severe. But this analysis only compares total square foot requirements with the 1970 inventory and does not take into account the fact that classrooms and labs cannot be substituted for each other. A more realistic analysis shows that there will be a slight space shortage in 1972 which will grow to a shortage of about 250,000 square feet.

Before making any policy decisions the college administration decided to analyze these results in more detail. Figure 21 illustrates station occupancy and space utilization for the years 1970 to 1974. Station occupancy in sizes 25, 40 and 100 classrooms is very low; this is due to the fact that section sizes are not closely matched to room sizes. If section sizes are more closely matched with classroom sizes for the 25, 40 and 100 size classrooms the college should be able to use its existing spaces better and possibly decrease staff requirements and therefore operating costs. Utilization rates are very low for both classrooms and laboratories and this indicates that the college should be able to increase its utilization by better allocation of sections to room sizes and by increasing the length of the teaching week from 35 to 42 hours per week.

Analysis of academic staff in one Science department, Chemistry, shows that Chemistry is overstaffed by 1974. (Figure 22 Base Case). This is due to the fact that staff are tenured and that total staff will only decrease with natural attrition. Thus it is decided that by decreasing section sizes in laboratories and by converting size 30 laboratories into classrooms beginning in 1973 the additional load placed on the Science staff can easily be handled by present staff. Since the high cost per student in the Sciences is due in part to the fact that there is a wide proliferation of programs these costs can be reduced by amalgamating some Science programs as enrolment decreases and reducing the number of activities or courses offered.

Administration has decided to test the following policy changes:

- Increase the teaching week from 35 to 42 hours
- Conversion of some size 30 laboratories to classrooms beginning in 1973
- More closely match section sizes in activities to classroom sizes
- Amalgamate technology programs into fewer activities
- Reduce section sizes in the remaining Science activities to size 15

Figure 22 illustrates the effect on academic staff in the Science area. In the base case percentage of staff time which was unassigned moved from 4% to 19% while in Case 1 the percentage of unassigned time in 1974 was only 9%. This is due to the fact that section sizes were decreased and therefore staff contact hours increased. The effects of program and activity amalgamation is illustrated in Figure 23.

Figure 24 compares space requirements between the Base Case and Case 1, 2. It can be seen that the net space requirements given the new policies or assumptions are considerably less than those under the Base Case.

Figure 25 compares total costs for the two cases. Total costs are considerably lower in Case 1 due to the fact that section sizes have been increased in the Arts discipline and reducing academic staff costs and lowering support costs. Lower space requirements have resulted in lower maintenance costs, etc.

G. WHAT THE MODEL CAN AND CANNOT DO

The following is a brief summary of the kinds of analysis that can and cannot be done with the simulation model:

General:

Model Can't	. forecast exogenous inputs -- e.g. data on enrolment or rules on staff workloads
	. predict community needs

- evaluate the quality of education
- create alternatives, but does analyze them in economic terms

Model Can:

- calculate the resource requirements of alternative educational programs
- compare the costs of different administrative rules on staff, space, equipment enrolment
- enable the administrator to manage and plan the institution in the future

Finance

Model Can't:

- predict operating and capital allocations from outside sources (except under formula financing)
- control expenditures

Model Can:

- provide detailed cost estimates for the college, division, department, program or activity
- be used under different assumed funding levels to indicate what courses, enrolments and methods can be supported
- be the analytical mechanism of a Planning Programming Budgeting system
- facilitate the preparation of annual budgets and long term growth plans for review by senior authorities
- provide detailed justification of requests for funds, either under present procedures or as a supplement to formula financing

Space Planning

Model Can't:

- say what kind of space should be used in a given program, or set class size
- prescribe certain sizes of offices, etc. for academic and support staff
- lay down policies on ancilliary facilities such as libraries, residences, lounges

Model Can:

- forecast detailed space requirements under alternative situations
- assess the impact on space of changes in teaching methods, enrolment, etc.
- pinpoint overages, shortages and per- cent utilization of different kinds of space at different future times
- assess the impact of alternatives in future construction
- evaluate the effect, on space needs, of changes in length of each week, com- puterized scheduling, etc.
- assess the economics of flexibility
- produce information for architects on the affinity of one type of space for others

Enrolment

Model Can't:

- predict enrolment (total or by course)
- predict student choice
- assess promotional effectiveness
- tell about community needs
- forecast success of students

Model Can:

- calculate resources needed for different enrolments
- assess different mixes of cou-ses
- help cope with uncertainty and variations in actual enrolment
- evaluate the economies of scale
- help set timing of acquisitions of new resources
- operate in long and short run context

Academic Planning

Model Can't:

- decide what courses should be offered
- balance academic versus professional subjects
- say much about community role
- design course content

Model Can:

- compare the resources (staff, space, equipment, etc.) needed for different mixes of programs
- analyze the resource requirements for changing course contents
- compare costs of educating different kinds of students (day, extension, industrial, manpower)

Teaching Methods

Model Can't:

- say which methods are pedagogically best
- generate new teaching ideas

- measure student reactions

Model Can:

- help make trade-off analyses of different teaching methods
- highlight the costs of introducing new methods
- calculate how college costs will rise with enrolment given possible changes in methods
- help tie together enrolment, program decisions and available resources into a coherent plan

Staff Planning

Model Can't:

- say what kind of staff should be used
- help recruit staff directly
- evaluate teacher performance
- determine staffing policy

Model Can:

- calculate the requirements for various staff
- take into account alternative staffing policies -- load, tenure, etc.
- analyze the cost of different mixes of staff
- predict future staff work requirements under alternative educational and administrative policies
- calculate future operating costs under different staffing policies and salary scales

H. SUMMARY

In this paper we have outlined the development and use of CAMPUS and CONNECT/CAMPUS. It might be useful, however, to summarize at this point the advantages of using the system:

1. Planning Rather Than Responding

   The ability to experiment with alternative futures should allow the planner to devise plans which are less sensitive to adverse turns of the wheel of fate. The simulation model can be considered a laboratory in which the college administrator can test alternative policies before decisions are made. The experimental results of such tests can provide objective estimates of the resource implications of the competing proposals. This information would be a healthy check on unsupported departmental proposals and bring about more careful planning at all levels. Better knowledge of the cost consequences of alternatives should improve decisions and reduce the number of unfortunate surprises in college planning.

2. More Comprehensive Justification of Budgets

   The use of computerized simulation models makes possible accurate and substantiated statements of financial requirements. The heightened credibility of these statements combined with a demonstrable use of improved management tools should improve an institution's position in supporting sound expenditure of public funds. The results of the simulation can be presented either in traditional budgetary formats, or in such a way as to juxtapose program levels and associated costs. A particular advantage of the system is its ability to compute the incremental costs of altering each activity level. This should facilitate efficient allocation of college resources. An important advantage which appears as a byproduct in the college budget making process is the extent to which the system should reorient top level budgetary negotiations from concentration upon aggregate dollar magnitudes to the underlying decisions which are of more fundamental importance.

3. Quicker, Cheaper, Less Tedious Planning

Laboriously produced master plans are often obsolete before their ink is dry. Simulation models permit continuous planning in response to changed circumstances and opportunities. Finally, the use of such models obviates the investment of scarce managerial time and talent in slow manual computations. Because of a paucity of information, an impending decision of any consequence in the college is likely to initiate a search for new data. Each time this occurs, it places a redundant burden upon academic and administrative personnel as they strive to supply requested information. Because these data are often supplied under tight time limits, the quality is frequently dubious. Typically, the results of one survey are unavailable or inappropriate to the next. Such a procedure is wasteful and cannot provide uniformly good information. Because it systematically brings together and analyzes information relative to a broad class of problems, the CAMPUS system should reduce this burden of tedious and repetitious paperwork.

4. Aiding Colleges in the Early Expansion Stages

Colleges in the early growth stage stand to profit greatly from the use of simulation models. The range of decision variables is so broad and the importance of early decisions so great that the planners deserve all the assistance that they can get. The design and use of the simulation model in the formative stages of a college may avoid costly errors and raise the return from new educational investment.

Central to the entire experiment of using systems analysis to aid university planning and management is the notion that better information in the hands of decision-makers means better information. If for any reason good analysis cannot be accomplished, or if analytical work is resisted by decision-makers, the effort is expended in vain. There is often a tendency for analysts with sophisticated analytical tools to wander about in search of problems that fit the tools. This procedure often produces interesting journal articles, but seldom anaything else of value. University systems, like many other real systems, are sufficiently complex to require a substantial investment of hard work and humility before the analyst is able to make a significant contribution . Given these conditions in the present CAMPUS technology, it is possible to make pronounced improvements in the quality of decisions in higher education, thus bringing about the more efficient utilization of the resources that the universities have at their disposal.

Figure 1

CAMPUS COMPREHENSIVE ANALYTICAL METHODS FOR PLANNING IN UNIVERSITY SYSTEMS

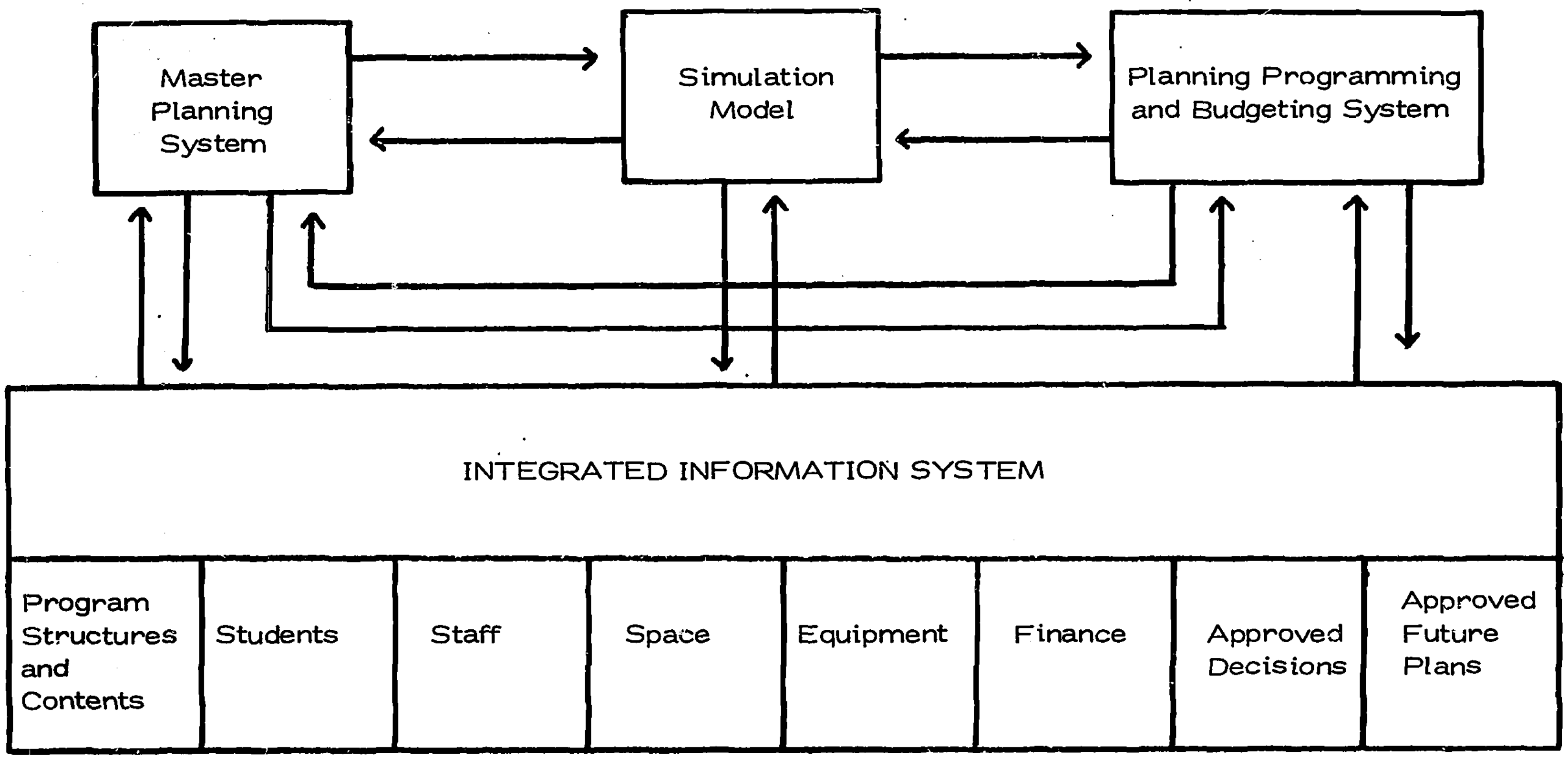


Figure 2

HEALTH SCIENCES RESOURCE REQUIREMENTS SIMULATION MODELS SYSTEMS FLOWCHART

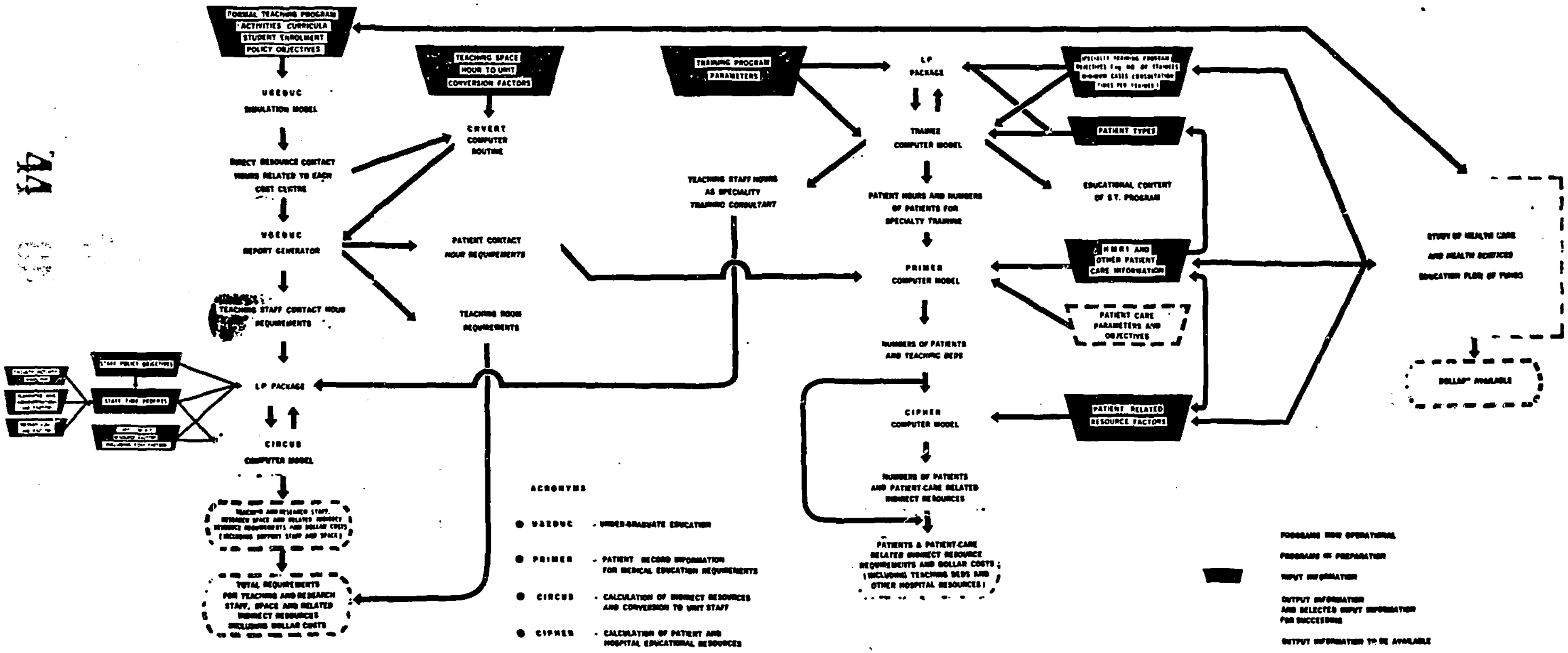


Figure 3

Staff Contact Hours with Meds. Undergrads over Academic Year

Students per yr. 175	250	250
Curriculum Departmental Allocations-66/67 Prop'ns	Departmental Proposed 7 Hosp.	Ideal System Proposed 7 Hosp.

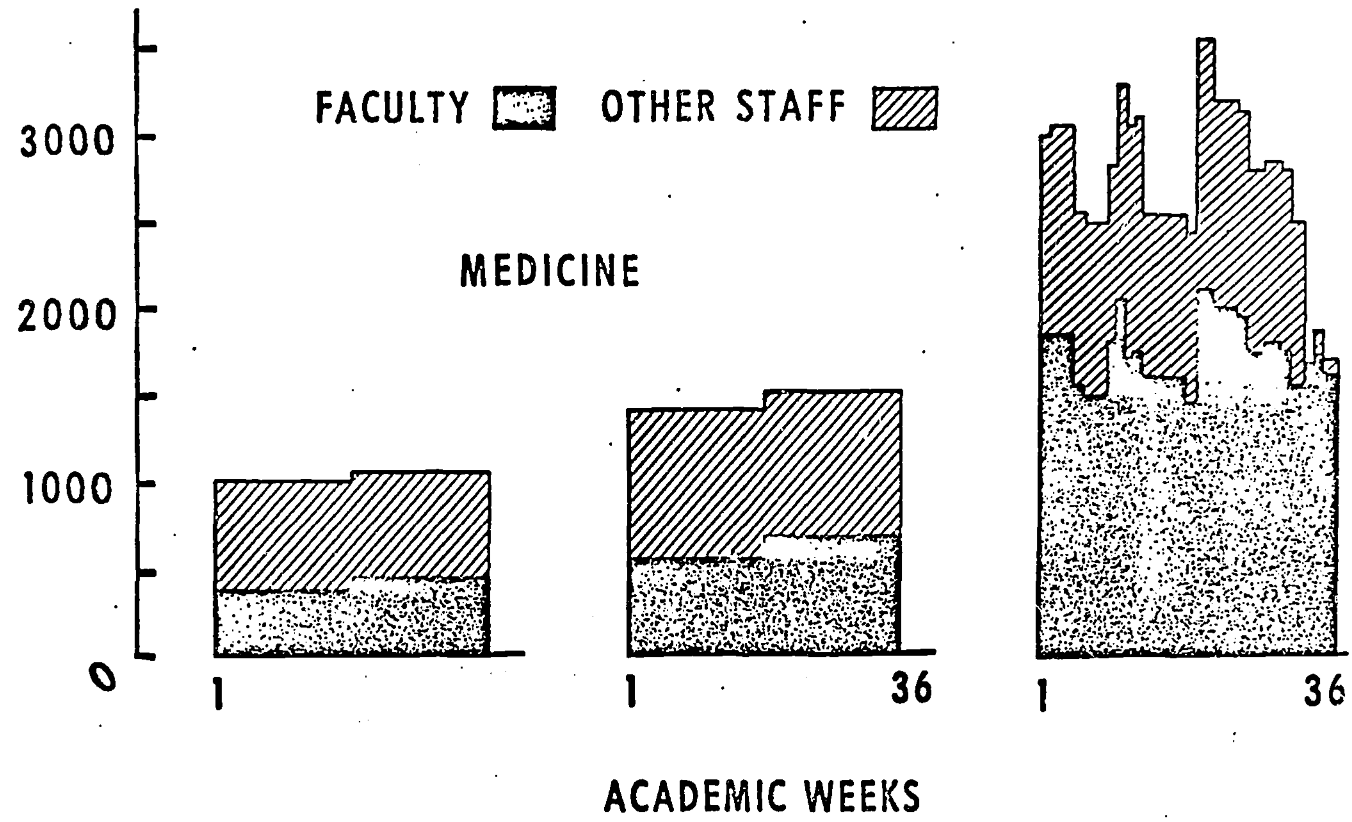


Figure 4

Staff Contact Hours with Meds Undergrads over Academic Year

Students per Yr.-175	250	250
Curriculum- Departmental	Departmental	Ideal System
Allocations-66/67 Prop'ns	Proposed 7 Hosp.	Proposed 7 Hosp.

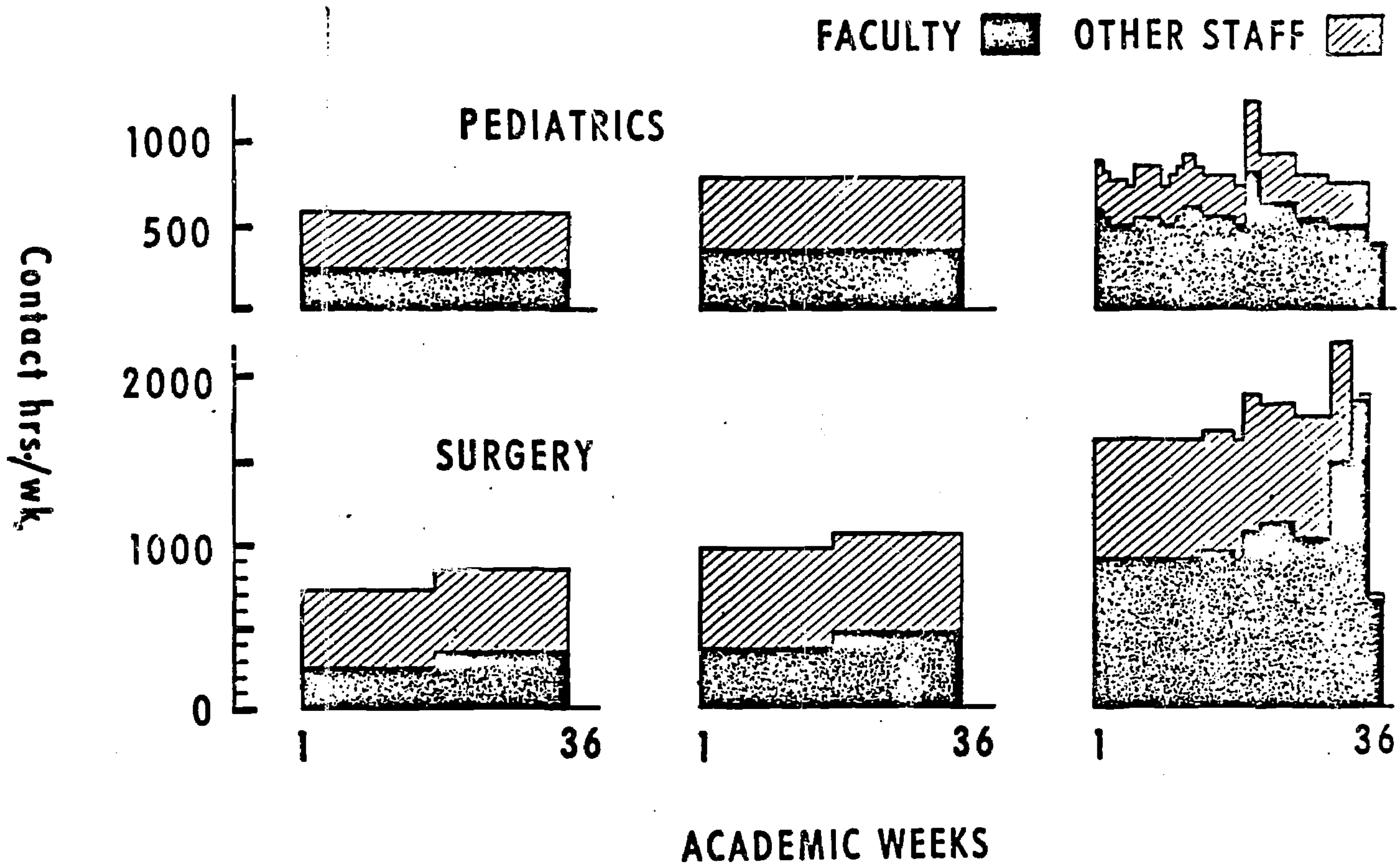


Figure 5

AMBULATORY PATIENT CONTACT HOURS
WITH MEDS UNDERGRADS

Students per yr. - 175	250	250
CURRICULUM - DEPARTMENTAL ALLOCATIONS - 66/67 PROP'NS	DEPARTMENTAL PROPOSED 7 HOSP.	IDEAL SYSTEM

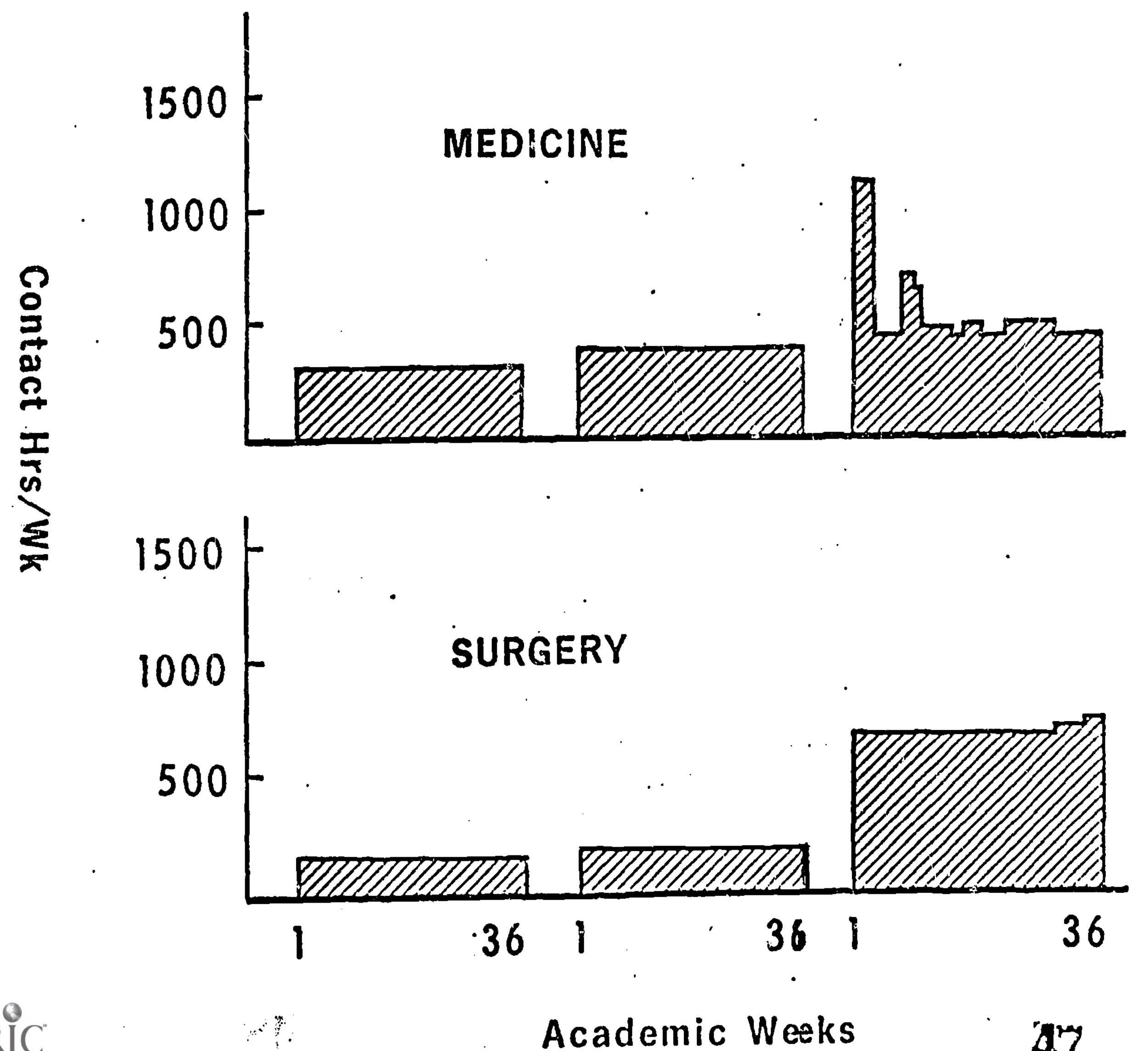
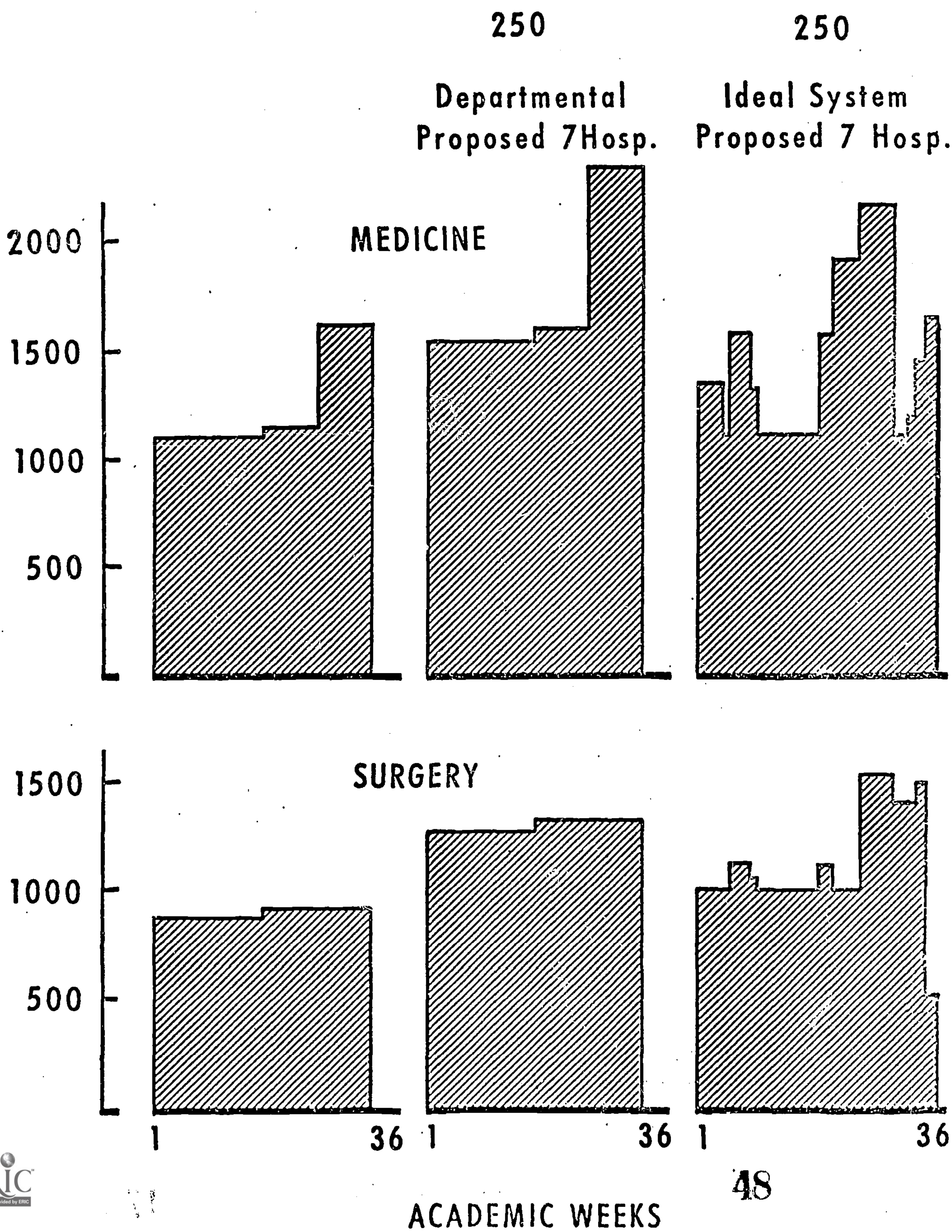


Figure 6

Hospitalized Patient Contact Hours with Med Undergrad



CONNECT/CAMPUS

Figure 7

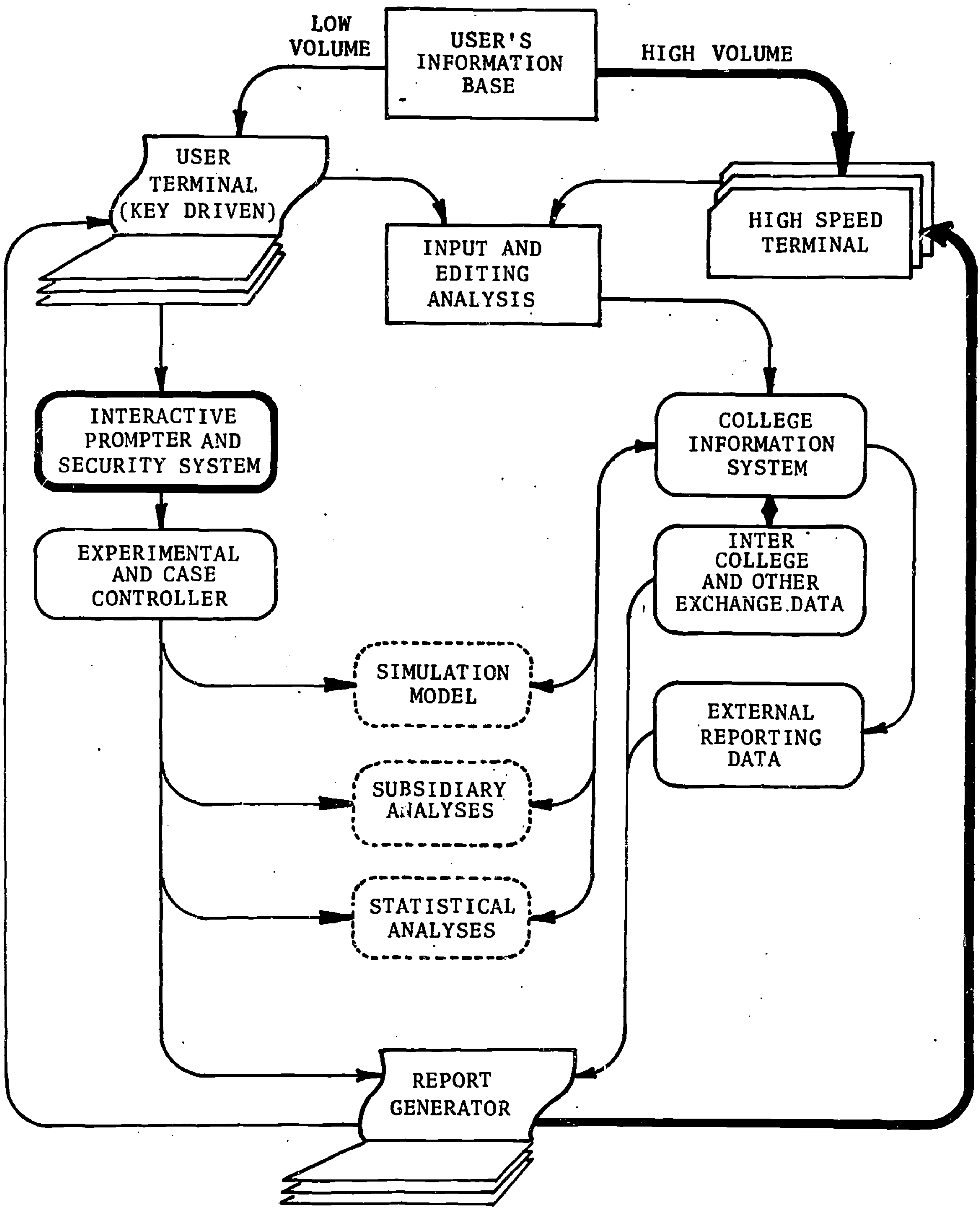


Figure 8

INTERACTIVE PROMPTER – EXPERIMENT TASK DEFINITION
(INEXPERIENCED USER)

WHAT WOULD YOU LIKE TO DO?

? WHAT CAN I DO?

YOU CAN EXPERIMENT, SIMULATE, REPORT, READ ABOUT RECENT FEATURES OR SIGNOFF. PICK ONE.

? EXPERIMENT

WOULD YOU LIKE TO EXPERIMENT ON RESOURCES, ACTIVITIES, ENROLMENT, ORGANIZATION OR FINANCES. PICK ONE.

? WHAT CAN I DO WITH ENROLMENT?

- ENROLMENT EXPERIMENTS ALLOW YOU TO CHANGE ENROLMENT AT ANY LEVEL FOR ANY TIME PERIOD.
- YOU CAN CHANGE EITHER TOTAL ENROLMENT OR THE DISTRIBUTION AMONG PROGRAMS
- THE CHANGES CAN BE EITHER ABSOLUTE, A PERCENTAGE CHANGE OR INSERTION OF A NEW VALUE.

DO YOU STILL WANT TO EXPERIMENT ON ENROLMENT?

? YES

AT A SPECIFIC LEVEL OR ALL LEVELS?

? ALL

DO YOU WANT TO CHANGE TOTAL ENROLMENT OR THE DISTRIBUTION AMONG PROGRAMS?

? TOTAL

WHAT SORT OF CHANGE?

? PERCENTAGE

BY HOW MUCH?

Figure 8 (continued ...)

? + 35%

FOR WHAT YEARS?

? 1970 - 1976

DO YOU WANT TO ADD MORE EXPERIMENTS TO THIS FILE?

? NO

PLEASE GIVE THIS EXPERIMENT A FOUR LETTER NAME

? AAAA

IF YOU WANT TO PERFORM A SIMULATION USING AAA REQUEST
A SIMULATION

Figure 9

INTERACTIVE PROMPTER - SIMULATION TASK SUBMISSION
(EXPERIENCED USER)

WHAT WOULD YOU LIKE TO DO?

? SIMULATE

WHAT EXPERIMENT FILE WOULD YOU LIKE TO INCLUDE

? AAAA

ANY MORE FILES"

? YES, BBBB

DO YOU WANT TO SPECIFY ANY SIMULATION OPTIONS?

? YES

WHAT OPTIONS?

? OUTPUT ONLY SPACE, ENROLMENT

ANY MORE OPTIONS?

? SIMULATE BY YEAR NOT TERM

ANY MORE OPTIONS?

? NO

PLEASE GIVE THIS SIMULATION A FOUR LETTER NAME

? TEST

TEST HAS BEEN SUBMITTED. YOU CAN CHECK ITS STATUS BY
THE COMMAND : STATUS TEST

? STATUS TEST

TEST HAS COMPLETED EXECUTION AND THE RESULTS ARE IN
THE INFORMATION SYSTEM

WHAT ELSE WOULD YOU LIKE TO DO?

? SIGNOFF

Figure 10

INTERACTIVE PROMPTER
REPORT ON DATA FROM SIMULATION RUN

SAMPLE

```
WHAT WOULD YOU LIKE TO DO?
?   REPORT
WOULD YOU LIKE TO EXAMINE THE CATALOGUE OF REPORTS?
?   YES
           TITLE                      REPORT NO.
           -----                      ---------
OPERATING COSTS                         SRG1
LABORATORY STATION OCCUP.               SRG2
LABORATORY SQUARE FEET                  SRG3
LABORATORY ROOMS REQD.                  SRG4
LABORATORY CONTACT HRS/WK               SRG5
SPACE PLANNING FACTORS                  SRG6
ENROLMENT                               SRG7
CUMULATIVE SPACE                        SRG8
YEARLY SPACE                            SRG9
OFFICE SPACE                            SRG10
CLAS ROOM SPACE                         SRG11
LABORATORY SPACE                        SRG12
OPERATING BUDGET                        SRG13
COST PER STUDENT                        SRG14
ACADEMIC STAFF                          SRG15
WHAT REPORT DO YOU WANT?
?   SRG8
FOR WHAT COST CENTERS?
?   TOTAL COLLEGE
FOR WHAT YEARS?
?   1969-1977
FOR WHAT PREVIOUSLY RUN CASES?
?   TEST,BASE
ANY MORE CASES?
?   NO
WOULD YOU LIKE TO SEE THIS REPORT NOW?
?   YES
WHAT WOULD YOU LIKE TO CALL THIS REPORT?
?   G2
```

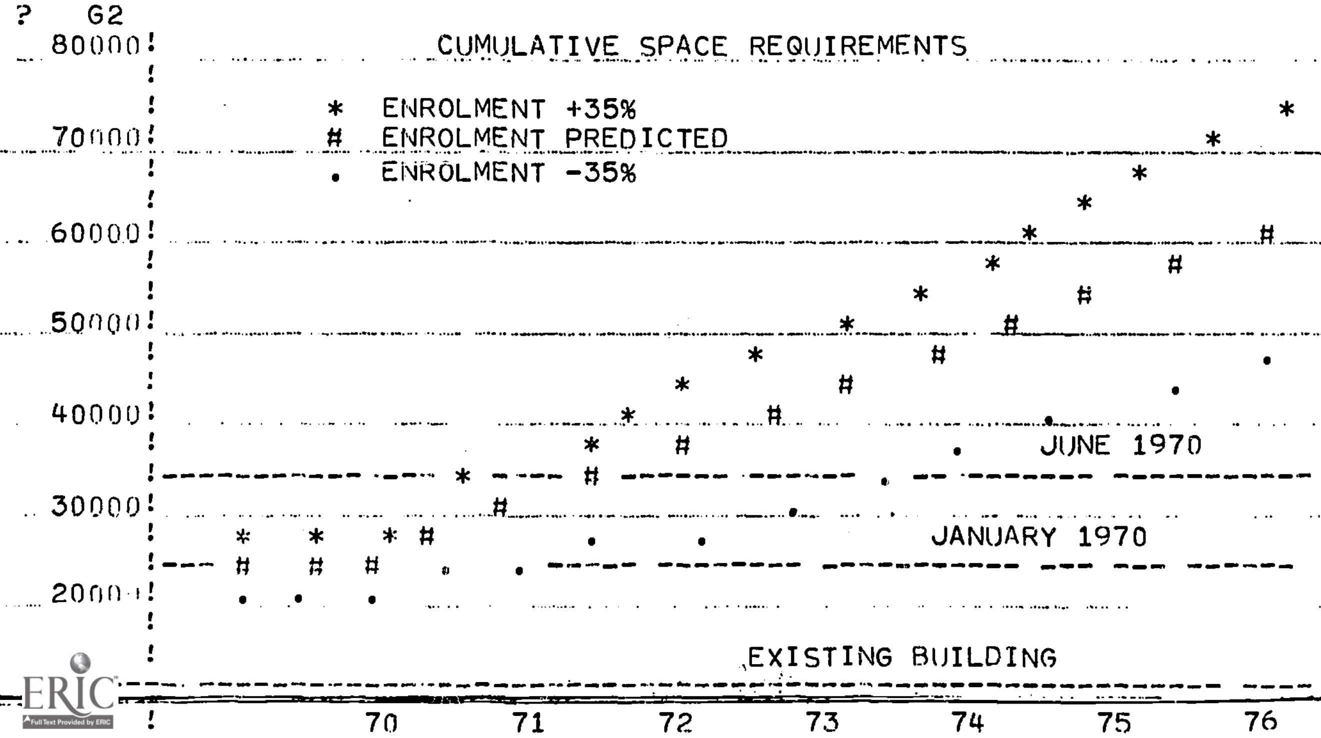


Figure 11

SAMPLE CONNECT/CAMPUS EXPERIMENTS

AREA	TYPE OF CHANGE	EXAMPLES
ORGANIZATION	Add or delete	Delete modern languages in 1973
	Economics of splitting into multi-campus; merging departments; creating new departments	Split all English activities into two separate departments, create new campus for all health category programs
ENROLMENT	By level By program	Total enrolment + 25% 1973; Freshman - 15% 1971; Modern Languages freshman + 20% 1971
CURRICULA	By program	Add economics 101 to core courses for all liberal arts programs
ACTIVITIES	Change section sizes Change schedule Change credits Change resources	Economics 101 section size + 10% Economics 101 from 2 to 3 hours per week; Move from classroom and staff to carrels and programmed texts for all mathematics activities
STAFF	Salaries Staff load Hiring policies	Academic + 15% in 1971; Full professor staffing units + 3 1975 Hire minimum 50% associate professors all years
SPACE	Utilization Teaching week Planning factors Manipulation	Classrooms used 45 hours per week instead of 35; All physics laboratories 35 square feet per station. Chemistry, physics lab compatible.
BUDGETS	Capital Operating	Compare requirements to $2 million capital budget 1971; Compare staff teaching loads if limited to $1 million academic budget in 1972
ENVIRONMENT	Inflation Interest rates Applications	Inflation staff salaries by 7.1% per year

Figure 12

A SAMPLING OF CONNECT/CAMPUS TABULAR* REPORTS

REPORT AREA SUMMARY REPORTS	CONTENTS	AVAILABILITY
STUDENTS	Students, student credits, student cross-loading	- by program, department or above - one or more semesters - one or more assumptions
STAFF REQUIREMENTS	Summary of number and salaries by category	- by department or above - one or more semesters - one or more assumptions
SPACE AND CAPITAL COST	Summary square foot and dollar requirements by category comparison with expected capital budgets	- by department or above - one or more years - one or more assumptions
OPERATIONAL COSTS	Summary dollar costs by resource types, budget format, program	- by program, department or aggregation - one or more semesters - one or more assumptions
DETAILED REPORTS STUDENTS	Students, student credits, cross loading	- by program, curricula, activity - one period (minimum period = one week) - one set of assumptions
ACADEMIC STAFF	Activity load and costs Requirements by rank	- by activity type, discipline by department - contact hours, numbers, dollar costs - one period - one set of assumptions

* Graphical reports can be requested in virtually any format for each area

Figure 12 (cont'd ...)

REPORT AREA SUMMARY REPORTS	CONTENTS	AVAILABILITY
EQUIPMENT	Detailed unit and dollar requirements by category sub-category	- by activity, department or above - units, dollar costs - one period - one set of assumptions
TEACHING SPACE	Detailed breakout by category, sub-category, size	- by activity, department or above - hours, square feet, rooms, utilization - shortages, substitution possibilities - one or more periods, or - one or more set of assumptions
PROGRAM COSTS	Allocation of costs by - degree cost or - discipline cost or - budget structure or - organization or - combination of above	- activity, program, department or above - hours, square feet, units, dollars, as applicable - one or more periods, or - one or more set of assumptions

C A M P U S C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 1.1
SOURCE DOCUMENTS: DEFINE 01

SIMULATION CHARACTERISTICS

NAME OF INSTITUTION BEING SIMULATED: C A M P U S C O L L E G E

CALENDAR YEAR OF FIRST SESSION TO BE SIMULATED: 1969/70

NUMBER OF SIMULATION PERIODS PER SESSION: 1

LENGTH OF SIMULATION PERIOD (IN WEEKS): 15

COMMENTS:

00 CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

Figure 13 (a)

C A M P U S   C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 2.4
SOURCE DOCUMENTS: ACTIVITY 06

A C T I V I T I E S

ACTIVITY NUMBER CODE	ACTIVITY CALENDAR NAME	COST CENTRE NODE OF AFFILIATION	SPECIALTY TYPE	ACTIVITY TYPE	SUCCESS FACTOR (PERCENT)	ACTIVITY CREDIT VALUE	SCHEDULE RANGE CODE	SECTION SIZE CODE	RESOURCE COMBINATION CODE	NUMBER OF ACTIVITIES
1	ABC	1-ARTS	1-BUSINESS	1-LECTURE	0	0	4	2	1	1
2	ACAN	1-ARTS	5-CUR AF H	1-LECTURE	0	0	2	3	1	1
5	ACD	1-ARTS	5-CUR AF H	3-CONSULTN	0	0	1	5	1	1
6	ACF	1-ARTS	6-LANGUAGE	3-CONSULTN	0	0	3	5	1	1
7	ACL	1-ARTS	19-LAWYER	1-LECTURE	0	0	1	3	1	1
8	ACL	1-ARTS	19-LAWYER	3-CONSULTN	0	0	1	5	1	1
9	ACV	1-ARTS	5-CUR AF H	1-LECTURE	0	0	2	3	1	1
10	ACV	1-ARTS	5-CUR AF H	3-CONSULTN	0	0	1	5	19	1
11	ADP1	2-BUSINESS	10-MATH-COM	1-LECTURE	0	0	1	3	1	1
12	ADP1	2-BUSINESS	10-MATH-COM	2-LAB	0	0	2	6	27	1
13	ADP2	2-BUSINESS	10-MATH-COM	1-LECTURE	0	0	1	3	1	1
14	ADP2	2-BUSINESS	10-MATH-COM	2-LAB	0	0	2	6	27	1
15	AEC	1-ARTS	11-MGMT-EC	1-LECTURE	0	0	2	3	1	1
16	AEC	1-ARTS	11-MGMT-EC	3-CONSULTN	0	0	1	5	1	1
17	AGA	1-ARTS	12-MGMT-STA	2-LAB	0	0	2	7	26	1
18	ALS1	1-ARTS	1-BUSINESS	1-LECTURE	0	0	2	3	1	1
19	ALS1	1-ARTS	1-BUSINESS	3-CONSULTN	0	0	4	5	1	1
20	ALD2	1-ARTS	2-CUR	1-LECTURE	0	0	1	3	1	1
21	ALD2	1-ARTS	2-CUR	3-CONSULTN	0	0	2	5	1	1
22	APC	1-ARTS	1-BUSINESS	2-LAB	0	0	1	6	1	1
23	APC	1-ARTS	1-BUSINESS	2-LAB	0	0	2	7	1	1
24	APS1	1-ARTS	5-CUR AF H	1-LECTURE	0	0	4	3	1	1
25	APS1	1-ARTS	5-CUR AF H	3-CONSULTN	0	0	1	5	1	1
26	APS2	1-ARTS	5-CUR AF H	1-LECTURE	0	0	2	3	1	1
27	APS2	1-ARTS	5-CUR AF H	3-CONSULTN	0	0	1	5	1	1
28	APY	1-ARTS	7-PSYCH	1-LECTURE	0	0	2	3	1	1
29	APY	1-ARTS	7-PSYCH	3-CONSULTN	0	0	1	5	19	1
30	ASY	1-ARTS	8-SOCIO	1-LECTURE	0	0	2	3	1	1
31	ASY	1-ARTS	8-SOCIO	3-CONSULTN	0	0	1	5	19	1
32	CAM	1-ARTS	11-MGMT-EC	3-CONSULTN	0	0	1	5	1	1
33	CAM	1-ARTS	11-MGMT-EC	2-LAB	0	0	1	6	24	1
34	CAM	1-ARTS	11-MGMT-EC	2-LAB	0	0	1	7	24	1
35	CAT	1-ARTS	3-MGMT-COM	2-LAB	0	0	1	6	26	1
36	CAT	1-ARTS	3-MGMT-COM	2-LAB	0	0	2	7	23	1
37	CAW	1-ARTS	3-MGMT-COM	2-LAB	0	0	4	7	38	1
38	CAV	1-ARTS	9-CRE ARTS	2-LAB	0	0	4	6	28	1
39	CGA1	1-ARTS	9-CRE ARTS	2-LAB	0	0	2	7	26	1
40	CGA2	1-ARTS	9-CRE ARTS	2-LAB	0	0	2	6	26	1

Figure 13 (b)

C A M P U S   C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 3.1
SOURCE DOCUMENTS: PROGRAM 01
PROGRAM 02
PROGRAM 03
PROGRAM 04
DEFINE 05

PROGRAM CURRICLLA AND ACTIVITY PARTICIPATICN

PROGRAM NODE	PROGRAM NAME	MAX. NO. YEARS-CREDITS	CREDIT YEARS	SIMULATICN PERIOD	PROGRAM CURRICULUM NC. CODE	ACTIVITY NUMBER CODE	ACTIVITY CALENDAR CODE	ACTIVITY TYPE	PARTICIPATICN RATE (%)
1	COMMUNICATIONS	2 0	1	1	1	4		0	100
						5	ACD	CONSULTN	100
						39	CGA1	LAB	100
						18	ALS1	LECTURE	100
						19	ALS1	CONSULTN	100
						45	CMD	LECTURE	100
						46	CMD	CONSULTN	100
						47	CMW1	LAB	100
						28	APY	LECTURE	100
						29	APY	CONSULTN	100
						30	ASY	LECTURE	100
						31	ASY	CONSULTN	100
						61	CST	LAB	100
			2	1	3	38	CAV	LAB	100
						2	ACAN	LECTURE	100
						3		0	100
						40	CGA2	LAB	100
						41	CGA2	LAB	100
						20	ALD2	LECTURE	100
						21	ALD2	CONSULTN	100
						51	CCS	LECTURE	100
						52	CCS	CONSULTN	100
						9	ACV	LECTURE	25
						10	ACV	CONSULTN	25
						6	ACF	CONSULTN	50
						53	CTP	LAB	25
						35	CAT	LAB	50
						36	CAT	LAB	50
						37	CAW	LAB	50

Figure 13 (c)

Systems Research Group

CAMPUS COLLEGE
SESSION 1969-70

INPUT DATA REPORT 4.4
SOURCE DOCUMENTS: XSTAFF 04

PAGE 1

ACADEMIC STAFF INVENTORY, TRANSITIONS AND HIRING CRITERIA

COST CENTER	STAFF CODE	RANK NAME	HIRE?	INITIAL INVENTORY	TRANSITIONS SAME	TRANSITIONS PROMOTE	HIRING CRITERIA MINIMUM	HIRING CRITERIA MAXIMUM	PERCENT DISTRIBUTION MINIMUM	PERCENT DISTRIBUTION MAXIMUM
1	1	PART-TIME DAY	YES	0	0	0	0	2	0	10
	2	PART-TIME NIGHT	YES	0	0	0	0	0	0	0
	3	CHAIRMAN	NO	1	99	0	0	0	0	0
	4	ASST CHAIRMAN	NO	1	99	0	0	0	0	0
	5	PROFESSOR	NO	3	95	0	0	0	25	40
	6	ASSOCIATE PROF	YES	7	70	25	0	0	27	47
	7	ASSISTANT PROF	YES	5	80	15	0	0	29	49
2	1	PART-TIME DAY	YES	0	0	0	0	2	0	10
	2	PART-TIME NIGHT	YES	0	0	0	0	0	0	0
	3	CHAIRMAN	NO	1	99	0	0	0	0	0
	4	ASST CHAIRMAN	NO	1	99	0	0	0	0	0
	5	PROFESSOR	YES	4	95	0	0	0	25	40
	6	ASSOCIATE PROF	YES	16	70	25	0	0	27	47
	7	ASSISTANT PROF	YES	10	85	10	0	0	29	49
3	1	PART-TIME DAY	YES	0	0	0	0	2	0	10
	2	PART-TIME NIGHT	YES	0	0	0	0	0	0	0
	3	CHAIRMAN	NO	1	99	0	0	0	0	0
	4	ASST CHAIRMAN	NO	1	99	0	0	0	0	0
	5	PROFESSOR	YES	6	95	0	0	0	25	40
	6	ASSOCIATE PROF	YES	17	70	25	0	0	27	47
	7	ASSISTANT PROF	YES	8	80	15	0	0	29	49
4			NO ACADEMIC STAFF AT THIS COST CENTER							
5			NO ACADEMIC STAFF AT THIS COST CENTER							

Figure 13 (d)

Figure 14 (a)

SAMPLE OVER TIME TABULAR REPORTS

00 CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

COST CENTRE
5 COLLEGE

C A M P U S C O L L E G E

OVER TIME REPORT 1.5
SESSION AVERAGES

SUMMARY REPORT

SESSION

	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1979-
STAFF										
ACADEMIC	1178	1498	1685	1748	1786	1912	2039	2189	2412	26
ACADEMIC SUPPORT	33	46	52	52	52	59	59	59	65	7
NON-ACADEMIC	81	96	101	101	111	116	116	126	136	1
SERVICE	274	300	326	342	342	368	368	394	426	4
TOTAL	1566	1940	2164	2243	2291	2455	2582	2768	3039	33
TOTAL EQUIPMENT COST	352	467	529	566	583	636	694	758	851	94
MISCELLANEOUS	221	319	352	364	371	395	414	442	483	52
MAINTENANCE	8	11	12	13	13	15	16	18	20	2
TOTAL AGGREGATE COST (THOUSANDS OF DOLLARS)	2147	2737	3057	3186	3258	3501	3706	3986	4393	48
SPACE										
OFFICE	15350	18670	20660	21330	21810	23280	24320	26040	28410	307
CLASSROOM	17740	23870	26130	27480	27630	30160	33860	36060	39430	418
INSTRUCTIONAL LABORATORY	1915	3270	3895	3845	4345	4445	4360	5260	5765	59
SPECIAL LABORATORY	30900	41750	48050	46400	50250	50450	51250	53400	62750	637
SERVICE DEPARTMENT	54287	71441	80744	85247	87825	95614	104271	113813	127710	1420
TOTAL SPACE (SQUARE FEET)	120192	159001	179479	184302	191860	203949	218061	234573	264065	2845
CAPITAL COSTS SPACE - (ACTUAL DOLLARS)	70450	480275	313200	142300	92800	255550	297400	401775	806925	5736
AFFILIATED STUDENTS										
AT THIS COST CENTRE	0	0	0	0	0	0	0	0	0	
AT AFFILIATED COST CENTRES										
ARTS	277	405	461	490	504	563	626	688	790	8
BUSINESS	434	571	643	682	707	787	868	956	1087	12
ENGINEERING	437	647	776	834	867	945	1043	1159	1313	14
CONTINUING EDUC	0	0	0	0	0	0	0	0	0	
TOTAL	1148	1623	1880	2006	2078	2295	2537	2803	3190	35
REVENUE										
TOTAL REVENUE FUNDS	0	0	0	0	0	0	0	0	0	
INDICATORS										
COST PER STUDENT (ACTUAL DOLLARS)	1870	1686	1626	1588	1567	1525	1460	1422	1377	13
SPACE PER STUDENT SQ.FT.	104	97	95	91	92	88	85	83	82	

Figure 14 (b)

00 CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

COST CENTRE
ARTS

CAMPUS COLLEGE

OVER TIME REPORT 1.5
SESSION AVERAGES

SUMMARY REPORT

	SESSION									
	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
STAFF										
ACADEMIC	244	349	399	424	424	448	485	521	570	634
ACADEMIC SUPPORT	33	46	52	52	52	59	59	59	65	72
NON-ACADEMIC	19	24	24	24	29	29	29	29	34	34
SERVICE	0	0	0	0	0	0	0	0	0	0
TOTAL	296	419	475	500	505	536	573	609	669	740
TOTAL EQUIPMENT COST	0	0	0	0	0	0	0	0	0	0
MISCELLANEOUS	33	60	68	72	73	77	83	88	97	107
MAINTENANCE	0	0	0	0	0	0	0	0	0	0
TOTAL AGGREGATE COST (THOUSANDS OF DOLLARS)	329	479	543	572	578	613	656	697	766	847
SPACE										
OFFICE	2790	3830	4280	4480	4560	4810	5110	5410	5940	[illegible]
CLASSROOM	0	0	0	0	0	0	0	0	0	0
INSTRUCTIONAL LABORATORY	0	0	0	0	0	0	0	0	0	0
SPECIAL LABORATORY	0	0	0	0	0	0	0	0	0	0
SERVICE DEPARTMENT	0	0	0	0	0	0	0	0	0	0
TOTAL SPACE (SQUARE FEET)	2790	3830	4280	4480	4560	4810	5110	5410	5940	6560
CAPITAL COSTS SPACE - (ACTUAL DOLLARS)	0	22800	14050	6250	2500	7800	9375	9375	10550	19375
AFFILIATED STUDENTS AT THIS COST CENTRE	277	405	461	490	504	563	626	688	790	890
TOTAL	277	405	461	490	504	563	626	688	790	890
REVENUE										
TOTAL REVENUE FUNDS	121	179	204	217	223	250	277	304	351	395
INDICATORS										
COST PER STUDENT (ACTUAL DOLLARS)	1187	1182	1177	1167	1146	1088	1047	1013	969	951

Figure 15 (a)

SAMPLE OVER TIME GRAPHICAL REPORTS

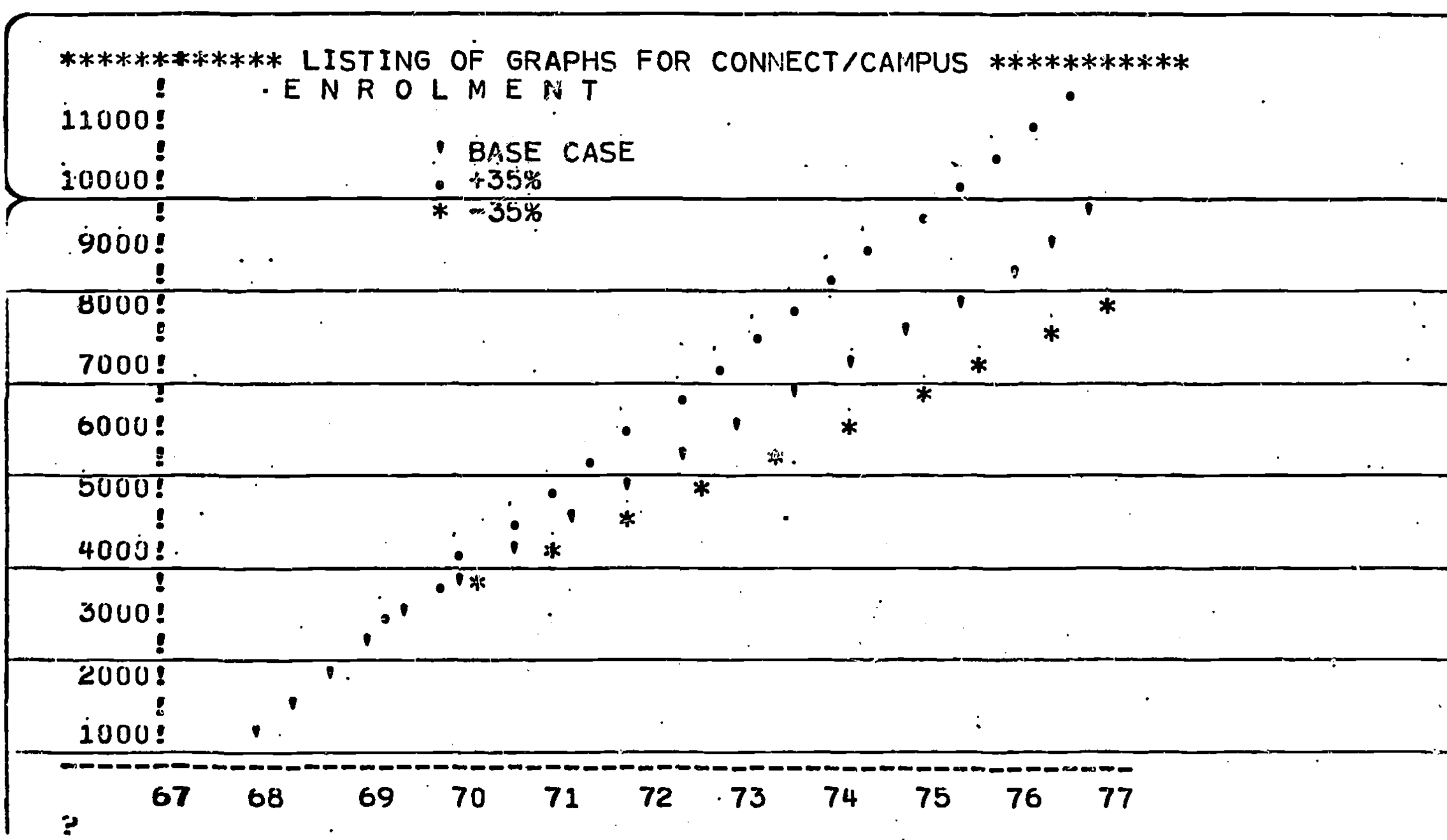


Figure 15.(b).

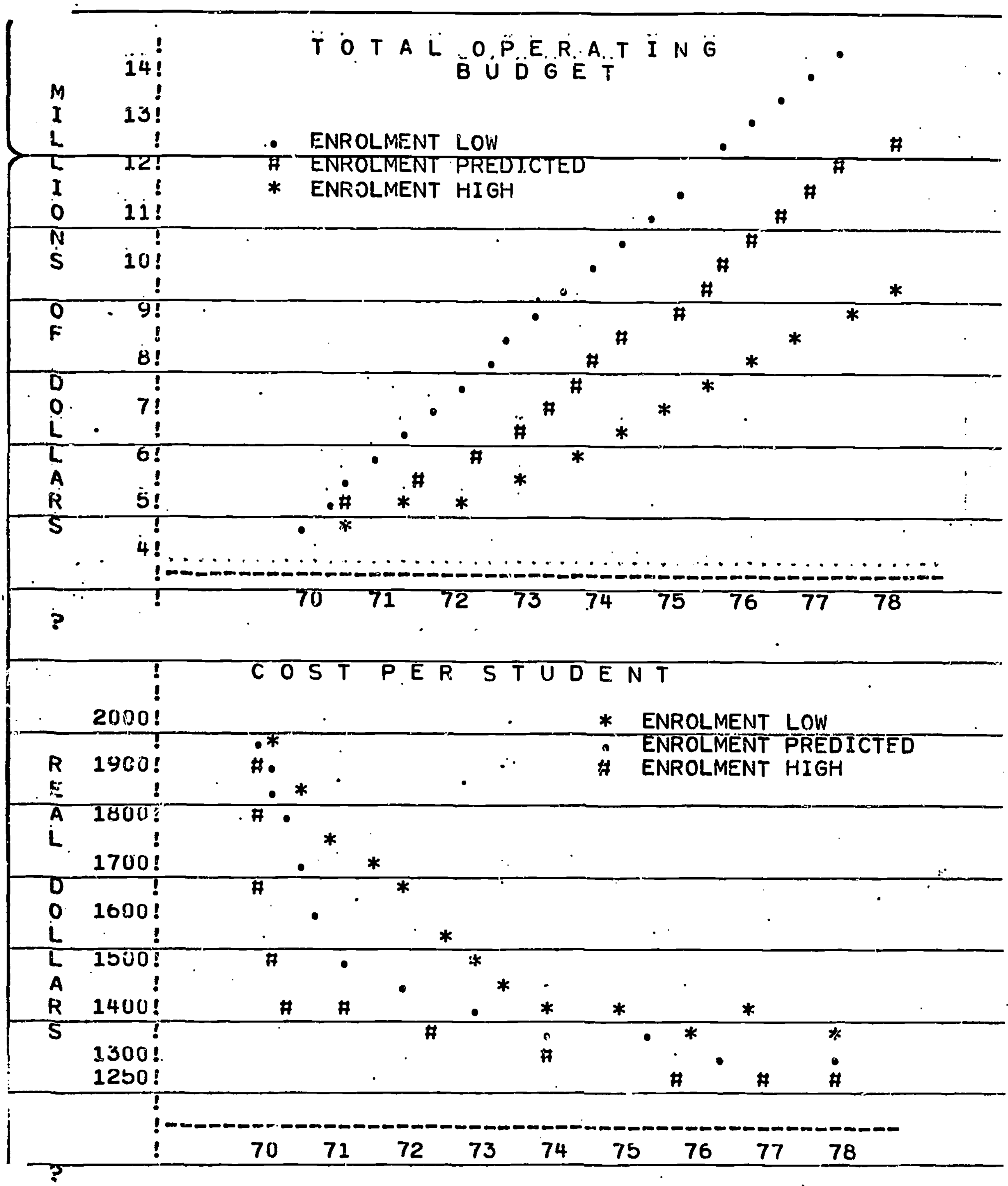
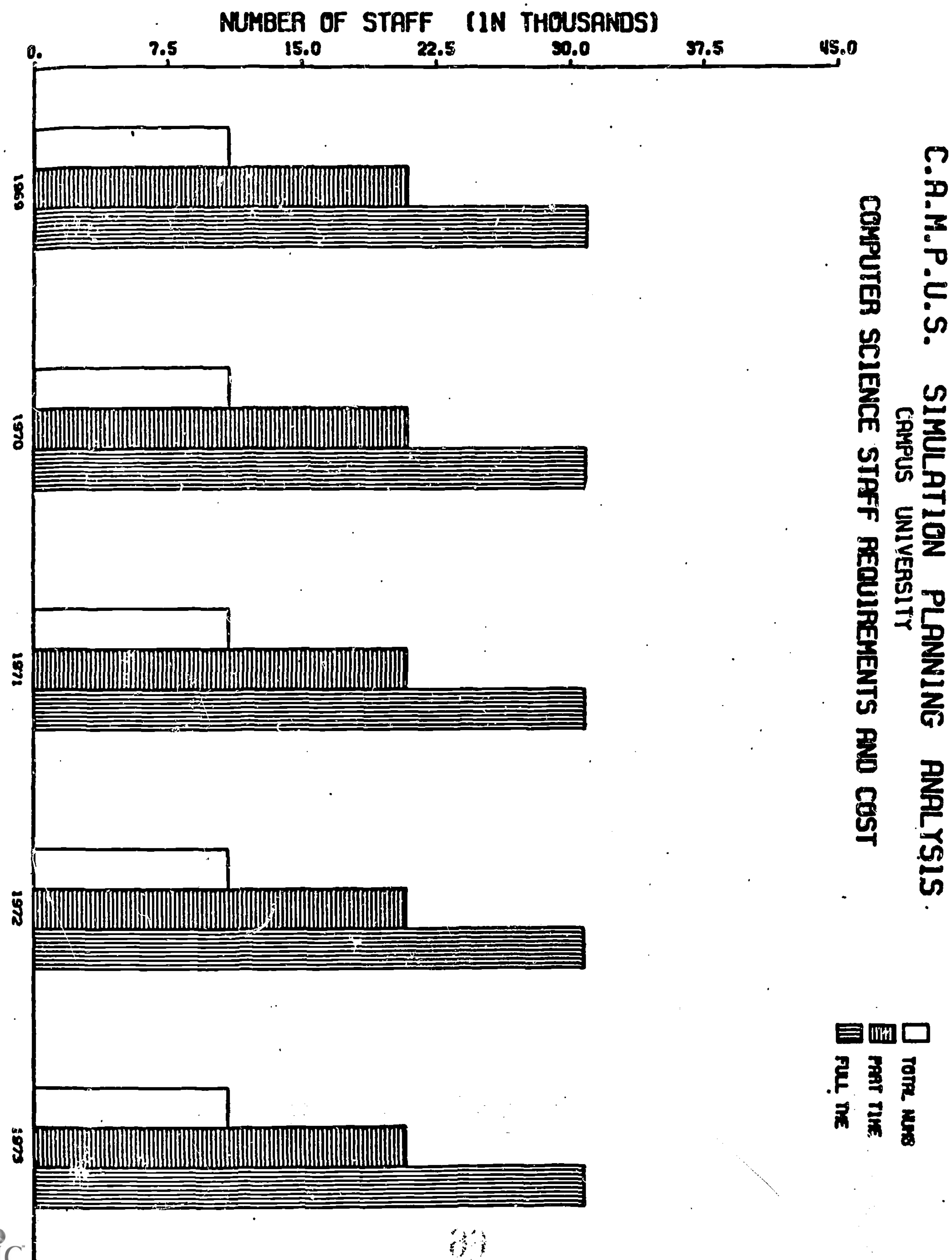

TOTAL OPERATING BUDGET
MILLIONS OF DOLLARS
14
13
12
11
10
9
8
7
6
5
4
• ENROLMENT LOW
ENROLMENT PREDICTED
* ENROLMENT HIGH
70
71
72
73
74
75
76
77
78
COST PER STUDENT
REAL DOLLARS
2000
1900
1800
1700
1600
1500
1400
1300
1250
* ENROLMENT LOW
• ENROLMENT PREDICTED
ENROLMENT HIGH
70
71
72
73
74
75
76
77
78

Figure 15 (c)



C.A.M.P.U.S. SIMULATION PLANNING ANALYSIS
CAMPUS UNIVERSITY
COMPUTER SCIENCE STAFF REQUIREMENTS AND COST
NUMBER OF STAFF (IN THOUSANDS)
0.
7.5
15.0
22.5
30.0
37.5
45.0
1969
1970
1971
1972
1973
TOTAL NUMB
PART TIME
FULL TME

Figure 16 (a)

SAMPLE ONE PERIOD REPORTS

COST CENTRE 00 CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

LEVEL 2 COLLEGE NODE 5 COLLEGE

C A M P U S C O L L E G E

COST CENTRE REPORT 2.5
SESSION 1970/71
SIMULATION PERIOD 1

S U M M A R Y S T A F F R E P O R T

AFFILIATED NODES AT LOWER LEVELS CODE	NAME	ACADEMIC NO.	ACADEMIC TOTAL SAL. ($)	ACADEMIC SUPPORT NO.	ACADEMIC SUPPORT TOTAL SAL. ($)	NON-ACADEMIC SUPPORT NO.	NON-ACADEMIC SUPPORT TOTAL SAL. ($)	TOTAL STAFF SALARIES ($)
1	ARTS	28	345.000	7	46.000	5	24.000	419.000
2	BUSINESS	48	612.000	0	0.000	6	29.000	641.000
3	ENGINEERING	42	537.000	0	0.000	6	29.000	566.000
4	CONTINUING EDUC	0	0.000	0	0.000	3	14.000	14.000
TOTALS FOR AFFILIATED NODES		118	1458.000	7	46.000	20	96.000	1640.000
STAFF REQUIREMENTS FOR THIS NODE		0	0.000	0	0.000	0	0.000	0.000
TOTAL STAFF REQUIREMENTS UP TO AND INCLUDING THIS NODE		118	1458.000	7	46.000	20	96.000	0.000

Figure 16 (b)

00 CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

CAMPUS COLLEGE

COST CENTRE	NODE	
LEVEL		
1 FACULTY	1 ARTS	COST CENTRE REPORT 2.2
AFFILIATED WITH	5 COLLEGE	SESSION 1970/71
		SIMULATION PERIOD 1

ACADEMIC STAFF INVENTORY BY RANK

RANK	PREVIOUS INVENTORY	INVENTORY AFTER TRANSITION	NEW STAFF	TOTAL STAFF	AVERAGE SALARY ($)	TOTAL SALARY ($)	STAFFING UNITS PER RANK	TOTAL UNITS ACCUMULATED	COST PER STAFFING UNIT ($)
CHAIRMAN	1	0	1	1	15900	16,000	20	20	800
ASST CHAIRMAN	2	0	2	2	14000	28,000	20	40	700
ASSOCIATE PROF	7	0	11	11	12400	136,000	20	220	618
ASSISTANT PROF	7	0	14	14	12100	169,000	20	280	603
TOTAL	17	0	28	28	12500	349,000	20	560	624

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Figure 16 (c)

00 CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

COST CENTRE

LEVEL 2 COLLEGE — NODE 5 COLLEGE

C A M P U S C O L L E G E

COST CENTRE REPORT 6.3
SESSION 1970/71
SIMULATION PERIOD 1

REQUIRED VERSUS AVAILABLE SPACE BY SPACE CATEGORY

SPACE CODE	CATEGORY NAME	REQUIRED SPACE (SQ. FT.)	MAINTENANCE COST ($)	AVAILABLE SPACE (SQ. FT.)	SQ. FT. SHORTAGE(-) OR SURPLUS
1	OFFICE	3640	254	3300	-340
2	OFFICE SERVICE	200	14	200	0
3	CLASS-RM SERVICE	0	0	0	0
4	CLASSROOM	23870	1670	33000	9130
5	INSTRUCT'L LAB	3270	228	0	-3270
6	INSTR SPEC LAB	41750	3845	55000	13250
7	LAB SERVICE	0	0	0	0
8	PHYSICAL ED	0	0	0	0
9	LIBRARY	8115	568	7500	-615
10	AUDITORIUM	0	0	0	0
11	DINING	6964	487	6000	-964
12	HEALTH	400	28	500	100
13	LOUNGE	44135	3089	32000	-12135
14	COMPUTER	0	0	0	0
15	CIRCULATION	0	0	0	0
16	MECHANICAL	0	0	0	0
17	REST ROOM	0	0	0	0
18	CUSTODIAL	0	0	0	0
19	PHYSICAL PLANT	7627	533	8000	373
20	WAREHOUSE	0	0	0	0
21	GENERAL SERVICE	1800	126	2000	200
22	INACTIVE	0	0	0	0
23	CONSTRUCTION	0	0	0	0
24	CONFERENCE	1800	126	1500	-300
	TOTAL	143571	10968	149000	

Figure 16 (d)

LEVEL 2 COLLEGE — COST CENTRE — NODE 5 COLLEGE — 00

CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

C A M P U S   C O L L E G E

COST CENTRE REPORT 5.4
SESSION 1970/71
SIMULATION PERIOD 1

DAY INSTRUCTIONAL SPECIAL LABORATORY ACTIVITIES - SQ. FT. REQUIRED

SPECIAL LAB ---- TYPE CODE	NAME	SIZE (STATIONS) 10	15	20	25	30	40
1	DRAFTING	300	450	0	0	900	1200
2	MECHANICAL	500	750	1000	0	0	0
3	PHYSICS	0	450	1200	750	0	0
4	MACHINE SHOP	500	1500	1000	1250	0	0
5	CIVIL ENGINEER'G	0	750	1000	0	0	0
6	CHEMISTRY	300	900	600	0	0	0
7	CHEMISTRY & PHYS	300	450	600	0	0	0
8	ELECTRONICS	300	1350	1200	750	0	0
11	BUSINESS MACHINE	300	450	600	750	900	2400
12	TYPING	300	900	0	750	1800	1200
13	MANUAL TYPING	300	0	0	0	0	0
14	MARKETING	300	0	0	750	0	0
15	RETAILING	300	0	0	750	0	0
16	GRAPHICS	300	450	0	750	0	1200
17	DATA PROCESSING	600	450	600	0	0	0
18	AUDIO-VISUAL	0	450	600	0	0	0
20	SR MECHANICAL	500	750	1000	0	0	0
21	WELDING & MET	500	0	0	0	0	0
24	CONTROL & INSTRU	300	0	0	0	0	0
28	PHOTOGRAPHY	300	0	0	0	0	0

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Figure 16 (e)

GG CAMPUS EXPERIMENTS - 1970 SEMINAR SERIES - BASE CASE

C A M P U S   C O L L E G E

COST CENTRE
LEVEL 2 COLLEGE
NODE 5 COLLEGE

COST CENTRE REPORT 5.4
SESSION 1970/71
SIMULATION PERIOD 1

ACTUAL SPACE REQUIRED FOR DAY INSTRUCTIONAL SPECIAL LABORATORY ACTIVITIES

ACTIVITY NUMBER	ACTIVITY NAME	SECTIONS EXPECTED	SECTION SIZES	LABORATORY REQUIRED TYPE	NUMBER	SIZE	STATION OCCUPANCY	HOURS/WEEK ROOMS REQUIRED	EQUIVALENT SQ. FT.	ACTUAL SQ. FT.	SQ. FT. DIFFERENCE
12	ADP1	2	14	17	2	15	93	4	73	150	77
14	ADP2	1	5	17	1	10	50	2	24	40	16
17	AGA	1	34	16	1	40	85	2	97	240	143
33	CAM	1	8	14	1	10	80	1	12	75	63
34	CAM	1	8	14	1	10	80	1	12	75	63
35	CAY	1	8	16	1	10	80	1	12	33	21
36	CAT	1	8	13	1	10	80	2	24	75	51
37	CAW	1	8	28	1	10	80	4	48	133	85
38	CAW	2	15	18	2	15	100	8	146	450	304
39	CGA1	1	42	16	1	40	105	2	97	240	143
40	CGA2	2	12	16	2	15	80	4	73	450	377
41	CGA2	1	24	16	1	25	96	2	61	750	689
43	CIR	1	8	13	1	10	80	1	12	37	25
44	CIR	1	8	13	1	10	80	1	12	37	25
47	CMW1	1	42	16	1	40	105	6	293	720	427
49	CPR	1	8	28	1	10	80	1	12	33	21
50	CPR	1	8	16	1	10	80	2	24	66	42
53	CTP	1	6	16	1	10	60	3	36	100	64
61	CST	1	36	12	1	40	90	3	146	600	454
		1	35	12	1	40	87	3	146	600	454
62	CCA	1	8	16	1	10	80	3	36	100	64
63	CPT	1	8	15	1	10	80	3	36	225	189
64	CPJ	1	8	28	1	10	80	4	48	133	85
75	CMW2	1	8	13	1	10	80	4	48	150	102
152	BA1	3	34	11	3	40	85	9	440	675	235
154	BA2	1	33	11	1	40	82	1	48	75	27
156	BA3	1	9	11	1	10	90	3	36	47	11
159	BB3	1	9	11	1	10	90	3	36	47	11
169	BD2	1	3	17	1	10	30	3	36	60	24
177	BF2	1	15	1	1	15	100	2	36	180	144
176	BF2	1	15	1	1	15	100	3	55	270	215
183	BH2	1	3	14	1	10	30	2	24	150	126
194	BM2	1	14	11	1	15	93	2	36	150	114
196	BM3	1	23	11	1	25	92	2	61	83	22
198	BN2	1	3	11	1	10	30	2	24	31	7
206	BP2	1	3	17	1	10	30	3	36	60	24
208	BP3	1	15	17	1	15	100	3	55	112	57
209	BP3	1	15	17	1	15	100	2	36	75	39
211	B02	1	3	17	1	10	30	2	24	40	16
230	GA1	1	32	11	1	40	80	3	146	225	79
		3	31	11	3	40	77	9	440	675	235
232	GA2	1	4	11	1	10	40	6	73	94	21
236	GB2	1	4	11	1	10	40	3	36	47	11
240	GD1	5	16	17	5	20	80	5	122	250	128
		3	15	17	3	15	100	3	55	112	57
258	GM2	2	24	11	2	25	96	4	122	166	44

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Figure 17

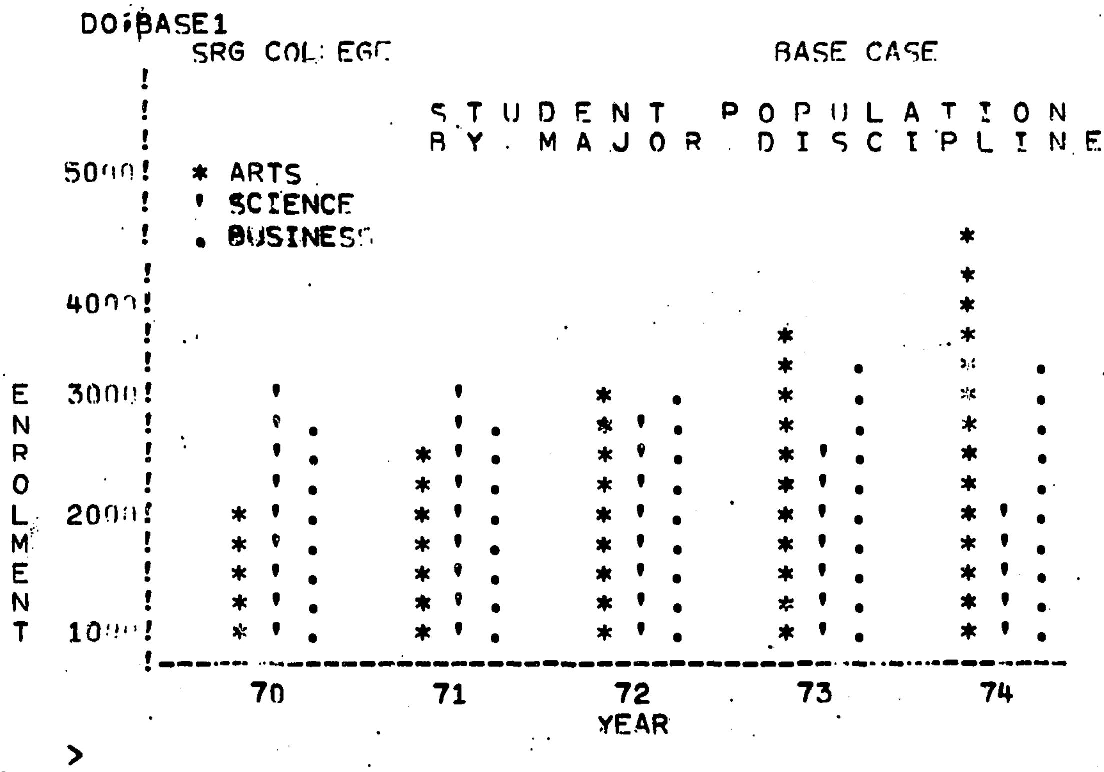
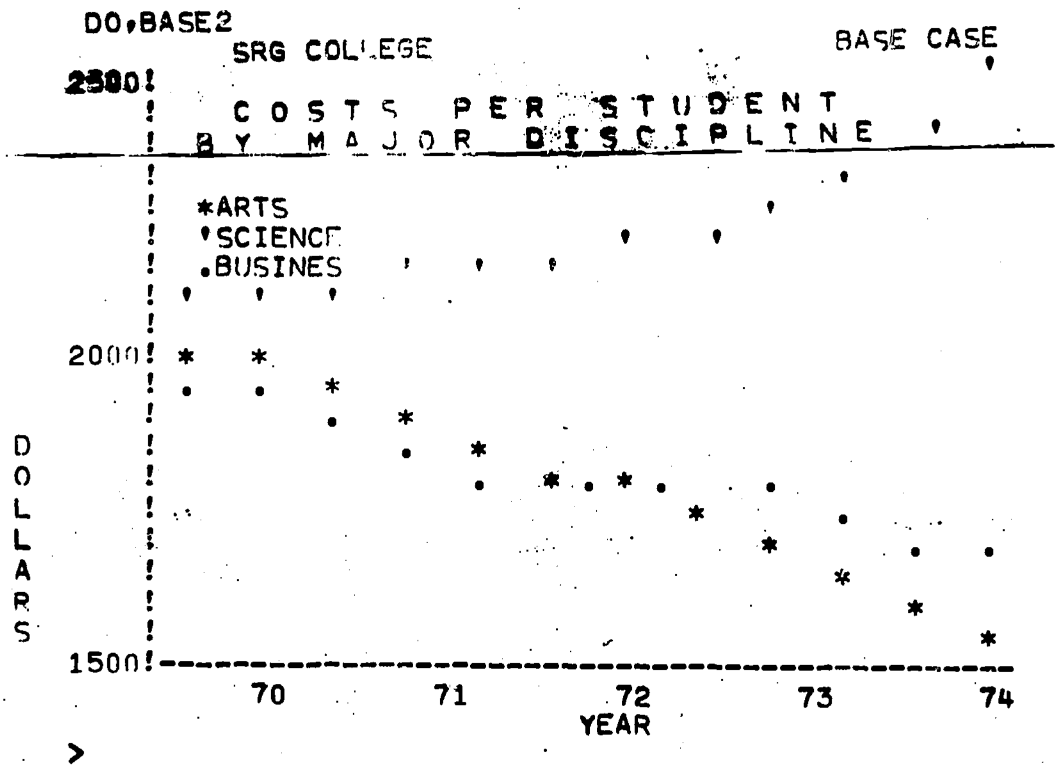

DO;BASE1
SRG COLLEGE
BASE CASE
STUDENT POPULATION
BY MAJOR DISCIPLINE
* ARTS
' SCIENCE
. BUSINESS
5000
4000
3000
2000
1000
ENROLMENT
70
71
72
73
74
YEAR

Figure 18


DO,BASE2
SRG COLLEGE
BASE CASE
2500
COSTS PER STUDENT
BY MAJOR DISCIPLINE
*ARTS
'SCIENCE
.BUSINES
2000
DOLLARS
1500
70
71
72
73
74
YEAR

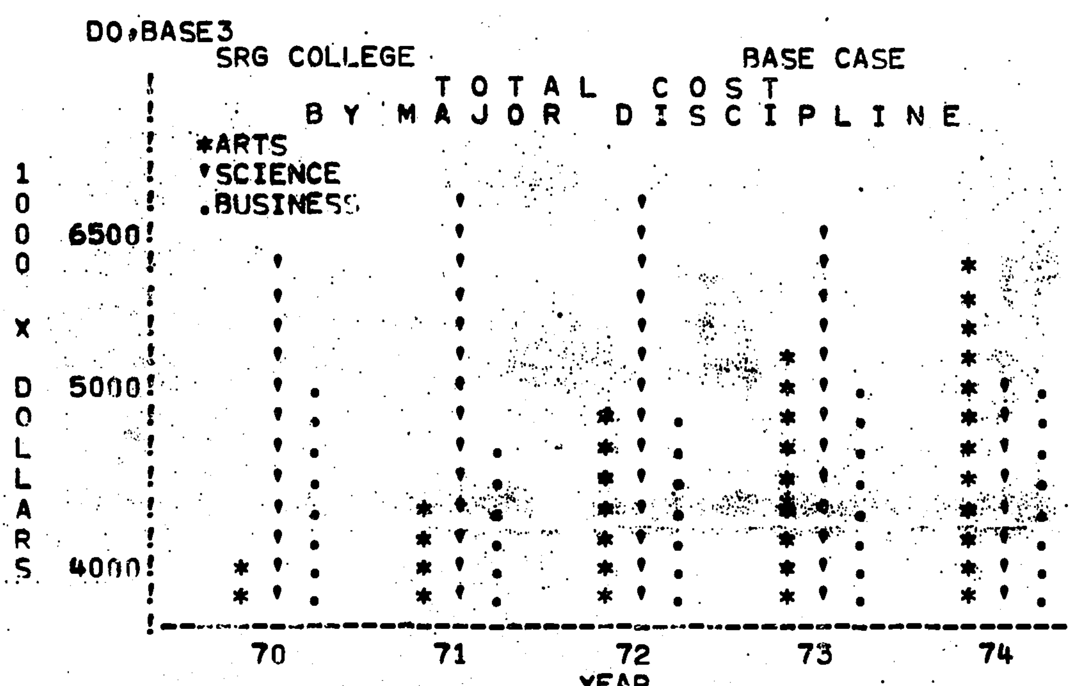

DO,BASE3
SRG COLLEGE
BASE CASE
TOTAL COST
BY MAJOR DISCIPLINE
*ARTS
'SCIENCE
.BUSINESS
1000 X DOLLARS
6500
5000
4000
70
71
72
73
74
YEAR

Figure 19

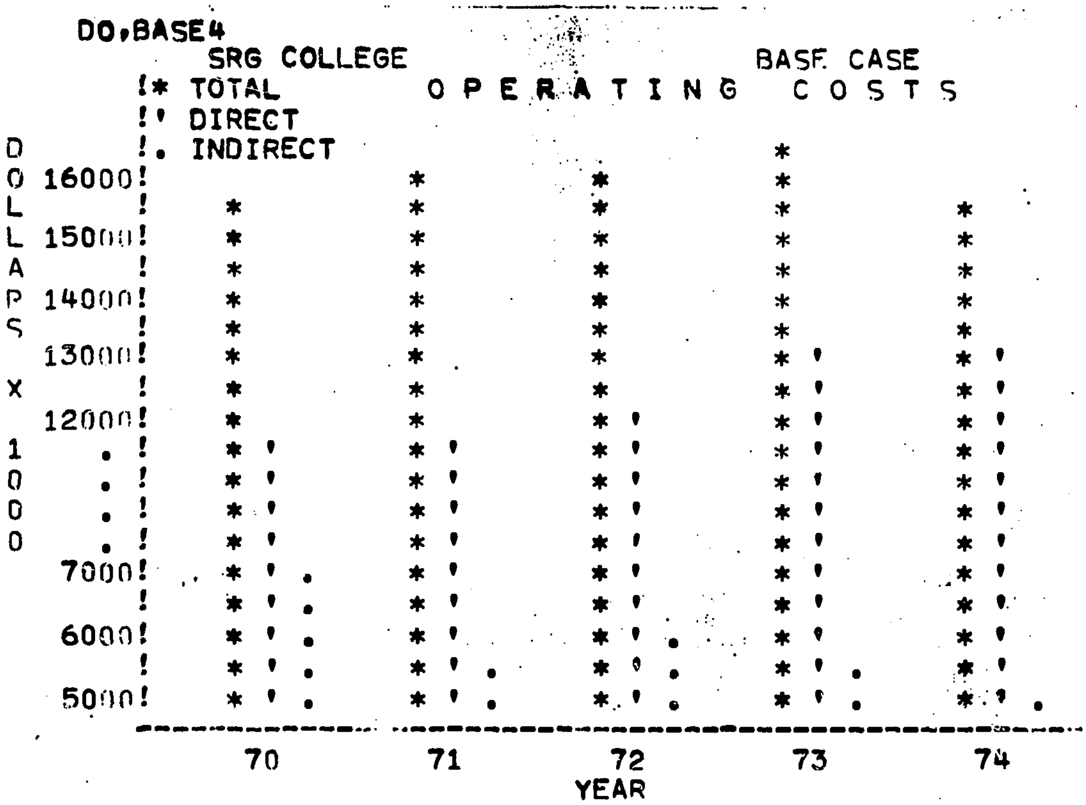


Figure 20

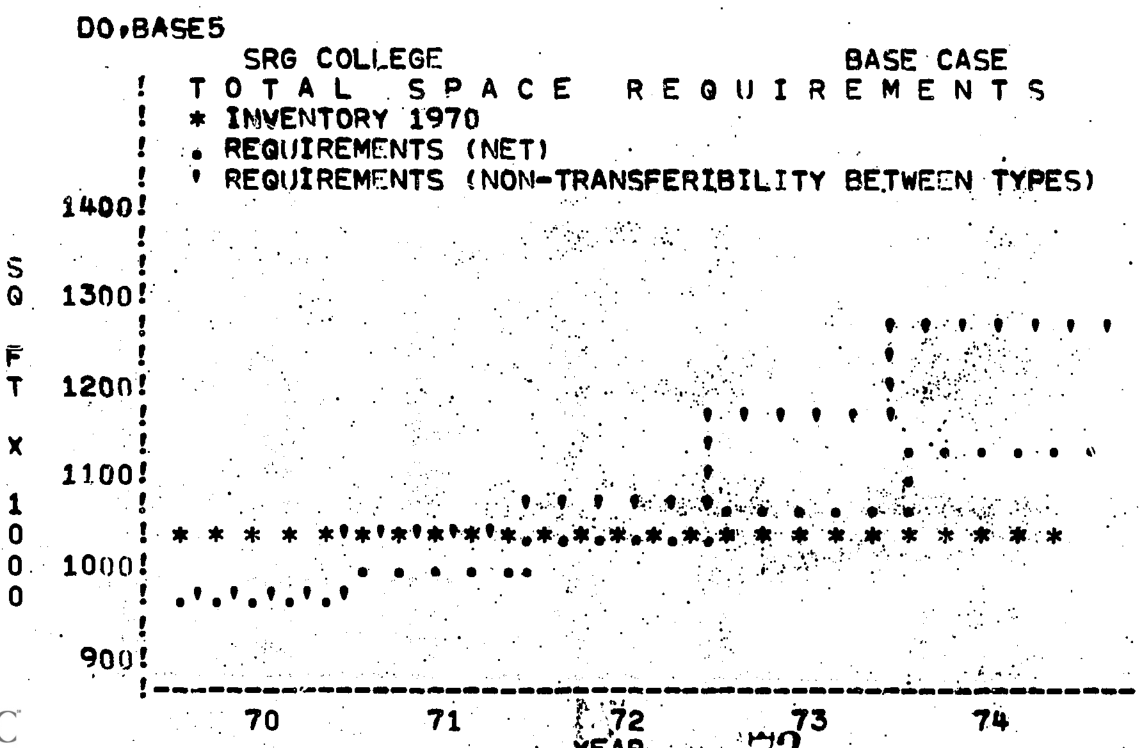


Figure 21

DO,BASE6

SRG COLLEGE BASE CASE

S P A C E - S T A T I O N O C C U P A N C Y
(W H E N I N U S E)

SPACE CATEGORY SPACE SIZE	1970	1971	1972	1973	1974
CLASSROOM					
10	85	87	87	90	92
15	83	88	83	90	93
25	72	72	74	76	78
40	78	79	78	79	80
60	88	89	89	86	88
100	67	68	67	71	73
LABORATORY					
15	90	88	86	82	74
30	91	91	85	83	80

DO,BASE7

SRG COLLEGE BASE CASE

T E A C H I N G S P A C E - U T I L I Z A T I O N
(T E A C H I N G W E E K = 3 5 H O U R S)

SPACE CATEGORY SPACE SIZE	1970	1971	1972	1973	1974
CLASSROOM					
10	72	74	75	78	79
15	67	69	71	75	76
25	65	66	70	71	73
40	62	64	67	68	70
60	60	62	63	63	65
100	63	65	65	67	68
LABORATORY					
	1970	1971	1972	1973	1974
15	64	63	60	60	56
30	63	62	57	54	51

Figure 22

DO+BASE8

SRG COLLEGE

A C A D E M I C   S T A F F   B Y   S C H O O L

SCHOOL: SCIENCE — CASE: BASE

	YEAR 1970	1971	1972	1973	1974
TOTAL NO.	203	201	187	178	162
% TEACHING	78	81	74	70	67
% OTHER	18	18	16	15	14
% UN-ASSIGNED	4	1	10	15	19

SCHOOL: SCIENCE — CASE: CASE 1

	YEAR 1970	1971	1972	1973	1974
TOTAL NO.	203	201	189	175	161
% TEACHING	78	71	77	75	76
% OTHER	18	18	18	17	17
% UN-ASSIGNED	4	1	5	8	9

Figure 23

DO,BASE10

SRG COLLEGE

A C T I V I T Y   A N A L Y S I S

(E X C E P T I O N   R E P O R T I N G)

DISCIPLINE: CHEMISTRY   YEAR: 2   TERM: SPRING 1974

	BASE				CASE 1			
ACTIVITY CODE	SECTION SIZE DESIRED	SECTION SIZE ACTUAL	NO.	HOURS WEEK	SECTION SIZE DESIRED	SECTION SIZE ACTUAL	NO.	HRS WEEK
CH201	22	21	2	8	30	29	6	24
CH207	22	24	4	16				
CH209	15	13	5	20				
CH211	15	12	3	12	15	14	6	24
CH212	24	17	2	8				
CH216	26	19	5	20	15	15	12	48
CH222	24	20	3	9				
CH224	13	12	5	15	15	14	11	44
CH227	13	10	3	12				
CH230	18	16	4	16				
TOTAL			36	136			35	140

Figure 24

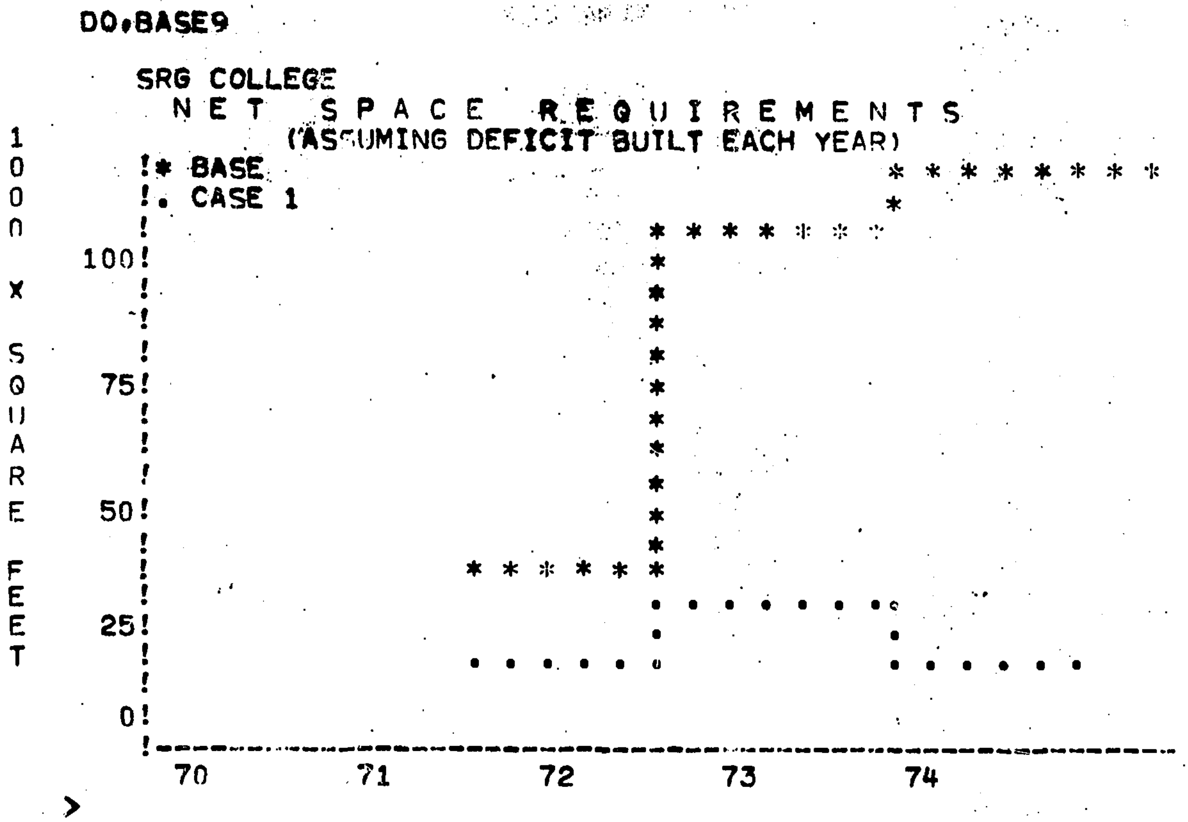


Figure 25

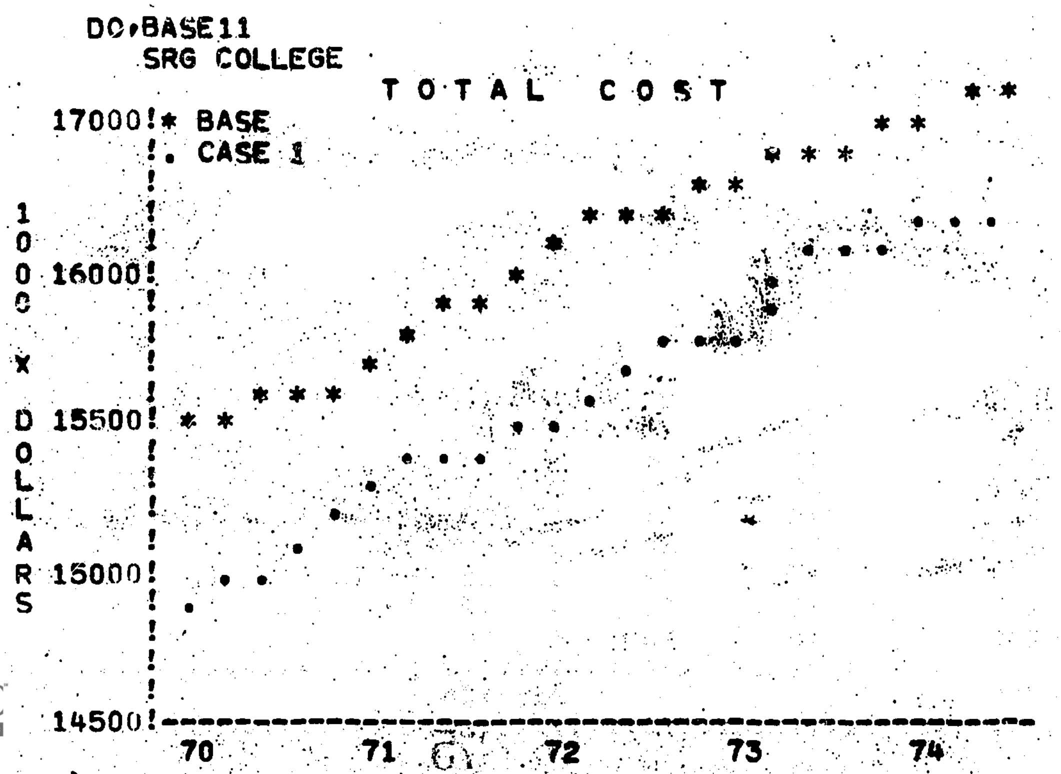


TABLE I

SCHEMATIC OF INPUT STRUCTURE AND REPORTING

(a)

Level 1 Command	Level 2 Command	Level 3 Command	Description	Input Data Report	Title
INPUT	DEFINE	1	Name, Time and Credit Factors	1.1	Simulation Characteristics
		2	Cost Center Levels	1.2	Cost Centers - Level/Node Structure
		3	Cost Centers	1.2	
		4	Program Levels	1.3	Programs - Level/Node Structure
		5	Programs	1.3	
		6	Program to Cost Center Affiliation	1.4	Affiliation of Program Nodes to Cost Center Nodes
	ACTIVITY	1	Activity Type	2.1	Activity Characteristics
		2	Specialty Type	2.1	
		3	Schedule Range	2.2	Activity Characteristics
		4	Section Size Range	2.2	
		5	Resource Combination	2.3	Activity Characteristics
		6	Activities	2.4	Activities
		7	Exception Activities	2.5	Exception Activities
		8	Exception Resources	2.6	Exception Activity Resources

...Cont'd

Table 1 (b)

Level 1 Command	Level 2 Command	Level 3 Command	Description	Input Data Report	Title
INPUT	PROGRAM	1	Curricula and Programs		
		2	Curricula Activities and Participation Rates	3.1	Program Curricula and Activity Participation
		3	Program Duration and Update		
		4	Credits per Credit Range by Program		
	STUDENTS	1	New Entrants to Institution with NO Academic Credit		
		2	Distribution of New Entrants with NO Academic Credit	3.2	Initial Distribution of Students into Programs
		3	New Entrants with academic standing	3.3	Student Transitions
		4	Student Transitions		
		5	Student Credit Load	3.4	Student Credit Load
	STAFF	1	Academic Staff Ranks	4.1	Academic Staff Characteristics
		2	Academic Staff Activity Teaching Duties		
		3	Academic Staff Activity Non-Teaching Duties	4.2	Academic Staff Activity Duties
		4	Academic Support Staff	4.6	Academic Support Staff
		5	Non-Academic Staff	4.7	Non-Academic Staff
	XSTAFF	1	Detailed Academic Staff Ranks		
		2	Detailed Academic Staff Activity Teaching Duties		
		3	Detailed Academic Staff Activity Non-teaching Duties	4.3	Academic Staff Non-Activity Duties
		4	Detailed Academic Staff Inventory, transition and Hiring Criteria	4.4	Academic Staff Inventory Transitions and Hiring Criteria
		5	Detailed Academic Staff Optimization and Update Policies	4.5	Academic Staff Optimization and Update Policies

...Cont'd

Table 1 (c)

Level 1 Command	Level 2 Command	Level 3 Command	Description	Input Data Report	Title
INPUT	AVLSPACE	1	Available Classroom Space	5.1	Available Classroom Space by Cost Center
		2	Available Instructional Laboratory Space	5.2	Available Instructional Laboratory Space by Cost Center
		3	Available Instructional Special Laboratory Space	5.3	Available Instructional Special Laboratory Space by Cost Center
		4	Available Space by Category	5.4	Available Cost Center Space by Space Category
	SPACE	1	Classroom Sizes (stations)	5.5	Room Size and Space Planning Factors - sq. ft. per Station
		2	Laboratory Sizes (stations)	5.5	
		3	Classroom Space Planning Factors	5.5	
		4	Classroom Type Characteristics	5.6	Classroom and Instructional Laboratory Characteristics by type
		5	Instructional Lab Space Planning Factors	5.5	
		6	Instructional Lab. Type Characterist	5.6	
		7	Special Lab. Space Planning Factors	5.5	
		8	Special Lab. Type Characteristics	5.7	Instructional Special Laboratory Characteristics by Type
		9	Service Space Characteristics by Type	6.1	Service Space Characteristics by Type
		10	Cost Center Space Characteristics	6.2	Cost Center Teaching Weeks and Space Utilizations
		11	Service Characteristics	6.3	Service Characteristics Codes
		12	Cost Information by Space Category	6.4	Const. & Maint. Costs by Space Category
		13	Miscellaneous Space Specifications	6.5	Mis. Space Input
		14	Teaching Space Control Centers	6.6	Teaching Space Control Centers

...Cont'd

Table 1 (d)

Level 1 Command	Level 2 Command	Level 3 Command	Description	Input Data Report	Title
INPUT	SERVICE	1	Service Department	7.1	Service Departments
		2	Service Staff	7.2	Service Staff
		3	Service Space	7.3	Service Space
		4	Service Equipment	7.4	Service Equipment
	REVENUE	1	Characteristics of Revenue	8.1	Characteristics of Revenue
		2	Revenue at Cost Centers	8.2	Revenue at Cost Centers
		3	Revenue at Programs	8.3	Revenue at Programs
		4	Revenue of Service Departments	8.4	Revenue at Service Departments
	EQUIPMEN	1	Equipment Resource Characteristics	9.1	Equipment Resource Characteristics
	MISCELLA	1	Miscellaneous Resource Characteristics	9.2	Miscellaneous Resource Characteristics
		2	Miscellaneous Resource by Cost Center	9.3	Miscellaneous Resources by Cost Center

TABLE 2

CAMPUS COLLEGE
SESSION 1969-70

INPUT DATA REPORT 4.3
SOURCE DOCUMENTS: STAFF 03
XSTAFF 03

PAGE 1

ACADEMIC STAFF NON-ACTIVITY DUTIES

COST CENTER CODE	COST CENTER NAME	NON-TEACHING DUTY CODE	NON-TEACHING DUTY NAME	RANK REQUIRED CODE	RANK REQUIRED NAME	STAFFING UNITS	AND	FUNCTIONAL BASES AND QUANTITIES IN PROPORTION 1		2		3
COMMON		1	CHAIRMAN	3	CHAIRMAN	17	1	1.00	0	0.0	0	0.0
COMMON		2	ASST CHAIRMAN	4	ASST CHAIRMAN	12	1	1.00	0	0.0	0	0.0
COMMON		3	COUNCELLOR		GENERAL	5	1	1.00	42	0.50	0	0.0
'EXCEPTIONS'												
1	ARTS	2	ASST CHAIRMAN	4	ASST CHAIRMAN	12	1	1.00	42	0.30	0	0.0

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TABLE 3

C A M P U S   C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 5.3
SOURCE DOCUMENT: AVLSPACE 03

PAGE 1

AVAILABLE INSTRUCTIONAL SPECIAL LABORATORY SPACE BY COST CENTRE

COST CENTRE CODE	NAME	SPECIAL LAB TYPE	SPECIAL LABORATORIES AVAILABLE BY SIZE(STATIONS) 10	15	20	25	30	40
5	COLLÈGE	1	1	0	0	0	1	1
		2	1	1	0	0	0	0
		3	0	2	1	0	0	0
		4	1	2	1	0	0	0
		5	0	1	0	0	0	0
		6	1	2	0	0	0	0
		7	1	1	0	0	0	0
		8	1	3	1	0	0	0
		11	1	1	1	0	0	3
		12	2	1	0	0	0	3
		13	1	0	0	0	0	0
		14	1	1	0	0	0	0
		15	1	1	0	0	0	1
		16	1	1	0	1	1	1
		17	1	1	0	0	0	0
		18	0	2	1	0	0	0
		20	1	0	0	0	0	0
		24	0	1	0	0	0	0
		28	1	0	0	0	0	0

TABLE 4

C A M P U S   C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 5.4
SOURCE DOCUMENT: AVLSPACE 04

PAGE 1

AVAILABLE COST CENTRE SPACE BY SPACE CATEGORY

COST CENTRE CODE	COST CENTRE NAME	SPACE CATEGORY CODE	SPACE CATEGORY NAME	SQ. FT. AVAILABLE	STATIONS AVAILABLE
1	ARTS	1	OFFICE	3100	0
2	BUSINESS	1	OFFICE	4500	0
		14	COMPUTER	550	0
3	ENGINEERING	1	OFFICE	5000	0
5	COLLEGE	1	OFFICE	3300	0
		2	OFFICE SERVICE	200	0
		4	CLASSROOM	33000	0
		6	INSTR SPEC LAB	55000	0
		9	LIBRARY	7500	0
		11	DINING	6000	0
		12	HEALTH	500	0
		13	LOUNGE	32000	0
		19	PHYSICAL PLANT	8000	0
		21	GENERAL SERVICE	2000	0
		24	CONFERENCE	1500	0

TABLE 5

CAMPUS COLLEGE
SESSION 1969-70

INPUT DATA REPORT 5.5
SOURCE DOCUMENTS: SPACE 01, SPACE 02, SPACE 03, SPACE 05, SPACE 07

ROOM SIZES AND SPACE PLANNING FACTORS - SQUARE FEET PER STATION

CLASSROOMS	SIZE(STATIONS)	15	20	30	40	60	80	200	0	0	0
	TYPE NUMBER 1	18	16	14	12	10	9	8	0	0	0
INSTRUCTIONAL LABORATORIES	SIZE(STATIONS)	10	15	20	25	30	40				
	TYPE NUMBER 1	30	25	22	20	18	16				
INSTRUCTIONAL SPECIAL LABORATORIES	EQUIPMENT SIZE CODE										
	1	0	0	0	0	0	0				
	2	30	30	30	30	30	30				
	3	50	50	50	50	50	50				

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TABLE 6

C A M P U S   C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 5.7
SOURCE DOCUMENTS: SPACE 08

PAGE 1

INSTRUCTIONAL SPECIAL LABORATORY CHARACTERISTICS BY TYPE

TYPE NUMBER	TYPE NAME	EQUIPMENT SIZE CODE	MAINTENANCE COST $/SQ.FT.	CONSTRUCTION COST $/SQ.FT.	EQUIPMENT CAPITAL BASIS	EQUIPMENT CAPITAL COST QTY.	EQUIPMENT OPERATING BASIS	EQUIPMENT OPERATING COST QTY.	SERVICE CHARACTERISTIC CODES 1	2	3	4	5	6	7	8	9	10
1	DRAFTING	2	0.0	0	0	000	0	0	4	24	20	0	0	0	0	0	0	0
2	MECHANICAL	3	0.0	0	0	000	0	0	4	24	1	15	12	16	17	0	0	0
3	PHYSICS	2	0.0	0	0	000	0	0	4	24	12	13	14	15	16	17	0	0
4	MACHINE SHOP	3	0.10	0	0	000	0	0	4	24	1	12	14	16	17	21	22	27
5	CIVIL ENGINEER'G	3	0.0	0	0	000	0	0	4	24	1	12	13	0	0	0	0	0
6	CHEMISTRY	2	0.0	0	0	000	0	0	4	24	12	13	0	0	0	0	0	0
7	CHEMISTRY & PHYS	2	0.10	0	0	000	0	0	4	24	12	13	14	15	16	17	18	0
8	ELECTRONICS	2	0.0	0	0	000	0	0	4	24	16	17	0	0	0	0	0	0
11	BUSINESS MACHINE	2	0.0	0	0	000	0	0	4	24	7	0	0	0	0	0	0	0
12	TYPING	2	0.0	0	0	000	0	0	4	24	7	0	0	0	0	0	0	0
13	MANUAL TYPING	2	0.0	0	0	000	0	0	4	24	7	0	0	0	0	0	0	0
14	MARKETING	2	0.0	0	0	000	0	0	4	24	0	0	0	0	0	0	0	0
15	RETAILING	2	0.0	0	0	000	0	0	4	24	0	0	0	0	0	0	0	0
16	GRAPHICS	2	0.0	0	0	000	0	0	4	24	0	0	0	0	0	0	0	0
17	DATA PROCESSING	2	0.10	0	0	000	0	0	4	24	5	6	0	0	0	0	0	0
18	AUDIO-VISUAL	2	0.10	0	0	000	0	0	4	24	26	20	25	0	0	0	0	0
20	SR MECHANICAL	3	0.0	0	0	000	0	0	4	24	1	15	12	16	17	18	0	0
21	WELDING & MET	3	0.10	0	0	000	0	0	4	24	12	14	15	23	29	0	0	0
24	CONTROL & INSTRU	2	0.10	0	0	000	0	0	4	24	17	16	0	0	0	0	0	0
25	MEDIA	2	0.0	0	0	000	0	0	4	24	0	0	0	0	0	0	0	0
26	ETV	2	0.0	0	0	000	0	0	4	24	30	0	0	0	0	0	0	0

TABLE 7

CAMPUS COLLEGE
SESSION 1969-70

INPUT DATA REPORT 6.2
SOURCE DOCUMENTS: SPACE 10

COST CENTRE TEACHING WEEKS AND SPACE UTILIZATIONS

COST CENTRE LEVEL	CODE	NAME	CLASSROOM TEACHING WEEK - HOURS	CLASSROOM UTILIZATION - %	LABORATORY TEACHING WEEK - HOURS	LABORATORY UTILIZATION - %
1	1	ARTS	35	70	35	70
1	2	BUSINESS	35	70	35	70
1	3	ENGINEERING	35	70	35	50
1	4	CONTINUING EDUC	35	70	35	70
2	5	COLLEGE	35	70	35	70

TABLE 8

C A M P U S   C O L L E G E
SESSION 1969-70

INPUT DATA REPORT 6.5
SOURCE DOCUMENTS: SPACE 13
SPACE 14

MISCELLANEOUS SPACE INPUT

CLASSROOM MANIPULATION REQUIRED - BY SIZE NO
- BY TYPE NO

INSTRUCTIONAL LABORATORY - BY SIZE NO
MANIPULATION REQUIRED - BY TYPE NO

NET/GROSS SPACE PERCENTAGE = 80

NET TO GROSS CONSTRUCTION COST ($/SQ. FT.) = 25

OFFICE MAINTENANCE COST ($/SQ. FT.) = 0.07

OFFICE SERVICE CHARACTERISTIC CODES

1	2	3	4	5
4	2	0	0	0