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AUTHOR Topping, Jim
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ABSTRACT

The applicability and validity of NCHEMS' Information Exchange Procedures (IEP) to major research universities are examined. IEP enables peer institutions to compare information about their resources. Evaluation of the IEP costing methods are examined in this document, which is intended as an appendix to "Evaluation of the IEP Costing Procedures." A step-by-step commentary on the implementation and analysis of the NCHEMS cost-study procedures is presented, including suggested modifications. The six universities taking part in this study were: University of Colorado; University of Illinois; University of Kansas; Purdue University; State University of New York at Stony Brook; and University of Washington. Areas examined were: Student Programs and Academic Disciplines; Student-Registration Data; Faculty Activity Data; Institutional Expenditure Data; Direct-Cost Data; Full-Cost Data; and Relation between Student Enrollment and Faculty Activity. It is noted that the universities often exhibited more similarity than dissimilarity; e.g., in their procedures for collecting data within their organizational departments. However, when findings were applied to the Higher Education General Information Survey (HEGIS) codes, clarification was needed, and a task group recommended a clarification of the HEGIS definitions. Each university's individual response is displayed in this document followed by the task group's evaluation and recommendation to NCHEMS. Included are graphs, tables, and statistics. (LC)

Technical Diary

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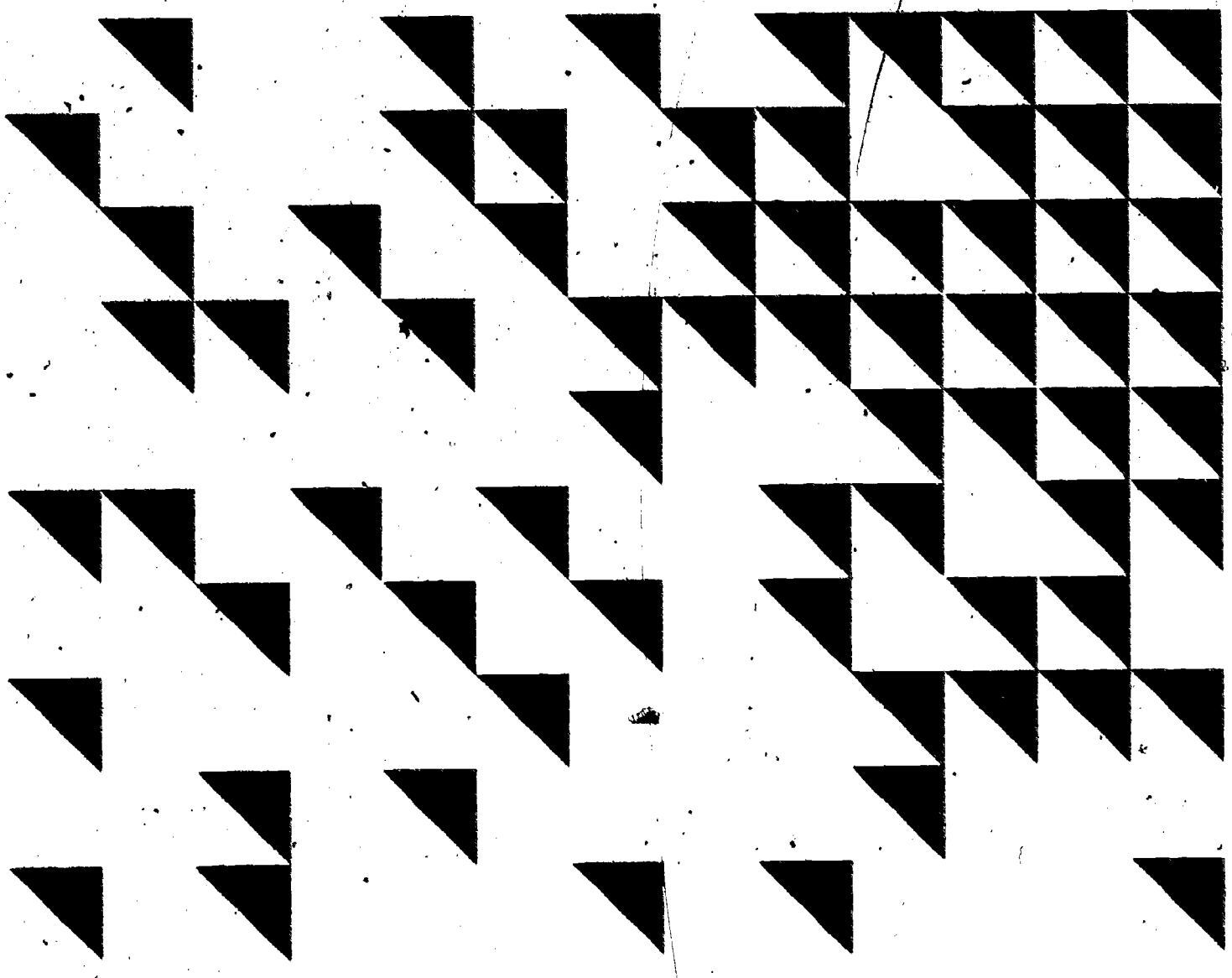
Information Exchange Procedures for Major Research Universities



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Technical Diary of the Major Research Universities' Pilot Test

Jim Topping
Project Director

March 1979

National Center for Higher Education Management Systems
P.O. Drawer P Boulder, Colorado 80302
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Preface

An original charge to NCHEMS was to develop a set of procedures and definitions that would enable peer institutions to compare information about their resources, activities, and educational outcomes. To fulfill this responsibility, NCHEMS developed in the early 1970s what eventually became known as the Information Exchange Procedures (IEP). Though IEP was generally accepted by colleges and universities, one sector of higher education—the major research universities—expressed reservations as to the applicability and validity of the procedures to their situation. Thus in early 1975, several of them petitioned the NCHEMS Board of Directors to reexamine certain portions of IEP from their perspective.

A task force representing the major research universities was subsequently appointed by the Board. Two working groups were formed—one to focus on the costing methods contained in IEP and the other on alternative approaches to information exchange. The first group, subsequently known as the Experimental Application and Analysis Subgroup, conducted an active pilot test of the costing portions of IEP to determine their relevance to a major research university. This work is documented in two reports:

- *Evaluation of the IEP Costing Procedures: A Pilot Study by Six Major Research Universities* (1979). A report that summarizes the technical findings of six major research universities based upon their experience in implementing NCHEMS Information Exchange Procedures. Participating in the study were the University of Colorado, University of Illinois, University of Kansas, Purdue University, State University of New York at Stony Brook, and the University of Washington.
- *Technical Diary of the Major Research Universities' Pilot Test* (1979). A step-by-step commentary on the implementation and analysis of the NCHEMS cost-study procedures, intended to be a set of technical appendixes to *Evaluation of the IEP Costing Procedures.* Modifications to adapt the procedures to major research universities are included as part of the advisory-group recommendations.

The second group, known as the Measures and Definitions Subgroup, examined alternative approaches to information exchange among major research universities. Its work, largely conceptual in nature, was developed by representatives from public and private universities, including Stanford University, State University of New York at Stony Brook, University of California at Los Angeles, University of Michigan, and University of Rochester. Their report is entitled *Information Exchange Procedures for Major Research Universities: Alternative Conceptual Approaches* (1979).

Together, these three documents constitute the final report of the NCHEMS Major Research Universities Task Force. NCHEMS is indebted to the participants in this project for their contribution of time and energy. While substantive conclusions were not reached in all aspects of the study, significant progress was made in exploring the issues surrounding information exchange among major research universities and, in some instances, in suggesting tentative solutions to the problems. We publish these reports in the hope that they will help other universities that want to undertake similar comparative studies.

A. Ray Chamberlain
Chairperson, Board of Directors

Ben Lawrence
Executive Director

Jim Topping
Project Director

Acknowledgments

A comparative cost study of six major universities is a large undertaking and could not be accomplished without the full support of those institutions participating in the study. The project director would like to acknowledge the aid and support of the following individuals who represented the pilot-test institutions:

University of Colorado:	Russell Nelson, Chancellor of the Boulder Campus Jack Bartram, Vice President for Budget and Planning Mark Meredith, Director of Institutional Studies
University of Illinois:	Ronald Brady, Vice President for Planning and Allocation Peter Czajkowski, Director of Long-Range Planning and Analysis Martin Zeigler, Associate Vice President for University Service
University of Kansas:	Richard Mann, University Director for Institutional Research and Information Systems Deborah Teeter, Director for Institutional Research and Planning
Purdue University:	John Hicks, Assistant to the President Howard Lyon, Fiscal Planning Director Laverne Knodle, Director of Analytical Studies Tom Schellhardt, Assistant Director of Analytical Studies
State University of New York at Stony Brook:	Alexander Pond, Acting President Raymond Maniuszko, Director of Institutional Studies
University of Washington:	Robert Thompson, Vice Provost for Planning and Budgeting Laura Saunders, Director of Planning and Analytical Studies

In addition, thanks are due to the members of the NCHEMS staff who contributed to this project, particularly Anahid Katchian, Dick Johnson, Lorraine Hori, and Cathy Patrick.

STEP 1

STEP 1

TOPIC: Inventory of student programs and academic disciplines.

OBJECTIVE: To list student programs and discipline offerings on the basis of the HEGIS codes assigned to them by the five participating institutions.[1]

GENERAL IEP PROCEDURES: The development of the IEP activity structure as detailed on pages 2:2-2.11 of the second edition of Technical Report 65, Procedures for Determining Historical Full Costs.

ADDITIONAL MRU PROCEDURES: All participating institutions classified their student programs and academic disciplines by assigning each of them a unique HEGIS code. The institutions used the inventory forms developed by the University of Colorado to determine the extent of commonality of disciplines and student programs among the universities. The inventory forms, labeled exhibits 1A and 1B, are shown on pages 1.9 and 1.10. The results

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1. The University of Colorado at Boulder, the University of Kansas at Lawrence, Purdue University at West Lafayette, the University of Illinois at Champaign-Urbana, and the State University of New York at Stony Brook were the original pilot-test institutions. A sixth university, the University of Washington, joined the group midway through the pilot-test period. Washington's data were added to the analysis beginning in step 5.

from the five universities were then displayed side-by-side for review by the Experimental Application and Analysis subgroup. (See exhibits 1C and 1D on pages 1.11 and 1.12 for examples of these discipline and program comparisons.) It took several iterations of the data before an acceptable inventory was achieved.

COLLECTION TIME PERIOD: Three months. This step was originally scheduled for one month, but due to misclassification and other inconsistencies within the data, the time period was extended to three months.

ANALYSIS OF THE DATA: The institutions were asked to collect and display their instructional-discipline and student-program offerings within organizational departments using the Higher Education General Information Survey (HEGIS) codes. This inventory was conducted at the discipline specialty level (four-digit code). After each school completed its inventory, NCHEMS assembled and displayed the data in a number of different formats. The formats consisted of detailed listings of disciplines by course level and student programs by student level for all five institutions. These lists were reviewed by NCHEMS and the study group to determine the extent to which the proposed data categories (disciplines and student programs)

were common among the five institutions. College catalogs were used to clarify the course content of a particular discipline or student program. In reviewing the data, it became apparent that the extent to which commonality of program and discipline profiles existed at the four-digit HEGIS level was relatively limited. For example, based on preliminary data on disciplines across the five universities, 37 disciplines were common to two institutions, 21 disciplines were common to three institutions, 15 disciplines could be found in four institutions, and only 17 disciplines were common to all five institutions. Similarly when comparing student program data across the five schools at the four-digit level, it can be seen that there were 68 student programs common to two institutions, 26 student programs common to three institutions, 16 student programs common to four institutions, and another 16 student programs common to all five institutions. Commonality was increased when disciplines and programs were listed at the two-digit level, with 46.1 percent (12 out of 26) discipline clusters being common to all five institutions and 50.0 percent (14 out of 28) of the student-program clusters being common to all five schools. In addition, when credit hours were examined, it was found that the majority of the credit hours (80.1 percent of the discipline

clusters and 70.9 percent of the student-program clusters) produced in the instructional areas common to the five schools. Table 1.1 summarizes data on disciplines and student programs for the five institutions. When initially comparing the preliminary inventories from the five universities,

TABLE 1.1

DISCIPLINES/STUDENT PROGRAMS
WITH COMMON HEGIS CODES ACROSS THE FIVE UNIVERSITIES

Disciplines/Student Programs Common to the Following Number of Schools	1	2	3	4	5	TOTAL
Four-digit disciplines						
Number	100	37	21	15	17	190
Percent	*52.6*	*19.5*	*11.1*	*7.9*	*8.9*	*100.0*
Credit hours[a]	539	458	444	588	1,439	3,468
Percent	*15.5*	*13.2*	*12.8*	*17.0*	*41.5*	*100.0*
Two-digit disciplines						
Number	4	2	3	4	12	25
Percent	*16.0*	*8.0*	*12.0*	*16.0*	*48.0*	*100.0*
Credit hours[a]	14	127	83	464	2,780	3,468[b]
Percent	*0.4*	*3.7*	*2.4*	*13.4*	*80.2*	*100.0*
Four-digit disciplines						
Number	127	68	26	16	16	253
Percent	*50.2*	*26.9*	*10.3*	*6.3*	*6.3*	*100.0*
Credit hours[a]	731	883	511	393	950	3,468
Percent	*21.1*	*25.5*	*14.7*	*11.3*	*27.4*	*100.0*
Two-digit disciplines						
Number	5	4	1	4	14	28[b]
Percent	*17.9*	*14.3*	*3.6*	*14.3*	*50.0*	*100.0*[b]
Credit hours[a]	22	463	48	477	2,458	3,468[b]
Percent	*0.6*	*13.4*	*1.4*	*13.8*	*70.9*	*100.0*[b]

[a]Stated in thousands.

[b]Does not sum to 100 due to rounding.

it was evident that numerous differences had occurred in assigning HEGIS data codes to the disciplines and student programs. These differences can be attributed to the following reasons: (1) the instructions to the institutions for conducting the inventory were open to different interpretations, (2) organizational units were equated to HEGIS disciplines, and (3) the use of the HEGIS taxonomy leaves room for a great deal of interpretation, and as a result, when assigning codes, the five institutions may have applied different definitions.

The first two problems can be corrected by clarifying the instructions to the individual universities. The third problem is a deficiency in the HEGIS Taxonomy. The Taxonomy that is currently being revised could be vastly improved by adding descriptions for each of the subject-matter areas and instructional programs.

RECOMMENDATIONS OF THE STUDY GROUP:

As a result of these observations, the study group strongly recommends that there be a clarification of the HEGIS definitions. The group feels that this action will provide for more valid HEGIS information as well as promote interinstitutional research efforts such as the one represented by this project. In

addition, the study group recommends that each institution participating in an information exchange effort produce and maintain data at the four-digit HEGIS level but, for exchange purposes, aggregate the data to a higher level of detail--either the two-digit HEGIS or a modified three-digit HEGIS where certain disciplines are distinctly recognized. For example, in physical education, the teaching techniques and the resources required to carry out the teaching differ substantially from the other education disciplines. Hence physical education would be assigned a modified two-digit code to distinguish it from the other education disciplines. A sample taxonomy for exchange of cost information is illustrated in table 1.2. Finally, the study group recommends that in any information-exchange effort, a statement describing the goals and objectives of the particular academic unit teaching the discipline or offering the degree program, the areas of specialization, the degree requirements, and any interdisciplinary relationships should accompany the data. Program statements of this nature will aid the reader in identifying similarities or differences among programs with identical names and HEGIS codes.

CONCLUSION: The major research universities included in this study displayed considerable diversity in their student programs and discipline offerings. This diversity must be taken into account in making inter-institutional comparisons but does not prevent the study group from proceeding with the study.

TABLE 1.2

SAMPLE TAXONOMY FOR INFORMATION EXCHANGE

0100	Agriculture and Natural Resources
0200	Architecture and Environmental Design
0206	Urban and Regional Planning
0300	Area Studies
0400	Biological Sciences
0500	Business and Management
0600	Communications
0700	Computer and Information Sciences
0801	Education (All Other)
0808	Special Education
0835	Physical Education
0839	Industrial/Vocations/Technical Education
0900	Engineering
1001	Fine Arts, General
1099	Studio Arts
1100	Foreign Languages
1201	Health Professions (All Other)[1]
1203	Nursing[1]
1204	Dentistry[1]
1206	Medicine[1]
1211	Pharmacy[1]
1218	Veterinary Medicine[1]
1300	Home Economics
1400	Law
1500	Letters
1600	Library Science
1700	Mathematics
1800	Military Sciences
1900	Physical Sciences
2000	Psychology
2100	Public Affairs and Services
2200	Social Sciences
2300	Theology
4900	Interdisciplinary Studies
0000	Undeclared Majors

[1]Many of the health professions were not included in the MRU-IEP pilot test if they were organizationally a part of a separate campus.

EXHIBIT 1A

FORM A: INVENTORY OF DISCIPLINES BY DEPARTMENT AND HEGIS CODES

PRELIMINARY. FOR TEST USE.

Institution: _____ Campus: _____ Academic Year 19 __ - __

Department, Division, or Academic Program Name[1]	Reported HEGIS Codes	Institutional Discipline Name	Full List of HEGIS Codes Act. Involved	Institutional Name for Unique HEGIS Codes	Level of Instruction Codes[2]

[1] A department or division is normally a budgeted, academic, organizational unit; an academic program normally is a nonbudgeted entity that designates as well as conducts or coordinates certain academic course offerings, often interdisciplinary in nature.

[2] Level of Instruction codes: 0 = remedial; 1 = lower level; 2 = upper level; 3 = graduate level.

EXHIBIT 1B

FORM B: INVENTORY OF STUDENT PROGRAMS BY DEPARTMENT AND HEGIS CODES

PRELIMINARY. FOR TEST USE.

Institution: _____ Campus: _____ Academic Year 19___ - ___

Department, Division, or Academic Program Name[1]	Reported HEGIS Codes	Institutional Student Program Name	◇ Full List of HEGIS Codes Act. Involved	Institutional Name for Unique HEGIS Codes	Level of Student-Program Codes[2]

[1] A department or division is normally a budgeted, academic, organizational unit; an academic program normally is a nonbudgeted entity that designates as well as conducts or coordinates certain academic course offerings, often interdisciplinary in nature.

[2] Level of Student-Program Codes: 0 = nondegree, noncertificate; 1 = certificate; 2 = associate; 3 = bachelor; 4 = master and first professional; 5 = doctor.

EXHIBIT 1C

INVENTORY OF ACADEMIC DEPARTMENTS BY TWO-DIGIT HEGIS CODES (DISCIPLINE/DEPARTMENT)
WITH DISCIPLINE SPECIALTIES

PURDUE	ILLINOIS	COLORADO	STONY BROOK	KANSAS
0000 GENERAL USE				
0001 Schl Of Hme Adm Gen				
0002 Schl Of Sci Admin				
0004 Schl Agr Gen				
0005 Temp Undergrad				
0100 AGRICULTURE & NATURAL RES				
0101 Schl Agr Gen	0101 Agr Admin			
0102 Agronomy	0102 Agronomy			
0104 Animal Sci	0104 Animal Sci			
0107 Wildlife Mgt	0105 Dairy Sci			
0108 Horticulture	0108 Hort			
0111 Agr Econ	0111 Agr Econ			
0113 Food Sci & Tech	0113 Food Sci			
0114 Forestry	0114 Forestry			
0115 Nat Res Mgt	0151 Voc Agr			
0190 Agr Unclass				
0194 Agr Mech				
0197 Wood Tech				
0200 ENVIRONMENTAL DESIGN				
0203 Int Des	0202 Arch	0201 Environ Des	0201 Environ Std	0202 Arch
0204 Hort	0204 Landscape Arch	0202 Environ Des	0206 Urban & Pol Sci	
0290 Creative Arts	0206 Urban & Reg Plan			
0300 AREA STUDIES				
	0301 Asian Std Cntr	0399 Interdis	0301 Asian Std	0302 East Asian Std
			0308 Ibero Amer Std	0307 Slavic & Soviet Area Std
			0396 Puerto Rican Std	0308 Lat Amer Area Std
				0313 Amer Std
0400 BIOLOGICAL SCIENCES				
0401 Bio Sci	0401 Schl Of Life Sci	0401 Bio (EPOB)	0401 Bio Sci	0401 Bio Sci
0414 Biochem	0402 Botany	0416 Bio (MCDB)	0414 Biochem	0409 Pharma & Toxi
0421 Entomology	0404 Plant Path		0417 Cellular & Compar	0411 Microbio
0490 Bot & Plant Path	0407 Zoology		0418 Marine Env Std	0415 Radiation Biophys
0491 Biomucleonics	0410 Physio & Biophys		0420 Ecol & Evol	
0492 Pharma & Toxi	0411 Microbio			
	0414 Biochem			
	0421 Entomology			

EXHIBIT 1D

INVENTORY OF ACADEMIC DEPARTMENTS BY TWO-DIGIT HEGIS CODES (PROGRAM/DEPARTMENT)
WITH PROGRAM SPECIALTIES

PURDUE	ILLINOIS	COLORADO	STONY BROOK	KANSAS
0000 GENERAL USE				
0001 General Studies				
0100 AGRICULTURE & NATURAL RES				
0102 Agronomy 0104 Animal Sciences 0108 Horticulture 0111 Agr Economics 0114 Forestry & Nat Res	0101 Agr 0102 Agronomy 0104 Animal Sci 0105 Dairy Sci 0108 Horticulture 0111 Agr Econ 0113 Food Sci. 0114 Forestry 0151 Vocational Agr			
0200 ENVIRONMENTAL DESIGN				
	0202 Architecture 0204 Landscape Arch 0206 Urban & Regional Plan	0201 Environmental Des	0201 Environmental Sci 0206 Urban & Policy Sci	0201 Environmental Design 0202 Architecture 0206 Urban Planning
0300 AREA STUDIES				
	0301 Asian Std Center 0305 African Std 0307 Russian & E. Euro Cntr 0308 Latin-AM & Caribb Stds Cn 0312 Medieval Civil 0313 Amer Civil		0301 Asian Std 0308 Ibero Amer Std 0396 Puerto Rican Std	0302 E Asian Std 0307 Slavic & Sov Area Std 0308 Lat Amer Area Std 0313 Amer Std
0400 BIOLOGICAL SCIENCES				
0401 Biology 0414 Biochem 0421 Entomology 0490 Botany & Plant Path 0491 Bionucleonics 0492 Pharma & Toxi	0401 Schl of Life Sci 0402 Botany 0404 Plant Path 0407 Zoology 0410 Physio & Biophys 0411 Microbio 0414 Biochem 0420 Environ Std 0421 Agr Entomology 0424 Nutritional Sci	0401 E.P.O. Bio 0416 M.C.D. Bio	0401 Biolog Sci 0414 Biochem 0417 Cellular & Compar 0418 Marine Environ Std 0420 Ecol & Evol	0401 Biolog Sci 0402 Botany 0414 Biochemistry 0415 Radiation Biophys 0421 Entomology 0499 Pharma & Toxi

STEP 1 APPENDIXES

PROTOCOL STATEMENTS
FOR

UNIVERSITY OF COLORADO

UNIVERSITY OF ILLINOIS

UNIVERSITY OF KANSAS

PURDUE UNIVERSITY

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

UNIVERSITY OF COLORADO

Protocol Statement

Step 1

Notes on University of Colorado data for the MRU-IEP project with identification of areas where Colorado data may differ from that of other institutions because (a) IEP protocols are so broad or (b) Colorado did not have data available in IEP protocol form and had to impute it from other data.[2]

Included with these notes are technical comments as to the extent to which Colorado representatives believe that the input did or did not bias the comparability of data.

Statement of institutional completion of step 1--identification and comparison of HEGIS codes used for institutional course disciplines and student programs

I. Synopsis of Task

To list institutional student programs and discipline offerings on the basis of HEGIS codes assigned to them and provide them for comparison with codes assigned by the other four participating institutions. The purpose of the task was to provide information for assessing the extent to which there was comparable HEGIS coding of student programs and course-discipline offerings among the five institutions in advance of running the Student Data Module information. This permitted both an estimate of the number of units that could be compared and an opportunity to adjust

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2. It is suggested that the final MRU-IEP reports should note data collection differences as one of the results of the research.

HEGIS codes to achieve comparisons with a greater number of programs and disciplines.

II. Synopsis of Institutional Completion of Task

In the existing Boulder Campus data base (Combined Course Information File), HEGIS codes were assigned (1) to course disciplines on the basis of the course abbreviation (example: AM = Applied Math = HEGIS 1703) and (2) to student programs on the basis of the three-digit student-major code (example: 404 = Applied Math = HEGIS 1703) and, for graduate programs, of a code distinguishing master's from doctoral students by program (A, B = master's; C, D, E = doctoral).

This institutional assignment resulted in the association of approximately 90 percent of the courses with a HEGIS code that also tracked to the academic department as a cost center. Assignment also resulted in the association of approximately 60 percent of the student head count by program with a similar departmental cost-center HEGIS code.

After initial interinstitutional comparison of the assignment of HEGIS codes to course disciplines and student programs, the institutionally assigned codes were adjusted in accordance with agreed-upon MRU-IEP procedures (a) to coincide as much as possible with the codes assigned to similar disciplines and programs at the other four institutions (to induce comparison with a greater number of four-digit HEGIS units and) (b) to track to the associated academic departments as a cost center, because there is no ready way to cost below the departmental unit level.

Adjustments were made to 45 course-discipline HEGIS codes, resulting in 100 percent of the courses tracking to a department and in improved comparison for six disciplines with those at the other institutions. Adjustments were also made to 54 student-program codes, resulting in improved comparison for 22 programs with those at other institutions but not significantly affecting the 60 percent track of program HEGIS codes to department HEGIS codes.

III. Inferences Regarding this Recoding of Data

The effect of recoding to improve the track between the HEGIS codes of subject discipline and department, and the HEGIS codes of program and department, may be that while a greater number of four-digit HEGIS comparisons may be achieved, a possible condition is that academic organizational units with the same HEGIS code but with varying subject disciplines may be compared, putting the costs in a different place than the subject matter. This would be especially the case for an institution with a large number of interdisciplinary disciplines. It may be appropriate to watch for instances of widely different cost comparisons at the lower-division level to see if this condition might be a reason for cost differences.

The HEGIS recoding conventions may also be evaluated in terms of differences between (1) changes for the purpose of achieving greater interinstitutional HEGIS comparison versus (2) changes to achieve more complete tracking of subject disciplines and student programs to departmental units. With regard to whether these changes do any violence to the integrity of the data, it would appear that they do not in the case of interinstitutional comparison

changes, but that they might possibly in the case of institutional subject to department changes. Such changes could affect discipline costs but would not affect program costs.

IV. Policy Implications Regarding the Data

In testing IEP to see if it works for major research universities, one important aspect is the extent to which the data are meaningful to the institution. The data are more meaningful if they track to the institutional organizational units. Therefore there appears to be a trade-off between the meaningfulness and usefulness to the institution in tracking data to departments versus the purity of data that focuses on subject matter.

V. Other Comments

A general problem of IEP is that the activities of a given department may differ, but there is little way to ascertain the difference. It is difficult to get behind the facade of input data and know, for example, whether there are significant pedagogical differences in the instruction of a HEGIS department at two or more institutions. As an illustration, one department may have a greater amount of laboratory instruction and higher costs than a similar department at another institution that has little laboratory instruction and lower costs.

UNIVERSITY OF ILLINOIS

Protocol Statement

Step 1

Procedure

The University Office of Administrative Information Systems Development maintains the official Code Book and associated computer files of all approved and existing organizational units (academic and administrative departments) and curricula (student programs). These files not only contain the institutional name and code of such units and curricula, but they also contain a reference to a four-digit HEGIS discipline code that has been assigned for external reporting purposes. The internal coding structure permits an identification of departments by subunits called divisions (for example, the Department of Mechanical and Industrial Engineering can be broken into the Division of Mechanical Engineering and the Division of Industrial Engineering). However, budget allocations and expenditure records do not recognize divisions within departments. Hence for the purposes of the IEP study, the basic organizational unit (discipline) used was the department, and each department was mapped initially to a single four-digit HEGIS category using the approved University mappings from the Code Book computer file. Each curriculum code is a unique entity with a single mapping to a four-digit HEGIS code.

Revisions for the IEP Project

The great majority of all disciplines and student programs listed in the final University of Illinois inventory was derived directly from the Code Book file described above. However, the University of Illinois has used the YY-XX option for institutional assignment of four-digit HEGIS codes that do not correspond

one-to-one with preassigned codes, where YY refers to the basic two-digit HEGIS code (for example, Engineering: YY = 09) and XX is in a range exceeding any nationally reassigned codes (for example, XX = 49 for the Department of Mechanical and Industrial Engineering). In order to increase the number of disciplines and student programs that would be compared across the MRU-IEP institutions, several departments and curricula were reassigned four-digit HEGIS codes in the nationally preassigned range, based upon a judgment of the principal activity of such departments and curricula (for example, the Department of Mechanical and Industrial Engineering was reassigned to HEGIS code 0910).

Implications and Conclusions

It is recognized that the revisions performed for the reasons noted above may result in a later comparison of unlike disciplines and student programs. However, the number of such revisions was not great, nor is it likely that they cut across the modified three-digit HEGIS discipline categories that are likely to be the level of MRU-IEP analysis. Thus we are lead to conclude that the revised University of Illinois inventory of disciplines and student programs is an acceptable one, not requiring any major deviation with institutional policies or procedures in order to force a fit to the IEP methodology.

UNIVERSITY OF KANSAS

Protocol Statement

Step 1

As part of an earlier effort mandated by the Kansas Board of Regents, the University of Kansas had mapped the taxonomy of the Program Classification Structure onto the University accounting structure. Each budgeted instructional department has a unique account code associated with it, and it was an easy task to assign to each unique account number a matching HEGIS discipline code. Two major criteria were employed in this matching process. First, every attempt was made to match the HEGIS discipline code with the account number as it had been reported in annual HEGIS reports. In addition, the Kansas Board of Regents had employed the HEGIS taxonomy to classify degrees offered at all Regents institutions, and the matching of HEGIS discipline codes was made to conform with the Regents inventory of degrees. Since both these criteria were based on HEGIS standards, the resulting match of HEGIS disciplines to instructional departments follows very closely the MRU-IEP standards.

Mapping of HEGIS codes to instructional majors was achieved by associating the university three-digit major code (a unique code for each major) with the appropriate HEGIS code. Again, the Board of Regents degree inventory proved very helpful in converting the unique university major code into HEGIS major codes. Within the major areas, the MRU-IEP conventions were followed very closely. However, in the nonmajor area, many four-digit codes were created with specific application to the University. This is not a problem in terms of the MRU-IEP concern, since the modified three-digit inventory collapses all nonmajors into one broad category.

PURDUE UNIVERSITY

Protocol Statement

Steps 1 and 2

The student data used as input to the Student Data Module (SDM) agree with the registrar's records as of the end of the drop/add registration period. The end of the drop/add registration periods is defined as follows:

1. Semesters--the end of the first week of classes
2. Summer Session--the end of the third day of classes

Students registering after these periods are not included in the SDM.

Each student is classified upon registration, and that code is carried throughout the Purdue System. The undergraduate classification used in the SDM is based on the registrar's classification rather than on accumulated credit hours. Purdue's classification of graduate students is based on completion of various graduate-school requirements, including filing a plan of study, passing preliminary examinations, and such, not on credit hours. The enrollments reported are based on the classification assigned by the graduate school.

Each registration period, the registrar creates an academic record file, which is used to create the SDM. Student majors (fields of study) and disciplines are included in the SDM. The Offices of the Registrar and Analytical Studies by mutual agreement assign HEGIS codes to fields of study, and these codes are in agreement with the HEGIS codes used by the Indiana Commission for Higher Education. Each field of study is associated with a subject or, in certain cases, with the discipline having responsibilities for several similar subjects. This

coding tracks approximately 70 percent of the student majors (fields of study) to the department responsible for the major.

HEGIS codes were assigned to disciplines or departments to track all subjects to the departments having responsibility for the subject. In some cases, Purdue established unique HEGIS codes for departments that are structured differently from the HEGIS taxonomy. An example would be HEGIS code 2291, which was assigned to the Department of Sociology and Anthropology.

Dual-level courses required special treatment so that better comparisons could be achieved. There were approximately 550 dual-level courses with enrollment at the end of drop/add for the fall semester. Each course was analyzed as to student enrollment by classification. Whenever the graduate-student enrollment was 50 percent or greater, the course was moved to grad I. All courses with graduate enrollment less than 50 percent were moved to upper-division undergraduate. Using the fall semester as the control, courses with the same subject abbreviation and course number for summer and spring were moved to the same division as the matching fall course. A total of 38,034 credits was moved from the grad I area and placed in the upper-division undergraduate. This action resulted in increasing the cost of grad I courses and reducing upper-division course costs.

Master's-thesis and doctoral-thesis courses were pulled from the 1975-76 file, and the credit values for all these courses were replaced with a constant value of "1." This action reduced the credit-hour total by 36,216. The file was reduced by 8,902 in summer, 13,483 in fall, and 13,831 in spring.

STATE UNIVERSITY OF NEW YORK AT STONY BROOK (SUSB)

Protocol Statement

Step 1

The Stony Brook General Campus is composed of the Colleges of Arts and Sciences, Engineering, and Urban and Policy Sciences. All other programs of the University are located in the various schools of the Health Sciences Center (HSC). The work load of the Health Sciences Center is not included in the Student Data Module (SDM) as per original agreement. However, the work load taken by HSC majors on the General Campus is included.

The assignment of HEGIS codes to disciplines for the most part resulted in all disciplines matching their sponsoring organizational units. The exceptions to this are the Departments of Computer Science and Applied Math, which are assigned in accordance with national conventions for purposes of comparisons among major research universities, rather than by organizational structures at SUSB.

Inventory of Disciplines and Programs

The following procedures were used in assigning HEGIS codes to disciplines and programs.

Disciplines/Courses. Codes assigned to departments and then to disciplines within the department. Codes were assigned by major subject area, for example, all Economics courses were coded Economics. No attempt was made to code each course in accordance with specific course content or subtracks within the discipline.

Ex. Dept. HEGIS = 1102 French and Italian
Discipline = 1102 French level 1, 2, 3
1104 Italian 1, 2

Major/Programs. Codes were assigned to departments and then to degree and nondegree programs within the department. Subtracks within the program or minors are not shown.

Ex.	Dept. HEGIS	= 1103	Germanic Language & Literature	
	Degree Program	= 1103	German	levels 3,4,5
		1106	Russian	3
	Nondegree Program	= 1115	Polish	0
		1115	East Euro Lang	0
		1114	Swedish	0
		T197	Yiddish	0

STEP 2

TOPIC: Collection and analysis of student-registration data.

OBJECTIVES: To develop an Instructional Work Load Matrix (IWLM) for each institution. This matrix identifies the relationship between disciplines and student programs and must be produced before direct and full-unit costs can be computed for student programs. A second objective was to enable each institution to compare its IWLMs with other institutions.

GENERAL IEP PROCEDURES: The procedures for developing the Instructional Work Load Matrix can be found on pages 2.12-2.17 of the second edition of Technical Report 65. Basically, this matrix describes the instructional relationship between disciplines and student programs. This relationship can be viewed in two ways. First, the IWLM displays the credit-hour totals that each discipline (by course level) contributes to each student program (by student level). This is referred to as the contribution report. Second, it displays the credit-hour totals that each student program (by student level) consumes from each discipline (by course level). This is referred to as the consumption report.

The study group decided to collect student-registration data for the 1975-76 fiscal year, reaffirming its earlier decision to collect the student and faculty data for the fiscal year, rather than the nine-month academic year. Thus student-registration files for each academic term were merged to produce a single Student Data Module report for the entire fiscal year with the institutions maintaining the option of identifying separate terms if desired. However, no separate reports were produced for summer or other special sessions.

ADDITIONAL MRU PROCEDURES:

The course levels in the regular IEP were expanded from three (lower, upper, and graduate) to five to include separate categories for doctoral course work and doctoral dissertations. The course levels and student levels of the MRU Instructional Work Load Matrix are illustrated in table 2.1.

Semester credit hours were retained as the activity measure at each of the source and student levels with the exception of the doctoral dissertation. At this advanced stage of graduate work, each registration for thesis/dissertation was counted as a single unit per term, regardless of the number of dissertation credits for which the student was registered. This

TABLE 2.1

MRU INSTRUCTIONAL WORK LOAD MATRIX

Course Level	Student Level					
	Lower Division	Upper Division	First Prof.	Graduate I	Graduate II	Total
Lower Division						
Upper Division						
Graduate I						
Graduate II						
Doctoral Dissertation						
Total						

was done in order to eliminate any variability in the method in which semester credit hours were assigned to dissertation activity. These dissertation registrations were then linked to the faculty activity reports (as part of step 3) to determine the amount of faculty resources devoted to the advising of dissertation students.

It was recognized that there is no clear distinction between GI- and GII-level courses and, to a lesser

extent, between GI and GII students. The study group agreed with the IEP definition of GI students as those who are pursuing a master's or other intermediate-level degree, or those who are in the initial stage of course work for a doctoral degree (roughly equivalent to the course work for the master's degree). GII students are defined as those who are in the advanced stages of the doctoral program. The pilot-test institutions felt that it was important to maintain the GI and GII course-level distinction and chose to define the course level based upon modal enrollment. That is, if more than 50 percent of the course enrollment constituted advanced doctoral students, then the course was classified as a GII course. The modal-enrollment test was also used to distinguish between upper-division undergraduate and graduate I coursework.

COLLECTION TIME PERIOD: Six months. This time period included the development and testing of the computer program that was written to aid in the comparative analysis of the IWLMs.

ANALYSIS OF THE DATA: The five participating institutions developed and submitted to NCHEMS their Instructional Work Load Matrix (IWLM) for the fiscal year 1975-76. The institutions also exchanged their program catalogs. The NCHEMS staff combined all five institutional IWLMs

and graphically displayed the results. These graphs provided a visual display for quick identification of those student programs that were common to more than one institution.

The graph, displayed in histogram fashion, is illustrated in exhibits 2A, 2B, and 2C at the end of this section. The student program and level are listed at the top, with the disciplines and course level listed down the side. Each institution's IWLM credit hours were scaled to a percent, with the total credit hours attached to each institutional histogram line. The percentage distribution of credit hours is derived for each institution by taking the total student credit hours (SCH) in a student program for an institution and using that total as the divisor for all contributing disciplines. For example, Purdue's (P) total upper-division SCH in the Computer Science (0700) student program is 4,204 SCH. Each discipline contributor is converted to a percentage by dividing the discipline SCH by 4,204. Thus 4,204 is divided into 589, which is the credit-hour contribution of the Mathematics discipline to the Computer Science program giving a relative percentage of 14 percent. This procedure is followed separately for each institution represented on the graph.

A legend is provided at the bottom of each graph. It gives the name of each institution, the symbol for each institution represented in the graph, its corresponding total student credit hours, and the lowest and highest student-credit-hour contribution to the student program.

To further aid the schools in judging discipline and program similarity, a summary of the number of student credit hours produced by each discipline and course level was provided. Likewise, a summary was prepared displaying student credit hours consumed by student programs for all student levels. These were displayed at the four-digit HEGIS level, two-digit HEGIS level, and for the instructional program as a whole. Tables 2.2 and 2.3 illustrate types of summary reports derived from these data. These reports were designed to aid the study group in judging the relative magnitude of disciplines and student programs and the relative distribution of SCH across course levels and student levels. Finally, a ratio was constructed relating SCH to headcount enrollments for each of the student levels (table 2.4). This table contains a measure of the average credit-hour load at each of the designated student levels for the 1975 fall semester. The fall-term data were used rather than those covering the

TABLE 2.2

SEMESTER CREDIT HOURS BY COURSE LEVEL ACROSS ALL DISCIPLINES

Course Level	Colorado	Illinois	Kansas	Purdue	Stony Brook[c]
Lower div., no.	332,434	447,406	280,900	460,209	153,264
Lower div., %	*54.5*	*42.7*	*47.9*	*55.8*	*45.2*
Upper div., no.	208,602	392,138	212,591	277,154	127,966
Upper div., %	*34.2*	*37.5*	*36.2*	*33.6*	*37.7*
Graduate I, no.	55,037	148,368	64,952	51,415	40,188
Graduate I, %	*9.0*	*14.2*	*11.1*	*6.2*	*11.8*
Graduate II, no.	13,651	58,908	28,314	35,621	18,020
Graduate II, %	*2.2*	*5.6*	*4.8*	*4.3*	*5.3*
Total, no.	609,724	1,046,820	586,757	824,399	339,438
Total, %	*100.0*[a]	*100.0*	*100.0*	*100.0**	*100.0*
Doctoral dissertation[b]	2,199	6,375	2,294	4,118	1,174

[a]Does not sum to 100 due to rounding.

[b]Doctoral dissertation was recorded as a single unit for each registration per team. Therefore these data are not comparable to the SCH units reported above.

[c]Excludes summer activity.

TABLE 2.3

SEMESTER CREDIT HOURS BY STUDENT LEVEL ACROSS ALL STUDENT PROGRAMS

Student Level	Colorado	Illinois	Kansas	Purdue	Stony Brook
Lower div., no.	285,343	387,255	255,046	405,733	152,488
Lower div., %	*46.8*	*37.0*	*43.5*	*49.2*	*44.9*
Upper div., no.	251,314	424,832	225,748	322,360	128,875
Upper div., %	*41.2*	*40.6*	*38.5*	*39.1*	*38.0*
First prof., no.	5,958	35,870	14,338	10,896	-
First prof., %	*1.0*	*3.4*	*2.4*	*1.3*	-
Graduate I, no.	46,667	125,901	65,473	67,281	39,264
Graduate I, %	*7.7*	*12.0*	*11.2*	*8.2*	*11.6*
Graduate II, no.	20,442	72,962	26,152	18,129	18,811
Graduate II, %	*3.4*	*7.0*	*4.5*	*2.2*	*5.5*
Total, no.	609,724	1,046,820	586,757	824,399	339,438
Total, %	*100.0*[a]	*100.0*	*100.0*[a]	*100.0*	*100.0*

[a]Does not sum to 100 due to rounding.

TABLE 2.4

HEADCOUNT ENROLLMENT BY STUDENT LEVEL

Fall Semester 1975

Student Level	Colorado	Illinois	Kansas	Purdue	Stony Brook
Lower div., H.C.E.[a]	9,962	13,114	8,712	13,484	5,604
SCH/headcount	*14.90*	*15.91*	*14.47*	*15.27*	*14.16*
Upper div., H.C.E.	7,328	12,674	7,087	9,857	4,337
SCH/headcount	*15.27*	*15.88*	*15.34*	*15.81*	*14.88*
First prof., H.C.E.	445	1,065	455	283	-
SCH/headcount	*14.09*	*16.96*	*14.65*	*17.36*	-
Graduate I, H.C.E.	2,189	4,308	3,593	3,345	3,381
SCH/headcount	*7.11*	*12.80*	*7.89*	*9.61*	*5.76*
Graduate II, H.C.E.	1,694	3,956	1,921	1,954	1,453
SCH/headcount[b]	*4.90*	*7.18*	*5.88*	*3.30*	*7.68*
Total, H.C.E.	21,618	35,117	21,768	28,923	14,775
SCH/headcount	*13.44*	*14.57*	*12.91*	*14.01*	*11.81*

[a] H.C.E. - Headcount Enrollment

[b] Doctoral Dissertations counted as a single unit.

entire fiscal year, because they provided a convenient reference (snapshot) of headcount enrollment that varies by term.

A methodology for judging similarity of student programs was developed at Purdue University and initially applied to its undergraduate programs. This methodology consists of calculating a similarity index representing the average percentage difference of the top 80 percent of the discipline contributors to the student program under examination. More specifically, the steps required to make such comparisons are given below and are illustrated for the Computer Science program in table 2.5:

1. Obtain a histogram such as exhibit 2A in which upper-division courses are exampled.

2. Examine the total SCHs at the bottom of the appropriate histogram. If the institutions being compared have program total SCHs that are substantially different, the two programs are, a priori, judged dissimilar. For example, in table 2.5, Purdue's total SCH is 4,204; Colorado's total SCH is 193. Clearly the order of magnitude between these two numbers is so great that the two programs should be judged dissimilar.

TABLE 2.5

06/27/77 PROGRAM 0700 - Computer Science PAGE 7

TOTAL UNDERGRADUATE
UPPER DIVISION DISCIPLINES

CALCULATION OF SIMILARITY INDEX FOR PURDUE UNIVERSITY

	PERCENT DISCIPLINE CONTRIBUTION					ABSOLUTE PERCENT DIFFERENCE			
	P	C	K	L	S	C	K	L	S
0700 Computer Science	65.03	10.88*	57.54	48.10	31.20	54.15	7.49	16.93	33.83
1700 STAT,MATH & THEO	14.01	1.55	15.46	19.45	26.74	12.46	1.45	5.44	12.73
2200 Social Sciences	4.14	7.77	5.85	4.20	15.93	3.63	1.71	.06	11.79
TOTAL % DISCIPLINES	83.18	20.20	78.85	71.75	73.87				
TOTAL SCH IN PROGRAM	4,204	193*	1,300	4,505	1,952				
TOTAL ABSOLUTE % DIFF						70.24	10.65	22.43	58.35
AVERAGE ABSOLUTE % DIFF (SIMILARITY INDEX)						23.41	3.55	7.48	19.45

*Total SCH in the program were of such great difference from Purdue that on a priori grounds, programs were judged dissimilar.

2.11

3. Select the disciplines that account for 80 percent of the total SCH for the student program under examination in your institution.

4. Record percentage contributions for each of the disciplines listed in step 3 for all institutions participating in the program comparison.

5. Subtract each institution's discipline contribution percentage from the corresponding discipline percentage at your institution. In table 2.5, Purdue's percentages were subtracted from every other institution's for each discipline listed. Record the absolute value of the percentage difference, that is, ignore the negative signs.

6. For each institution, add the absolute percentage differences across disciplines and divide by the number of disciplines to obtain the similarity index.

Tables 2.6 and 2.7 show two additional examples of these computations for Purdue's Biology and Engineering programs.

TABLE 2.6

06/27/77 PROGRAM 0400 - Biological Sciences PAGE 4

TOTAL UNDERGRADUATE
UPPER DIVISION DISCIPLINES

CALCULATION OF SIMILARITY INDEX FOR PURDUE UNIVERSITY

	PERCENT DISCIPLINE CONTRIBUTION					ABSOLUTE PERCENT DIFFERENCE			
	P	C	K	L	S	C	K	L	S
0400 Biological Sci.	46.85	58.42	62.14	60.23	48.27	11.57	15.29	17.38	2.58
0100 Agriculture	9.14			2.55		9.14	9.14	6.59	9.14
1900 CHEMISTRY, GEN	8.05	18.34	16.74	3.44	18.61	10.29	8.69	4.61	10.56
2200 SOCIOLOGY&ANTHR	7.89	6.90	5.72	4.46	9.25	.99	2.17	3.43	1.36
2000 PSYCHOLOGY, GEN	6.83	5.33	5.80	9.15	9.57	1.50	1.03	2.32	2.74
1500 PHILOSOPHY	5.19	8.04	3.86	5.00	5.25	1.15	1.33	.19	.06
TOTAL % DISCIPLINES	83.95	93.03	94.26	88.83	86.95				
TOTAL SCH IN PROGRAM	6,805	18,976	8,064	24,444	10,726				
TOTAL ABSOLUTE % DIFF						34.64	37.65	34.52	26.44
AVERAGE ABSOLUTE % DIFF (SIMILARITY INDEX)						5.77	6.28	5.75	4.41

TABLE 2.7

06/27/77 PROGRAM 0900 - Engineering PAGE 9

TOTAL UNDERGRADUATE
UPPER DIVISION DISCIPLINES

CALCULATION OF SIMILARITY INDEX FOR PURDUE UNIVERSITY

	PERCENT DISCIPLINE CONTRIBUTION					ABSOLUTE PERCENT DIFFERENCE				
	P	C	M	L	S	C	M	L	S	
0900 Engineering	77.09	73.38	75.44	77.38	78.51	3.71	1.65	.29	1.42	
0500 Business	3.80	3.73	1.96	1.93		.07	1.84	1.87	3.80	
TOTAL % DISCIPLINES	80.89	77.11	77.40	79.31	78.51					
TOTAL SCH IN PROGRAM	52,353	22,094	14,950	56,965	4,482					
TOTAL ABSOLUTE % DIFF						3.78	3.49	2.16	5.22	
AVERAGE ABSOLUTE % DIFF (SIMILARITY INDEX)						1.89	1.75	1.08	2.61	

Suggested categories for judging the similarities of programs using the similarity index are:

0.0-5.0	Similar
5.1-10.0	Moderately Similar
10.1 or more	Dissimilar

It should be noted that these categories are arbitrary. However, it may be possible to assess and refine their usefulness and accuracy by validating them against expert judgment offered by subject-matter specialists intimately familiar with the student programs being compared. For example, if the head of the Department of Mathematics at Purdue agrees with his counterpart at the University of Illinois that the two departments are similar in the patterns of courses taken by students, this consensus would serve as one indication that the calculated similarity index of 4.4 has some degree of validity and utility relating to student credit hour distributions.

Sixteen undergraduate programs at Purdue were analyzed using the above methodology. Similarity indexes for Purdue compared with the other four institutions are shown in table 2.8. The suggested categories given above were then applied to the table 2.8 results and are presented in summary form in table 2.9. Of the

TABLE 2.8

STUDENT-PROGRAM SIMILARITY INDEXES BY
UNDERGRADUATE TWO-DIGIT HEGIS PROGRAM FOR PURDUE

Program Code and Name	MRU Being Compared with Purdue			
	Colorado	Kansas	Illinois	Stony Brook
0200 Architecture[a]	18.4	19.6	19.0	19.3
0400 Biology	5.8	6.3	5.8	4.4
0500 Business	7.8	7.0	4.2	NP
0600 Communications	7.3	5.7	3.0	NP
0700 Computer Science	--[b]	3.6	7.5	19.5
0800 Education	15.6	8.9	7.3	13.1
0900 Engineering	1.9	1.8	1.1	2.6
1000 Fine and Applied Arts	3.8	10.8	7.5	8.1
1100 Foreign Languages	9.7	9.4	7.7	8.5
1200 Health Professions	4.5	8.1	11.3	--[b]
1500 Letters	6.0	8.0	3.0	5.0
1700 Mathematics	4.0	5.9	4.0	7.0
1900 Physical Sciences	1.6	2.3	1.7	1.4
2000 Psychology	8.7	.9	3.9	7.9
2100 Public Affairs	--[b]	--[b]	--[b]	NP
2200 Social Sciences	8.9	4.7	4.2	8.7

NP = No Program

[a]This represents a Landscape Architecture program at Purdue and is therefore dissimilar in program composition from the Architecture programs in the other four schools.

[b]The total SCH generated by Purdue program was of such great difference from that of comparative institution's program that a score was not computed.

TABLE 2.9

NUMBER AND PERCENT OF UNDERGRADUATE PROGRAMS
SIMILAR, MODERATELY SIMILAR, AND DISSIMILAR TO PURDUE'S PROGRAMS

	Colorado (N) %	Kansas (N) %	Illinois (N) %	Stony Brook (N) %
Similar (score of 0.0-5.0)	(5) *31.2*	(5) *31.2*	(8) *50.0*	(4) *30.8*
Moderately similar (score of 5.1-10.0)	(7) *43.8*	(8) *50.0*	(5) *31.2*	(5) *38.5*
Dissimilar (score of more than 10.0 or judged dissimilar a priori)	(4) *25.0*	(3) *18.8*	(3) *18.8*	(4) *30.8*
Total of Programs in Common	(16) *100.0*	(16) *100.0*	(16) *100.0*	(13) *100.0*[a]

[a]Total does not sum to 100:0 due to rounding.

16 undergraduate student programs Purdue had in common with Colorado, Kansas, or Illinois, 75 to 80 percent were categorized as similar to moderately similar in discipline-contribution patterns. Stony Brook had the greatest number of programs in the dissimilar category (31 percent) and the fewest number of programs in common with Purdue (13).

It should be noted that similar analyses could be conducted at the graduate level. The more detailed four-digit HEGIS disciplines would probably show more meaningful contribution patterns than the two-digit HEGIS disciplines used at the undergraduate level. This greater refinement is possible because graduate students tend to select more courses within their major department or school.

STUDY GROUP RECOMMENDATIONS:

The results of the analyses described in this step indicate few difficulties in the exchange of IWLM data among major research universities. The study group recommends that each registration for doctoral-dissertation credit count as a single unit, regardless of the number of credits for which the student was registered. The study group also recommends that judgments of similarity, moderate similarity, and dissimilarity of student-program information as

measured by SCH be made using the method outlined. It is urged that the similarity index be used together with more subjective evidence, such as a department head's expert opinion, catalog course descriptions, and so forth. Caution must be exercised in interpreting the phrase similar programs. This phrase means no more than that the programs are similar in the contribution of disciplines to the programs' total SCH. The study group recommends analyzing most undergraduate programs in terms of contribution of two-digit HEGIS disciplines, but graduate or highly structured undergraduate programs, such as engineering, in terms of four-digit HEGIS contribution.

CONCLUSION:

The five major research universities in this study exhibited more similarity than dissimilarity in the sample comparisons that were made of their IWLM data. It also is possible that the extent of dissimilarities is overstated by the analytical technique used. The institutions coded academic departments and all of the courses taught therein to HEGIS disciplines because of the manner in which budgets and expenditures are developed and recorded. Thus it is very possible that similar courses taught to students in a similar HEGIS program (such as Computer Science) might be mapped to dissimilar HEGIS disciplines (such as

Engineering, Math, or Business), depending upon the organizational structures of the institutions.

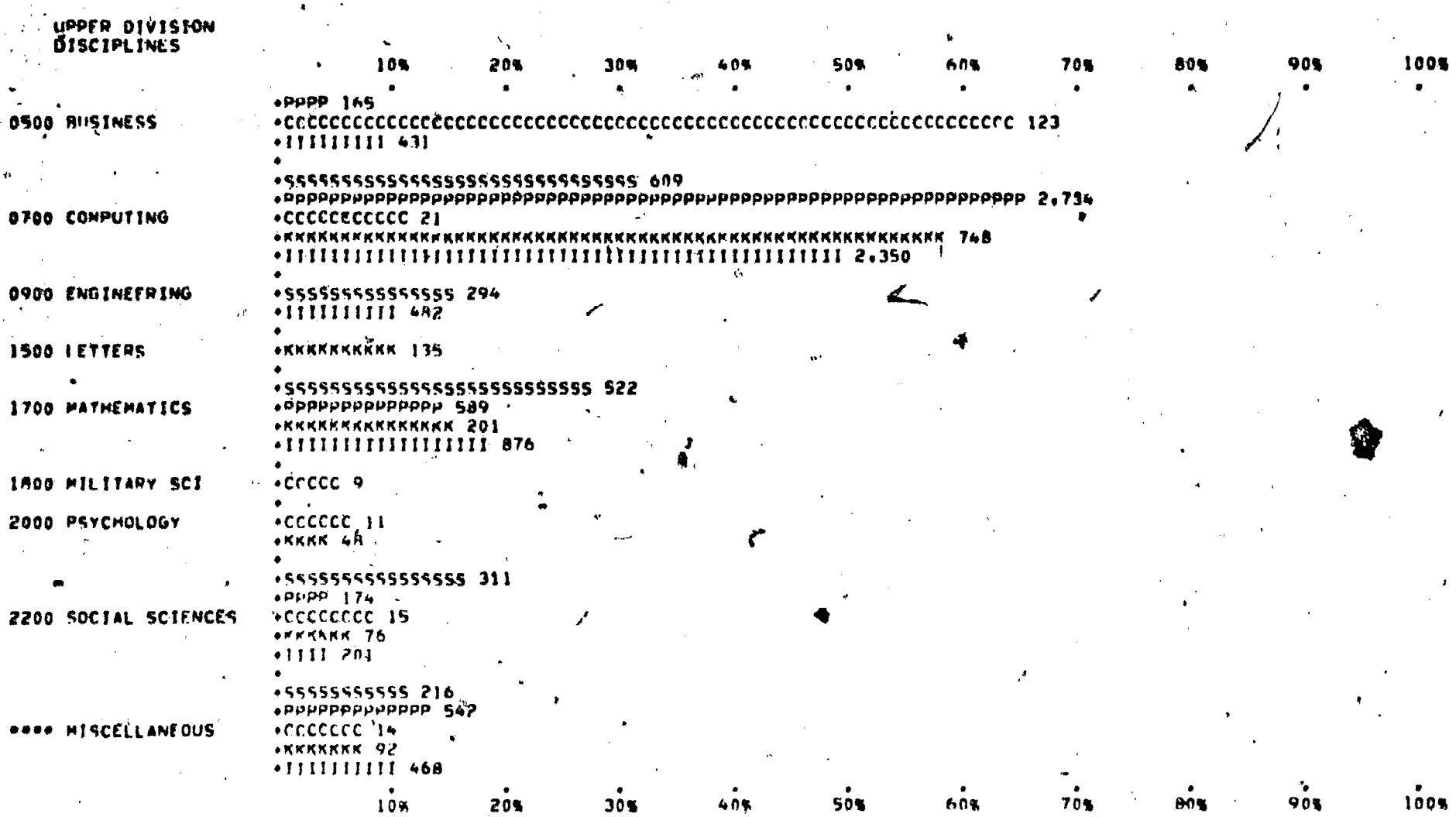
There is reason to believe that some of these apparent, rather than real, dissimilarities might disappear when student-program costs are analyzed. Conversely, it is possible that programs that appear to be similar from the IWLM analysis may, in fact, be somewhat dissimilar (such as Art History, or Appreciation versus Art Practice).

There is nothing in step 2, given the one modification to the procedures, that would prevent this study group from proceeding with the study.

EXHIBIT 2A

05-03-77 RVMARTIN — PROGNAM 0700 COMPUTING — 7

TOTAL UNDERGRADUATE
% OF TOTAL STUDENT CREDIT HOURS



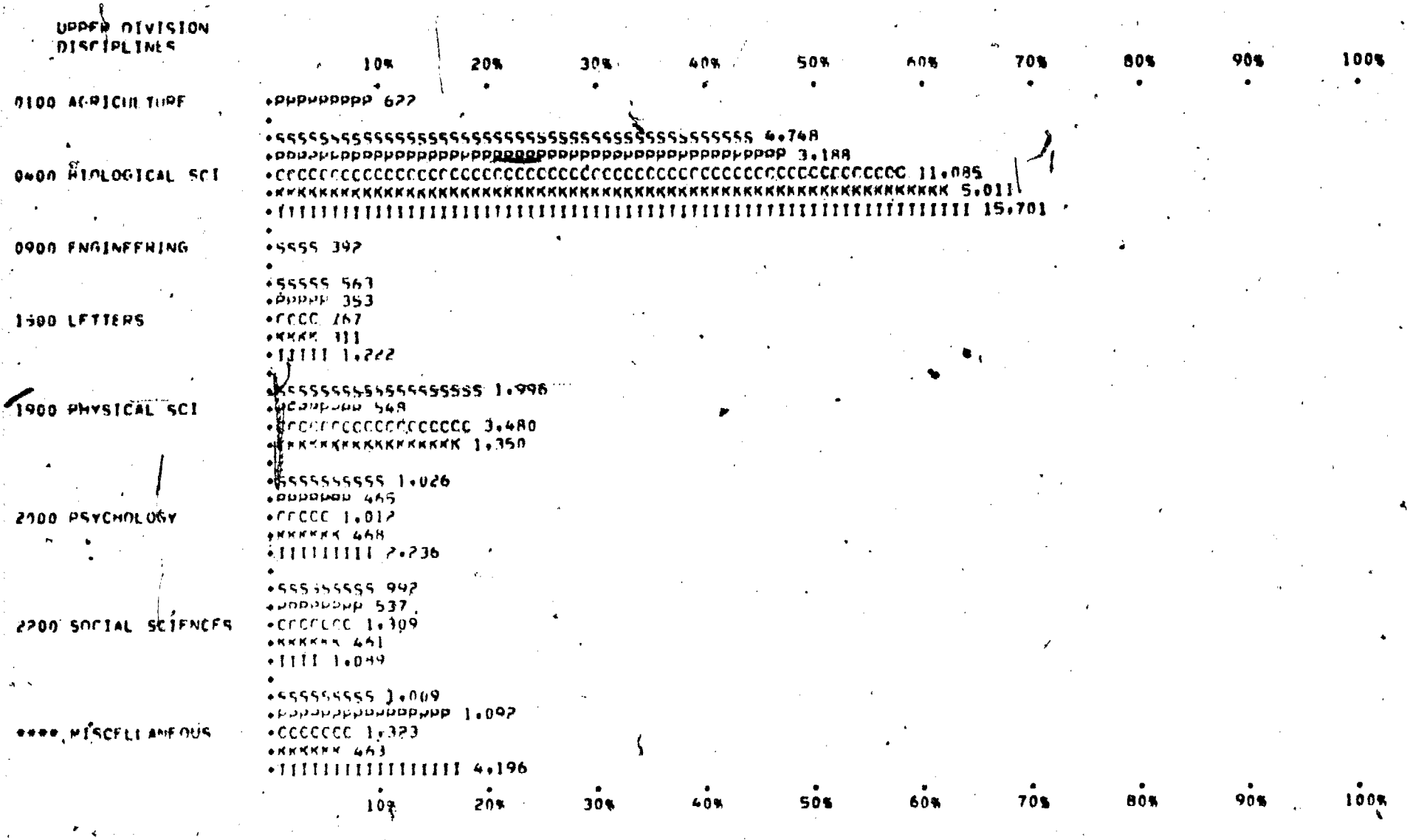
SYM		TOTAL SCH	LOW SCH	HIGH SCH
S	STONY BROOK	1,952	0	609
P	PURDUE	4,204	0	2,734
C	COLORADO	193	0	123
K	KANSAS	1,300	0	748
I	ILLINOIS	4,808	0	2,350

EXHIBIT 2B

06-20-74 RUMARTIN

PROGRAM 0400 BIOLOGICAL SCI

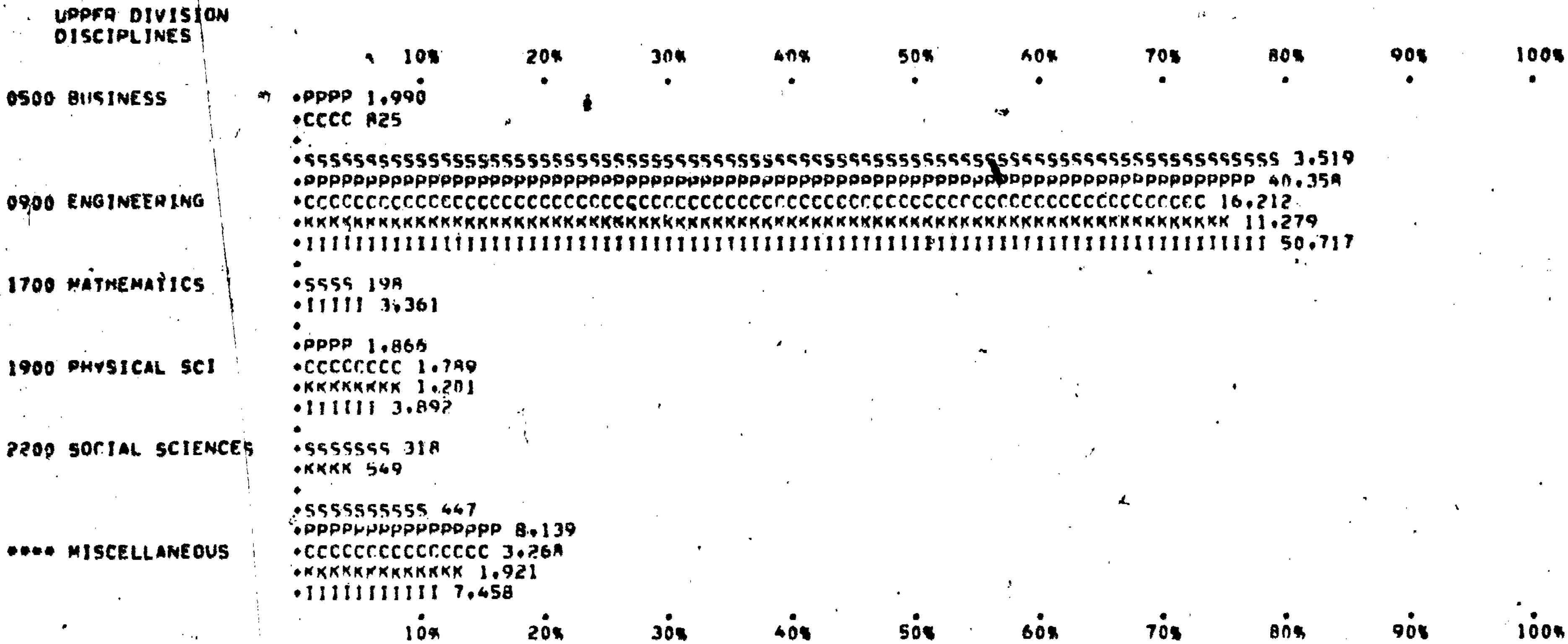
TOTAL UNDERGRADUATE
% OF TOTAL STUDENT CREDIT HOURS



SYM		TOTAL SCH	LOW SCH	HIGH SCH
S	STONY BROOK	10,726	0	4,748
P	PURDUE	6,805	0	3,188
C	COLORADO	18,976	0	11,085
K	KANSAS	8,064	0	5,011
I	ILLINOIS	24,444	0	15,701

EXHIBIT 2C

TOTAL UNDERGRADUATE
% OF TOTAL STUDENT CREDIT HOURS



SYM	TOTAL SCH	LOW SCH	HIGH SCH
S - STONY BROOK	4.482	0	3.519
P - PURDUE	52.353	0	40.358
C - COLORADO	22.094	0	16.212
K - KANSAS	14.950	0	11.279
I - ILLINOIS	65.428	0	50.717

STEP 2 APPENDIXES

PROTOCOL STATEMENTS
FOR

UNIVERSITY OF COLORADO

UNIVERSITY OF ILLINOIS

UNIVERSITY OF KANSAS

PURDUE UNIVERSITY

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

UNIVERSITY OF WASHINGTON

UNIVERSITY OF COLORADO

Protocol Statement

Step 2

I. Synopsis of Institutional Completion of Task

The existing Boulder Campus data base containing both the student-program and the course-discipline data for 1975-76 data was the Student Term Master File. Files were available for the summer, fall, and spring semesters.

In accordance with conventions of the MRU-IEP project, the following steps were taken:

Course level was determined as follows:

Lower division	(100 and 200 level courses)
Upper division	(300 and 400 level courses)
Grad I	(500 and 700 level courses)
Grad II	(600 and 800 level courses)

The lower-division and upper-division numbering schemes conform to the MRU-IEP definitions. Graduate courses meet the general definition of MRU-IEP levels; however, the assignment of course numbers has not been consistently followed by all departments. The primary discipline in which inconsistent numbering occurred (for 600 level courses) was Business.

Student-major numbers were converted to four-digit student-program HEGIS codes using a table that converts student-major codes to the student-program HEGIS inventory generated in step 1.

Student-level codes were converted to MRU student-level categories using a simple look-up table.

Course credit hours in the Term Master File were used in creating SDM data. The following idiosyncracies affecting course credit hours by HEGIS and level were noted: (A) Each independent-study student enrollment was treated like a separate section (that is, three students enrolled in the same independent-study course for three hours would add up to nine credit hours, the effect of which is some maldistribution of faculty service months among levels if done on a credit-hour basis). (B) Doctoral-thesis credit hours per student enrollment were converted to units of one, in accordance with the project conventions.

II. Inferences Regarding Conventions Used in Converting Institutional Data to Conform to MRU Categories

The limitation of existing institutional data in a predetermined format and the conventions used in converting the data for MRU-IEP purposes suggest the following inferences with regard to graduate course level, assignment of course-discipline HEGIS codes, and the counting of credit hours for independent study.

Courses at the 500 and 700 levels belong in grad I instruction; 800-level courses are used for doctoral dissertations. It is known that some 600-level courses are designed for grad I instruction rather than grad II, particularly in Business.

Idiosyncratic treatment of independent-study credit hours inflates that measure of productivity. This would result in a maldistribution of faculty service months allocated to those courses if credit hours were to be used as the activity units for distribution purposes. (The Colorado activity units were contact hours, derived from another file.)

III. Policy Implications Regarding these Data

The policy implied in inadequate tracking of graduate-level courses to grad I and grad II is that if the institution were to exchange these data on an ongoing basis, an additional step of converting courses to level on the basis of the level of 50 percent or greater of the students enrolled would need to be followed.

UNIVERSITY OF ILLINOIS

Protocol Statement

Step 2

Procedure

The University of Illinois student data system contains a record of the registration (and associated semester credit hours) of each student in each course-section. The students are identified by curriculum code--student level and the course sections are identified by department-course number. The curriculum codes were mapped to the four-digit HEGIS student-program codes, and the departments were mapped to the four-digit HEGIS discipline codes identified in the MRU-IEP inventory lists developed in step 1 of this project. The student and course levels also were mapped to those agreed upon by the MRU-IEP study group under the conventions described below:

1. Student levels. The coding of student levels in the University of Illinois data system corresponds to that proposed by the MRU-IEP study group. Hence there was a one-to-one transformation of same.
2. Course levels. Lower-division (100 level) and upper-division (200 level) courses were mapped directly to their IEP counterparts. The University's 300-level and 400-level courses were mapped to graduate I or graduate II depending upon a determination of the modal enrollment of such students in those courses. Doctoral-dissertation courses were defined as those wherein a doctoral candidate was enrolled in a University of Illinois 499 course.

Semesters Included

Three semesters have been included in the data base--summer 1975, fall 1975, and spring 1976. While the summer term partially overlaps fiscal years 1975 and

1976, this procedure is consistent with that followed annually when the University participates in the State of Illinois Cost Study, and the variability of summer enrollments is not great enough to try to split and recombine successive summer sessions. Furthermore, such a procedure would be most difficult to undertake given the structure of our data systems.

Credit-Hour Values

All credit-hour values were taken directly from the student records, with the exception of doctoral-dissertation courses, which were revised to a unit of one each semester. It should be noted that the University of Illinois assigns graduate units or portions thereof to graduate students rather than semester credit hours. The data system translates such units into credit hours on the basis of four credit hours per unit. A later comparison of average semester credit-hour loads per graduate student may reveal whether or not this procedure results in credit hours that have similar value across the MRU-IEP pilot-test institutions.

Credit Hours Included

All on-campus credit hours taught in the three semesters have been included. None of the extramural credit hours have been included, independent of the physical location of such courses. Credit hours taught in the School of Basic Medical Sciences have been included to date but will be excluded if it is desired to do so later in the project. Even if they are included, the net result will be a unique HEGIS discipline that will not be compared across the MRU-IEP pilot-test institutions.

Implications/Conclusions

Very little manipulation of University of Illinois student records was needed in order to fit the MRU-IEP conventions. The only areas of significance in this regard were: (1) mapping 300- and 400-level courses to graduate I and graduate II using the modal enrollment test and (2) identifying doctoral-dissertation credit hours and reducing their value to one per semester. We conclude that there is no particular reason to reject the MRU-IEP conventions with regard to the treatment of credit hours based upon the procedures applied in step 2. We repeat the need to test the equivalency of graduate credit hours at the University of Illinois vis-a-vis other institutions because of the unit-to-credit hour conversion process used at the University of Illinois.[3]

3. The University of Illinois subsequently made test checks on selected programs and determined that their degree requirements (in terms of student credit hours) were roughly comparable to those of the other pilot institutions. Therefore, it can be concluded that the Illinois one-to-four conversion rate on graduate credits did not distort its credit-hours data for purposes of comparisons.

UNIVERSITY OF KANSAS

Protocol Statement

Step 2

The University of Kansas maintains a data file for each semester, which contains information concerning each individual student enrolled, that is, the student's major, the student's class, what classes the student is enrolled in, and so forth. The class information includes the instructional department through which the class is offered, the course number that determines the level of the course, and the number of credit hours for which the course is being offered. Creation of the data for the Student Data Module (SDM) was straightforward--the instructional department could be mapped into a HEGIS discipline; the student's major could be mapped into a HEGIS major; the course numbers were used to map into discipline levels, (for example, 0-299 mapped to lower-division undergraduate); and the student's class was converted to a student level, (for example, class 1 and 2 mapped to freshmen and sophomores). Thus it was a relatively easy matter to construct the Induced Work Load Matrix. In this fashion, data for the Student Data Module were created without excluding any student majors or disciplines and without departing from MRU-IEP conventions. Except for doctoral dissertation, no values for student credit hours were modified. Data were collected for fall 1975, spring 1976, and summer 1976 and were compared against independent data sources to verify that University totals matched.

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

Protocol Statement

Step 2

The following details qualify our structure of the Student Data Module.

1. Fall 1975 and spring 1976 semesters are included. The Extended Day student work load (Continuing Education--Master's level) funded from regular state funds is also included. Summer student work load is not included. The informal-studies noncredit-bearing work load is not included.
2. The source of student credit-hour data was the registrar's files. The SUNY reporting period (end of the fourth week), after significant add/drop transitions have settled, was used to snapshot work load for each semester.
3. The only modified credit-hour values are those defaulted to one for doctoral dissertation courses.
4. Dual level courses are not a problem at Stony Brook, since they do not exist.
5. All Health Science Center disciplines were excluded. That portion of work load taken in the Health Science Center by General Campus majors was not included. That portion of the work load taken by Health Science Center majors in General Campus disciplines was included. (665 credit hours were all coded HEGIS 1200).
6. The data are arranged to array a matrix of four student levels--.20, .30, .50, .60--and five discipline levels--.20, .30, .50, .60, .90.
7. HEGIS discipline codes were assigned in accordance with the major exmphasis of study as identified by course abbreviation, that is, MSA = Applied Math and Statistics = HEGIS 1703.

8. HEGIS program codes were assigned to a valid list of programs maintained in the registrar's office and existing on the Student Data File. Three position alpha codes are used, such as CLT = Comparative Literature = HEGIS 1503.
9. The .90 course level is defined as one final course in each advanced doctoral program (G2), which is a thesis or dissertation course. All required G2 courses and preparatory courses for exams are not included in level .90.
10. To determine .60 course level (G2), we looked at the student levels in all graduate courses (except those tagged .90). If 50 percent of greater of the students enrolled were advanced doctoral level (earned greater than 24 credit hours of graduate work or possessed a master's degree and enrolled in a Ph.D. program), the course was tagged .60 (G2).
11. The .50 course level is all graduate courses remaining after the determination of .60 and .90 as described above.
12. The .30 course level was assigned to courses with numbers from 200 through 499. The curriculum offered at this level was designed as introductory and general in subject scope and generally was taken by freshmen and sophomores.
13. The .20 course level was assigned to courses with numbers less than 200. The curriculum offered at this level was designed as introductory and general in subject scope and generally was taken by freshmen and sophomores.
14. The .30 student program level is assigned when the student has earned more than 56 credit hours toward a bachelor's degree.
15. Student program code 0000 was assigned to records when the major was undecided, general, or visitor. It was also assigned to worthless data to reconcile totals to existing campus reports.
16. Discipline code 4997 was assigned to worthless registration data to reconcile totals to existing campus records.

17. The control cards of the SDM (ENRL 115) were set to define FTE and full-time parameters as follows:

Student Level	FTE Value	Minimum Hours for FULL TIME
.20	30 SCH	24 SCH
.30	30	24
.50	24	18
.60	24	18

18. Bachelor's degree requirements for the College of Arts and Sciences require 120 credit hours for graduation. The College of Engineering requires 128.

UNIVERSITY OF WASHINGTON

Protocol Statement

Step 2

1. The student file was extracted from the Student Information System. The file used was the "Sectioned" file, which reflects the students enrolled status for the tenth day of each quarter.
2. The academic terms (quarters) used were:

Autumn	1975
Winter	1976
Spring	1976
Summer	1976

Summer 1976 was used instead of summer 1975 because the Faculty Activity Analysis (source of data for the Personnel Data Module) reporting was poor for that term.

3. No student majors or disciplines were excluded (all health sciences were included).
4. For Doctoral Dissertation (course level .90) credit hours (STUD-UNIT) was set to one in the extract. In the Student Data Module, all credit hours were multiplied by .67 to convert quarter hours to semester hours.
5. There were two categories of dual-level courses that we handled specially. These were our 500 level (graduate level classroom instruction) and our 600 level (independent-study or research) courses.

For the 500 level courses, a census of each class was taken. A level .60 student was counted as G2. Level .40 and .50 students were counted G1. If G2 > G1, the course was coded .60, otherwise .50.

For the 600 level courses, if the student was level .60, it was coded .60; otherwise it was coded .50.

6. The extract programs were tested at the detail level for one department (Architecture) for one quarter (summer 76) against an existing Student Information System detail report (Course Content Report). Also, the grand-total student credit hours were checked for reasonableness.

STEP 3

TOPIC: Collection and analysis of faculty-activity data.

OBJECTIVE: To determine what reasonable set of faculty activities/assignments should be costed. These data represent the primary programs of instruction, organized research, public service, and other academic-support functions as may be necessary to represent an MRU. The faculty data, including both activity and salary information, are necessary to determine how the expenditures of an account should be distributed to IEP activity centers. The Personnel Data Module develops these distribution percentages, which will be applied to the institution's expenditure data in step 5. A second objective of this step is to examine the similarity of faculty-activity data across the five institutions.

GENERAL IEP PROCEDURES: The procedures for collecting and processing the faculty activity data can be found on pages 2.29-2.37 of the second edition of Technical Report 65. Further documentation can be found in NCHEMS Technical Reports 44 amd 54, Faculty Activity Analysis: Procedures Manual and Faculty Activity Analysis: Interpretations and Uses of Data.

ADDITIONAL MRU PROCEDURES:

The pilot-test group analyzed the five institutions' faculty-activity forms and initially made the following recommendations for a common grouping of faculty activities:

- Scheduled Teaching and Related Activities--Including preparations, grading, supervising of individual students, and such
- Doctoral Student Thesis/Dissertation Advising--This category is intended to isolate the faculty member's time spent in the supervision and guidance of graduate students who are writing their doctoral thesis/dissertation
- Course and Curriculum Development--Including the development of new instructional materials or the revision of existing materials
- Administration and Committee Work--Includes work as a departmental administrator and service on departmental or university-wide committees
- Departmental Research--Research, scholarship or other creative work funded through the departmental budget
- Separately Budgeted Research--Research, scholarship, or other creative work that has a separate funding source
- Counseling and Other Student-oriented Services--Includes personal, career, and financial counseling, writing recommendations, participating in student social clubs, and such
- Public or Community Service
- Cooperative Extension Service
- Professional Development--Includes sabbatical leaves and time devoted to professional organizations

An FTE faculty definition was adopted by the study group that basically accounts for the FTE faculty in units of person months. An individual employed full time for one academic semester was treated as the equivalent of 4 1/2 person months, and likewise an individual employed full time during an eight-week summer session was counted as 2 1/4 person months. Institutions were instructed to include any staff member with an academic or professional appointment who had teaching, research, or service responsibilities in their faculty activity reports.

In the faculty-activity analysis, faculty time spent on sabbatical leave was regarded as Professional Development. For cost purposes, the salary paid to a faculty member while on sabbatical was identified with the home-department code so that those costs could later be allocated to the home department's activities.

IEP recommends that total compensation be used to develop the faculty distribution percentages. Total compensation was interpreted to include all fringe benefits (including those paid by a state agency) as well as tuition waivers to graduate students.

COLLECTION TIME PERIOD: Six months.

ANALYSIS OF DATA: Each institution examined its faculty-activity reporting system in light of the 10 recommended categories. Because faculty reporting systems were preestablished in each of the five universities and because the 1975-76 faculty data had already been collected, some of the institutions could not report faculty-activity data for all 10 categories. Table 3.1 is a summary of the faculty data available from each institution. The study group decided to maintain all 10 faculty-activity categories at least through the data-collection phase.

TABLE 3.1

FACULTY ACTIVITY DATA
AVAILABILITY FROM THE PARTICIPATING INSTITUTIONS

Faculty Activity	Purdue	Stony Brook	Kansas	Colorado	Illinois
A. Scheduled Teaching and Related Activities	Yes	Yes	Yes	Yes	Yes
B. Doctoral Student Thesis/ Dissertation Advising	Yes	Yes	Yes	Yes	Yes
C. Course and Curriculum Development	No	No	Yes	Yes	No
D. Administration and Committee Work	Yes	Yes	Yes	Yes	Yes
E. Departmental Research	Yes	Yes	Yes	Yes	Yes
F. Separately Budgeted Research	Yes	Yes	Yes	Yes	Yes
G. Counseling and Other Student Oriented Services	Yes	No	Yes	Yes	Yes
H. Public or Community Service	Yes	Yes	Yes	Yes	Yes
I. Cooperative Extension	Yes	N/A	Yes	N/A	Yes
J. Professional Development	No	Yes*	Yes	Yes	Yes

*Includes sabbatical leaves only.

Each institution further described in a protocol statement their faculty-activity reporting procedures. These showed significant differences in even superficially similar categories of Faculty Activity Analysis (FAA). Where procedures differed, attempts were made to bring the data into alignment. For example, two of the institutions, Stony Brook and Kansas, had not surveyed their faculty in fiscal year 1975-76. Therefore they were forced to rely on faculty-activity data from 1974-75, but efforts were made to update their faculty files by matching them against current course assignments and adjusting their faculty-activity distributions where necessary. Another difference that should be noted is that two of the institutions, Illinois and Purdue, surveyed a broader group of faculty and academic staff than did the other three institutions. In addition, these universities differ uniquely in mission from the other three universities by including an Agriculture Experiment Station and Cooperative Extension Services. Therefore relatively larger percentages of time appeared in Institutes and Research Centers (2.1), Separately Budgeted Research (2.2) and Cooperative Extension Services (3.3) for these two institutions. There were also significant differences in the definitions of total effort (percent versus hours) and different levels of reflection of assigned versus

self-assessed effort. Assignment methods typically place a higher proportion of faculty effort into the three primary functions, while self-assessment emphasizes supporting activities. Table 3.2 contains a summary of methodological differences among the five universities in the collection and reporting of the faculty-activity data.

A work sheet was drawn up for recording faculty compensation percentages in the 10 activity categories for all two-digit HEGIS disciplines (table 3.3). A similar work sheet was used for examining the person-unit data. At this point in the analysis, the data were presented to the study group for review. It became evident from examining the initial summary of the data that a degree of comparability did exist among the five MRUs, especially within the primary faculty activities. However, the degree of comparability was somewhat masked, because some universities (primarily Illinois and Purdue) had assigned faculty activities to categories in addition to the recommended set. In addition, not all institutions had collected data for all 10 categories. Therefore it was decided to collapse the data displayed in table 3.3 into the following 7 categories:

TABLE 3.2

INSTITUTIONAL DIFFERENCES IN COLLECTING FACULTY-ACTIVITY DATA

Procedure	Colorado	Illinois	Stony Brook	Kansas	Purdue
Institutionally administered Faculty Activity Analysis	Yes	Yes	Yes	Yes	Yes
When administered	Fall 1975	Each academic term	Fall 1974 Spring 1975	Fall 1974[a]	Each academic term
Administered to whom	All ranked resident instructional faculty	Instruction and research faculty and academic administrators	Instruction and research faculty	Instruction and research faculty and academic administrators	Instruction and research faculty and academic administrators
Teaching and research assistants included	Not surveyed but included in total comp.	T.A.s/R.A.s	Not surveyed but included in total comp.	T.A.s/R.A.s	T.A.s/R.A.s
Faculty response rate	85%[b]	100%	80%[b]	100%	100%
Compensation inclusive of fringe benefits and tuition waivers	Yes, fringe benefits were imputed	Yes, fringe benefits were imputed	Yes, fringe benefits were actual expense	Yes, fringe benefits were actual expense	Yes, fringe benefits were imputed
Distribution of time/effort to course levels within instruction	Faculty contact hours	Faculty contact hours	Faculty contact hours	% of time/ effort reported	% of time/ effort reported
Sabbaticals included	4.8	4.8	4.8	Spread across all activities	4.6[c]

[a] These faculty-activity responses were updated to reflect the activities that actually occurred during the academic year 1975-76. Colorado, Stony Brook, and Kansas reports do not reflect summer faculty activities.

[b] Nonrespondents were assigned the average of their colleagues' responses.

[c] Sabbaticals were originally included in 4.6 at Purdue but in later steps are reported under 4.8.

TABLE 3.3

PERCENT OF TOTAL COMPENSATION IN EACH FACULTY-ACTIVITY CATEGORY

TOTAL OF ALL DISCIPLINES

Faculty-Activity Category[a]	Colorado[b]	Illinois	Stony Brook[b]	Kansas[b]	Purdue
Teaching (1.1, 1.2, 1.3, 1.4, 1.9)	45.9	39.2	50.0	57.1	56.3
Doctoral Advising (1.1---.90)	5.1	5.6	4.5	2.4	4.4
Separately Budgeted Research (2.2)	--	11.3	8.3	3.9	19.2
Departmental Research (2.3)	12.2	4.4	13.5	10.8	2.7
Public Service (3.2)	2.3	1.1	3.3	1.6	2.5
Extension (3.3)	--	8.4	--	0.3	1.3
Academic Administration (4.6)	14.1	7.7	14.4	8.5	4.9
Course Development (4.7)	3.5	--	--	3.7	--
Professional Development (4.8)	7.0	2.9	5.5	7.6	--
Counseling and Career Guidance (5.3)	--	0.6	--	4.1	--
Other - Institutes & Research Centers (2.1)	9.8	15.2	0.2	--	7.4
Other - Patient Services (3.1)	--	0.2	--	--	--
Other - Public Broadcasting Services (3.4)	--	0.0	--	--	--
Other - Libraries (4.1)	--	2.2	--	--	--
Other - Ancillary Support (4.5)	--	0.6	0.2	--	0.2
Other - Social & Cultural Development (5.2)	--	0.4	--	--	--
Other - Student Auxiliary Services (5.5)	--	0.1	--	--	--
Other - Executive Management (6.1)	--	--	--	--	0.9
Other - General Administrative Services (6.3)	--	--	--	--	0.1
Other - Public Relations & Development (6.7)	--	0.0	--	--	--
TOTAL PERCENT	99.9	99.9	99.9	100.0	99.9
TOTAL COMPENSATION IN $ THOUSANDS	$24,595	$105,768	$15,922	$22,482	$65,580

[a]Notation following each faculty-activity category is the PCS subprogram to which the faculty compensation was assigned

[b]ado, Stony Brook, and Kansas did not survey faculty paid exclusively from externally-sponsored funds and fore underreported faculty compensation in categories 2.1 and 2.2. This was corrected in step 5.

- Instruction and Related Activities (1.1 to 1.4, 1.9, 4.7)--Includes scheduled teaching, thesis advising, student academic advising, and course and curriculum development
- Institutes and Research Centers (2.1)--Includes all on-going research activities conducted within the framework of a formal research organization
- Separately Budgeted Research (2.2)--Includes all sponsored research activities that are normally managed within the academic departments
- Departmental Research and Professional Development (2.3, 4.8)--All other research activities and professional development, including sabbatical leaves, that are funded through the departmental budget
- Public Service (3.1, 3.2, 3.4)--Includes patient care, community services, and public broadcasting
- Cooperative Extension Services (3.3)--Includes programs where direction and fiscal control are shared by the institution with other governmental agencies, such as the Agriculture Extension program
- Academic, Student, and Institutional Support (4.1 to 4.6, 5.0, 6.0)--Includes all administration and committee work, student career counseling, advising student clubs, and so forth

The percentage of total faculty compensation in each of these seven categories was calculated using the total discipline compensation as the base. Total compensation was also recorded for reference with the percentages. Table 3.4 displays the distribution of faculty compensation for all two-digit HEGIS categories. A weighted average for each of the faculty-activity categories was computed to aid in the comparison process.

By examining table 3.4, it can be seen that the bulk of faculty compensation appeared in the Instruction and Related Activities category (49.8 percent), followed by Separately Budgeted Research inclusive of Institutes and Research Centers (21.3 percent), Academic, Student and Institutional Support (12.0 percent), and Departmental Research and Professional Development (10.2 percent). These four categories accounted for approximately 93 percent of the faculty's effort and compensation. Public Service attracted only 2.5 percent of the faculty's effort, and Cooperative Extension was evident primarily at two universities, Illinois and Purdue, and only in selected disciplines, for example, Agriculture (0100) and Home Economics (1300). The research accounts were somewhat underreported at three universities (Colorado,

TABLE 3.4

PERCENT OF TOTAL COMPENSATION IN PCS PROGRAM CATEGORIES

Total of All Disciplines

PCS Categories	Colorado	Illinois	Stony Brook	Kansas	Purdue	Weighted Average
Instruction and Related Activities (1.1-1.4, 4.7)	54.5	44.8	54.5	63.2	50.2	
Institutes and Research Centers (2.1)	9.8	15.2	0.2	-	7.5	
Separately Budgeted Research (2.2)	-	11.3	8.3	3.9	19.3	
Departmental Research and Professional Development (2.3, 4.8)	19.2	7.4	19.0	18.4	5.9	
Public Service (3.1, 3.2, 3.4)	2.3	1.4	3.3	1.6	4.5	
Cooperative Extension (3.3)	-	8.4	-	0.3	1.6	
Academic, Student, and Institutional Support (4.6, 5.0, 6.0)	14.1	11.5	14.7	12.5	11.0	
Total percent	99.9	100.0	100.0	99.9	100.0	
Total compensation in thousands of dollars	$24,595	$105,765	$18,922	$22,482	$65,580	

Note: Colorado, Stony Brook, and Kansas did not survey faculty paid exclusively from externally sponsored research funds and therefore underreported faculty compensation in categories 2.1 and 2.2. This was corrected in step 5.

Kansas, and Stony Brook), because the research faculty were not entirely surveyed in their regular faculty-survey procedure. This tended to skew the data away from research and toward the remaining categories for these three institutions. Another observation of the data is that Colorado and Stony Brook had higher percentages of faculty time and compensation devoted to Academic Support categories, primarily Academic Administration (4.6), while Purdue had the least. This could be due to the way the faculty-activity forms were constructed and administered, or it could reflect differing administrative structures at the test universities.

STUDY GROUP RECOMMENDATIONS:

To achieve comparable data in this step, it would be necessary for all pilot-test institutions to meet four conditions: (1) to use a faculty activity form with common activity categories, (2) to survey the faculty routinely every academic term, (3) to use the same definition of faculty for all institutions, and (4) to use the same method of administering the FAA (assignment versus self-reporting). Unfortunately, none of these conditions was met in this pilot-test. However, by collapsing each institution's unique set of faculty activities into a standard set of faculty activities (initially 10 and later 7 categories),

the study group felt that the effects of the first limitation were significantly reduced. Similarly, the second limitation was at least partially addressed by having each institution that did not survey its faculty every term update its faculty file to reflect current course and research assignments. The third limitation, dissimilar faculty groups, would not likely affect unit costs but may affect intermediate results such as student/faculty ratios. The fourth limitation was addressed by introducing the Modified Direct Cost concept, more fully described in step 5.

CONCLUSION: The study group recognized that there were major differences in data-collection instruments and procedures used in collecting faculty data among the pilot-test institutions. Since a goal of IEP is to produce comparable cost data by discipline and course level, and since most accounting systems do not record costs by level of instruction, the differences noted in this chapter may have a significant effect on the final disaggregate unit-cost data.

STEP 3 APPENDIXES

PROTOCOL STATEMENTS

FOR

UNIVERSITY OF COLORADO

UNIVERSITY OF ILLINOIS

UNIVERSITY OF KANSAS

PURDUE UNIVERSITY

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

UNIVERSITY OF WASHINGTON

UNIVERSITY OF COLORADO

Protocol Statement

Step 3

I. Synopsis of Institutional Completion of Task

The institutional data for creation of Faculty Activity Analysis (FAA) and Personnel Data Module (PDM) data existed in two streams--one for faculty Paid from Resident Instruction accounts and the other for faculty Paid from Sponsored Research accounts. The Resident Instruction faculty service months were distributed among instruction and noninstructional tasks on the basis of FAA data described below. Sponsored Research faculty were assigned 100 percent to research. The creation of FAA, PERSON, FUND, and TASK records occurred as follows:

Creation of FAA Data for Ranked Faculty in Resident Instruction

The existing data base for determining the distribution of faculty service months over the various MRU-IEP categories of effort was the Faculty Estimate of Activity and Time (FEAT) file. This file was composed of data reported by approximately 85 percent of the full-time faculty on the Boulder Campus for the fall 1975 semester. (No other faculty-effort reports were available for that year.)

It was necessary to extrapolate from the 85 percent fall sample to 100 percent of the fiscal year 1975-76 faculty through the following method. Data from the FEAT file were averaged by rank within academic department for subsequent use in distributing faculty service months across the following MRU-IEP effort categories:

1. Instruction (total) (1.1)
2. Noninstructional:
   a. Course/Curriculum Development (4.6)
   b. Administration/Committee Work (4.7)
   c. Departmental Research (2.3)
   d. Counseling and Student Service (5.3)
   e. Public Service (3.2)
   f. Professional Development (4.8)

The programs for converting institutional data into TASK records included the following provisions:

- All ranked Resident Instruction faculty were assigned the average distribution for their rank in their department
- A campuswide average distribution were assigned to any faculty for whom average rank data were not contained in the FAA file
- The Sponsored/Project Research category was blanked out in the FAA data file, since the service-month information for faculty paid from sponsored research would come from accounting records obtained from another file (the General Ledger).
- All Teaching Assistants/Associates were assigned 100 percent to instruction

Creation of PDM PERSON, FUND, and TASK Records

The following steps were taken to create the PERSON, FUND, and TASK records.

1. A finance-office table of accounts for Resident Instruction, Organized Research, Public Service, and Sponsored Research accounts was obtained and used to obtain faculty dollar and FTE data from summer 1975 and academic year 1975-76 Faculty Personnel Rosters
2. FTE data were converted into MRU-IEP service months according to the formula
3. PERSON and FUND records were generated for all faculty
4. TASK records were generated as follows:
   a. Instructional Tasks

      For Resident Instruction faculty, the total number of service months distributed to Instruction was generated through the procedures described above under Creation of FAA Data. Then these service months were distributed across each faculty member's courses taught (the courses-taught data were obtained from a Course Information file) including lab and recitation subsections, according to the percentage distribution of his/her course contact hours (also obtained from the Course Information file)

   b. Noninstructional Tasks

      Resident Instruction faculty service months for non-instructional activities were distributed by rank within department using the program for FAA data described above

Following the creation of the PERSON, FUND, and TASK records, the PDM programs were run.

II. Inferences

A likely skewing of the distribution of service months for many faculty probably results from the use of fall-only average effort by rank within department. This skewing could have a noticeable effect upon the results of the MRU-IEP data for Colorado. Institutional staff are uncertain as to the nature of the skewing.

The treatment of Sponsored Research faculty as 100 percent research, even for those faculty who taught one or more courses, assumes this instruction to be a costless byproduct of research.

The use of FAA data that are faculty estimated for total scholarly effort, as opposed to only assigned effort as determined by a dean or chairperson, contains inherent skewing among categories, especially affecting the amount of service months in instruction and departmental research, as a result of the open-ended, voluntary nature of the hours per week worked. This skewing may very well produce data that are markedly different from data produced at other institutions using different data-collection methods.

III. Policy Implications

Institutions that would want to participate in IEP on an ongoing basis would need to adopt consistent FAA reporting.

UNIVERSITY OF ILLINOIS

Protocol Statement

Step 3

Procedure

Each semester, the University of Illinois collects information on the activities of its academic staff. The academic staff largely consists of teaching-research faculty, including graduate research and teaching assistants. However, it is best defined negatively, in the sense that the academic staff contains all individuals who are not in Illinois Civil Service positions. Examples of academic staff, other than the traditional faculty ranks, include: deans and department heads, high-level administrators in both academic and administrative support units, librarians, research associates, and field staff in the cooperative extension service. The primary objective of the faculty-activity survey is to apportion each individual's FTE-appointment salary for that semester to various categories of activities--instruction (both direct and indirect), organized research, public service, and other support or administrative functions of various types. The process by which this is performed is described briefly below:

1. An individual's total appointment is distributed by account, where an account distinguishes a department and a fund. For example, a full-time (1.0 FTE) professor in electrical engineering may have two appointments--.5 FTE in electrical engineering paid from state-appropriated funds, and .5 FTE in the same department paid from a specific organized-research contract (separate fund). Similarly, another individual might have an appointment in two different departments, both paid from the same fund. This also would result in two separate accounts.

2. The individual, with the approval of the department head, distributes the total FTE appointment within each given account to the various released-time activities in which he or she is engaged that semester. To continue the example above, the professor in electrical engineering would likely to assign all (.5) of his activity on the organized-research contract to organized research. On the other hand, the .5 state-appropriated funds appointment might be split .4 to instruction and .1 to administration if that professor had some approved released-time administrative duties that semester.
3. The FTE assigned to instruction is split further by a computer algorithm between the various course sections taught by the faculty member, where the algorithm is based upon the clock hours of each section, independent of the level of the course and the total student semester credit-hour load of the course. For example, if the professor in electrical engineering taught two course sections that semester, one meeting four hours per week and the other three hours per week, then 4/7 X .4 FTE (and salary dollars) would be assigned to the first course and 3/7 X .4 to the second, even if one course was an undergraduate course and the other was at the graduate level, or if one had 10 students and the other had 50 students.
4. the data-collection system recognizes subsidies for instructional activities. For example, an academic administrator may teach a course one semester a year. Rather than transfer a portion of that administrator's salary to that department (account) in the budgetary process, the faculty-activity system will make that transfer via a subsidy given-subsidy received record, which transfers a portion

of the person's FTE salary to the department receiving the benefit of his or her services.

The process described above results in a data base containing a record of FTE salary for each activity of each academic staff member for each account for each semester. It should be noted that similar records are created for individuals on sabbatical leave, with such leave being defined as an activity. For the purposes of the MRU-IEP project, these records have been combined to encompass all three semesters. Because of the contents of the data base, there was a straightforward means to map:

1. Departments to four-digit HEGIS disciplines via the inventory created in step 1 of the MRU-IEP project
2. Course levels to course levels (for instructional activities) in step 2 of MRU-IEP
3. University of Illinois activities to IEP activities on a judgmental basis, given the definition of each
4. University of Illinois fund codes were not changed in step 3 because agreement had not been reached at that time as to the IEP fund categories. However, the University of Illinois fund codes were kept intact and can be mapped to IEP funds later in the project

Revisions Required for IEP

The only revision required for the MRU-IEP project concerned the treatment of academic salaries. The University of Illinois financial and budgetary system does not charge back fringe benefits or the value of tuition and fee waivers to individual employees or their departments. Rather, the real (in the case of fringe benefits) expenditures or foregone income-imputed expenditures (in the case

of tuition and fee waivers) are all recorded in central pool accounts. Thus in order to correspond to MRU-IEP conventions, it was necessary to revise the cash salaries shown in our activity-analysis system to reflect fringe benefits and tuition and fee waivers. The revision was made by multiplying the cash salaries by a variety of factors that reflected the employee rank and the fund, since the fringe benefits and waivers differ to some extent depending upon rank or fund.

Implications/Conclusions

It should be noted that the procedures described above would make it possible to develop distribution percentages for the allocation of expenditures in any department that employs academic staff. It is likely that such percentages will be used only for the basic teaching research public service departments, institutes, and centers. Most, if not all, of the support units will be assigned to the IEP activity structure directly, given the primary nature of those units.

With the relatively minor exception of the addition of fringe benefits to cash salaries, we were able to map University of Illinois activities/salaries to the MRU-IEP structure in a reasonable and straightforward manner. We conclude that there is no reason to believe that the protocol involved in step 3 of this project (for the University of Illinois) required a distortion of our basic academic personnel-activity data.

UNIVERSITY OF KANSAS

Protocol Statement

Step 3

I. Synopsis of Task

The purpose of this task was to ascertain whether faculty activities among the MRUs are comparable and to attempt to implement the Personnel Data Module (PDM) of IEP as amended for MRUs by (1) determining a reasonable set of MRU faculty activities that can be costed and (2) using appropriate faculty-activity data available within each institution to map onto the agreed-upon set of faculty activities.

II. Synopsis of Institutional Completion of Task

In order to collect personnel data for the PDM, a two-step approach was employed. The first step was to collect financial data. These data were collected for instructional personnel (including teaching assistants and assistant instructors) only, and were collected from an institutional payroll data base. This data base was used to ascertain person units (number of months of an individual's appointment), compensation (salary and fringe benefits paid out to individuals), and the other information necessary for the FUND records of PDM.

Step 2 was more difficult and involved considerable divergence from MRU-IEP convention. Rather than using the TASK records and the software of PDM to distribute compensation and person units among the faculty activities, the following approach was employed.

In order to split up an academic professional's time into the various activities specified by the PDM, it was necessary to use the Faculty Activity Analysis (FAA) conducted in fall of 1974. Every member of the unclassified staff at Kansas University was asked to detail how many hours a week were spent at various activities (see left-hand column of table I). The individual profiles were summarized into a departmental profile, which illustrated what percentage of time the entire academic staff spent at certain activities.

Since time did not permit the generation of a current Faculty Activity Analysis, the following method was used to update and validate the fall 1974 data. A copy of each department's fall 1974 profile was sent to that department's head, along with a letter from the Executive Vice Chancellor for the Lawrence Campus, explaining the information in the profile and the intended use of the information. Each department head was asked to modify the profile to reflect FY 1976 activities, if any modifications were necessary; otherwise, it would be assumed that their profile had remained unchanged since 1974.

The updated profiles were used to provide the percentage distribution among faculty activity for each instructional department. This information was then coded onto the TASK records.

III. Other Comments

Some difficulty arose from the fact that there is not a one-to-one correspondence between the activities used in the FAA and the activities incorporated into PDM. However, most activities could be mapped from the KU

study to the NCHEMS structure (see table 3A.1). Two major problems developed in this mapping process. The first regarded a category called Unscheduled Teaching (B.1), which includes thesis advising, thesis committee participation, and participation in another faculty member's course. This activity was mapped into 1.1.xxxx.90 in the NCHEMS structure, which created several mismatches when the Student Data Module (SDM) and PDM data were merged. The resolution of these mismatches is described later. This modification also had a tendency to slightly overstate Doctoral Student Thesis Dissertation Advising (activity 1.1.xxxx.90). The other obtuse activity was Academic Support (D.3), which had no analog as far as the NCHEMS structure is concerned. To solve this problem, the percentage of time spent in Academic Support (usually quite small) was distributed proportionately across all other activities.

The final stage for implementation of the PDM module involved some "laundry" work to eliminate the mismatches mentioned above. A great many of these occurred because of the assumption concerning the mapping of unscheduled teaching into 1.1.xxxx.90. It appears that in some departments, there were no doctoral-thesis student credit hours, but that the effort reported at that level resulted from a faculty member advising doctoral students in another department or participating in another faculty member's course. To resolve the mismatches, whenever effort was reported but student credit hours (SCH) did not exist, the effort was redistributed proportionately to course levels where SCH were generated.

Sabbaticals were handled in the following fashion. Since the generation of the PDM depended on a departmental profile rather than individual faculty records, it was quite impossible to distribute the time of those faculty

on sabbatical to Personal Development (4.8). Instead, the departmental profile was applied to all faculty on sabbatical, and thus Personal Development will be somewhat understated.

Table 3A.1

	KU FACULTY ACTIVITY ANALYSIS	PDM CROSSOVER
Part II	Scheduled Teaching:	
Sec. A	UG-LD	1.1.xxxx.20
	UG-UD	1.1.xxxx.30
	G-I	1.1.xxxx.50
	G-II	1.1.xxxx.60
B.1	Unscheduled Teaching	1.1.xxxx.90
B.3	Course Development	4.7
D.2	Administration Duties	4.6
D.4	Committee Participation	4.6
C.1	Creative Activities	2.3
C.3	Sponsored Research	2.2
B.2	Academic Advising	5.3
D.1	Student Activities	5.3
E.2	General Professional Services	3.2
E.1	Extension	3.3
C.2	Professional Development	4.8
D.3	Academic Support--suppressed category and redistributed percentage assigned in proportion to effort devoted to remaining activities.	

PURDUE UNIVERSITY

Protocol Statement

Step 3

Purdue University Activity and Assignment Report

Purdue's Activity and Assignment (A&A) reports are the medium for collecting the types and quantity of effort that individual faculty members are involved in during a given operating period. Genesis of the staff-activity reports began in the early thirties, when President E. C. Elliott requested such information from his faculty, which numbered about 70. The data gathered were used originally as reference, available for answering inquiries from legislators, citizens, and others. It wasn't until 1952, when the Office of Institutional Studies was established, that the service report was used primarily for costing purposes. Since 1952, Purdue has prepared annual cost studies, both direct and indirect, with the heart of the studies being the data generated from the staff-activity reports. From a beginning distribution of approximately 70 has grown a system that now produces activity reports for more than 6,500 staff a semester.

Semester reports are generated for every monthly paid staff member from a teaching and research department or for any individual who is involved in contact teaching. Staff classifications include faculty ranks; graduate assistants both teaching and research; and monthly paid administrative and professional staff. The reports are issued to all department heads by the Office of Analytical Studies (OAS) at the end of each semester. Two parts of the four-part form may be sent directly to the faculty member, who reports his activity in terms of average hours per week. The department head reviews this information and completes the copy that is forwarded to the dean and OAS, reporting only assigned full-time-

equivalent (FTE) staff for each applicable category. The individual's copy also may be sent back to him with the assigned FTE entered. Differences between the relative weights of the activities as reported by the faculty and the assigned weights as reported by the department head ideally are explained, justified, or otherwise resolved through dialogue between the parties. In this way, the A&A reports fulfill their central reporting function and also may be used as a planning and management tool by the departments.

Input Data to the Personnel Data Module (PDM)

Much of the input data to the PDM was gathered, massaged, and distributed by Purdue's internal direct-cost system. The Person, Fund, and Task records were created in two distribution programs from this system and automatically inputted into the PDM. One program distributes salary dollars and payroll FTE to the activities reported by each individual during the fiscal year (on a semester by semester basis). The output file from this program contains one supporting payroll record for each assignment record. This file is then used to create the Person, Task, and Fund records.

Funding (payroll) input to the PDM is created from the University's Staff Benefits and Payroll Data. Payroll charges for those salaried individuals included in the PDM are accumulated each month and organized into files relating to each operating period (semester). From the earnings information available by account, FTE staff is calculated and incorporated into the records. There is a total of 2.500 FTE staff per individual available in a given fiscal year, 1.000 for each semester and .500 for the summer session. For inclusion in the PDM, these activity units had to be multiplied by a factor of 4.5 to create man months (person units).

Compensation records used to create the fund records encompassed both salaries and fringe benefits. In Purdue's PDM, these two components are identified separately. Fringe benefits comprise institutionally paid premiums for medical insurance, life insurance, social security, and staff tuition waivers. Staff fee remissions were determined using an average semester fee remit for both resident and nonresident students of $590 for the fall and spring semesters and $285 for the summer session.

Task records were created from the aforementioned system on a semester by semester basis. Tasks specifically identified in the PDM were closely aligned to the 10 activity categories on Purdue's report. The only activity not identified separately was Course and Curriculum Development. This activity is included in 4.6. (Academic Administration). The salary paid to a faculty member while on sabbatical was identified with the home department and placed in 4.6, as recommended by the study group.

Since Purdue's direct-cost system is used to provide data for the indirect-cost study conducted by the Office of Contracts and Grants Business Affairs, it is essential that activities reported are dictated by the individual's funding. Therefore the person qualifier is an inherent feature that is prepared prior to PDM input. For example, if none of the account numbers in an individual's funding record was a general unrestricted fund, a "look-up" table was used to create Program Classification Structure (PCS) assignments based upon the payroll record. If an individual's funding was entirely from a sponsored research account, a PCS code of 2.2. (Individual or Project Research) was assigned. One departure from the MRU-IEP conventions was in the treatment of unsponsored

departmental research. Research activity funded from general, unrestricted funds is regarded as an instructional program element at Purdue and was therefore crossed to 1.1. (Instruction) rather than 2.2. (Individual or Project Research).

Assignment of administrator ranks appearing in the PDM were as follows. Administrative activities relating to the University activities and conducted by department heads were assigned a PCS code of 6.1. (Executive Management). Department administrative activities were assigned to 4.6. (Academic Administration). Administrative activities reported by deans and administrators from a dean's department were also assigned to PCS 4.6.

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

Protocol Statement

Step 3

In this module, two significant sets of data were not included. The first represents the areas in which we lack detail necessary for inclusion in MRU-IEP. Summer-school curriculum and informal studies are such areas. The second area is that of contributed personnel not included in the Personnel Data Module (PDM). Within this area, the unfunded individual teaching was dropped rather than costed at some average rate. The research-funded individual was also not costed, due to a campus policy that all our professionals should be encouraged to undertake appropriate instructional assignments that do not detract from their performance of primary duties. Generally, less than five instructional contact hours per week is considered not to detract from primary research duties. Their compensation remains lodged in Organized Research rather than split between instruction and research.

Personnel Data Module (PDM)

The following details qualify our structure of the PDM.

1. Fall 1975 and spring 1976 semesters are included. Extended Day student work load (Continuing Education--master's level) funded from regular state funds is also included. Summer student work load is not included. Informal-studies noncredit-bearing work load is not included.
2. Instructional tasks (1.1) were assigned to course levels in accordance with the Student Data Module (SDM) design. Five levels are included. Discipline HEGIS codes were assigned also in accordance with the SDM. Contact hours (activity units) in instructional tasks taken from our

Course and Section Analyses (CASA) file. All individuals with teaching tasks supported by unrestricted funds are included in the PDM.

3. Instructional supportive and noninstructional activity units of faculty were obtained from the F74-S75 Faculty Activity Analysis (FAA), as this was the most current report available. FAA data were available for faculty supported by unrestricted funds (less teaching and graduate assistants). Additional TASK records for activities outside of general academic instruction were generated based on faculty response in terms of percentage of time. If no response was received for a particular faculty member, a department average was assigned based on his funding department.
4. Health Science faculty with teaching tasks on the General Campus and Health Science Center disciplines were dropped. General Campus faculty with teaching tasks in Health Science Center disciplines were dropped.
5. Service months were assigned on the basis of FTE and number of semesters taught. FTE was multiplied by 9 months if the faculty member taught two semesters and by 4.5 months if he only taught one semester. Teaching and research assistants were initially equated to .25 FTE. This was later increased to .50 FTE to bring those data into conformance with practice established by the other pilot universities. The FTE of teaching administrators were multiplied by 12 months, no matter how many semesters the administrators taught. Service months for administrators in instruction were later scaled down by the PDM programs, since additional administrative tasks are generated.
6. The state year-end payroll file (April 1, 1975 - March 31, 1976) was used for faculty compensation FUND records.
7. Fringe benefits of those with instructional tasks are included on independent FUND records.

8. Tuition waivers of graduate assistants with instructional tasks are included as fringe benefits. Independent FUND records were generated. Waivers are established in line with the FTE.

	Waiver $[a]	FTE
1/2 time	$ 675	.12/.13
3/4 time	1,015	.18/.19
Full time	1,350	.25

a. mid-point between in-state and out-of-state tuition charges.

9. Research funded and unfunded individuals who had teaching tasks were dropped. Contact hours dropped for fall and spring numbered 1,215.

10. Administrators were assigned service months and salary dollars in accordance with contact hours delivered in instruction. The SUNY costing algorithm was used as follows:

Weekly faculty contact hours (Sum of F-75 and S-76)	PDM Treament
Less than 10	Tasks dropped; no costs or service months applied to instruction
10 to 15.99	25 percent of salary and three service months applied to instruction
16 to 23.99	50 percent of salary and six service months applied to instruction
24 or more	100 percent of salary and twelve service months applied to instruction

The balance of administrators' salaries was maintained in the administrative funding account. This split was accomplished by generating additional TASK records for administrators who taught.

11. Sabbaticals--Instructional teaching tasks for a faculty member were dropped from the PDM for the term in which he was on sabbatical leave. Those on sabbatical for the academic year were assigned nine service months

in activity task 4.8. The salary assigned to the 4.8 task was half the regular annual salary. Those on sabbatical for one term (fall or spring) were assigned 4.5 service months in activity task 4.8. The salary assigned to the 4.8 task was half the regular annual salary. The balance of salary and service months was assigned to teaching tasks in the other semester. This was accomplished by using qualified FUND and TASK records.

12. Compensation and person units were distributed within the PDM software in accordance with activity units (contact hours) reported in CASA and FAA.

UNIVERSITY OF WASHINGTON

Protocol Statement

Step 3

1. Personnel data were extracted from our Faculty Activity Analysis (FAA) system. Reporting to this system are academic faculty, research faculty, administrators of academic departments, teaching assistants and research assistants. The response rate is about 95 percent.
2. Compensation reported was just three times monthly salary; no fringe benefits or tuition waivers were included.
3. Person units were calculated as 3 (percent FTE)/100. The percent FTE comes from the payroll system.
4. Activity units used were simply percentage of time as reported to the FAA system.
5. FUND data were extracted from the FAA, which had extracted it from the payroll system.
6. TASK data came from the FAA.
7. FAA data are collected and reviewed by each academic department. How much review and by whom varies.
8. Compensation and person units were distributed to activities via the PDM.
9. Person qualification was used.
10. Persons on sabbatical are coded with activity code 511 (leave), which in turn is assigned to activity center 4.8. Compensation reported is their leave salary. Person units are reduced in the same proportion as salary.
11. Research and academic administration are reported in the FAA. Academic administration was assigned to activity center 4.6.

Research was split between activity centers 2.2 and 2.3. That portion funded by the state was coded as 2.2, the rest as 2.3.

12. The grand totals of person units (person months), compensation, and average monthly salary were checked for reasonableness.

STEP 4

TOPIC:	Cross-check for errors between faculty-activity data and student-enrollment data.
OBJECTIVE:	To determine that the disciplines and course levels taught by the faculty are identical to the disciplines and course levels in which the students are enrolled and to visually inspect faculty and student data for errors, inconsistencies, and improbable data.
GENERAL IEP PROCEDURES:	In order to relate the faculty-activity data to the student-enrollment data, both sets of data must be coded to the identical activity structure. Frequently, mismatches among disciplines and course levels occur. The purpose of this step is to resolve any significant mismatches between the two data sets before proceeding with the analysis.
ADDITIONAL MRU PROCEDURES	None.
COLLECTION TIME PERIOD:	No new data were collected in this step. The matching of the two data sets is an iterative process that proceeded simultaneously with the collection of the faculty data in step 3.

ANALYSIS OF THE DATA: The analysis of the data was done by visually examining a listing of the faculty and student data by four-digit HEGIS codes and course level to identify any number of possible inconsistencies. Table 4.1 lists the number of potential problems for each institution. Basically, each listing was checked by looking down columns for mismatches or unlikely data. Also, occurrences of less than 50 credit hours, very high credit-hour/service-month ratios, and service months less than 1.0 were recorded for double-checking by the institution. When credit hours or service months are very low, or when the faculty and

TABLE 4.1

SUMMARY OF POTENTIAL PROBLEMS IN FACULTY AND STUDENT DATA

	CU	IL	KU	PU	SB
1. Number of occurrences of salary with no SCH	6	12	0	3	10
2. Number of occurrences of SCH with no salary	8	6	17	8	5
3. Number of SCH ≤ 50 hours (excluding .90)	8	28	20	14	9
4. Number of Center ID errors (in 1.1 only)	0	2	0	2	3
5. Number of productivity ratios over 1,000 (combined with low person units and SCH)	2	5	1	0	4
6. Number of person units < 1	6	17	7	1	7
7. Number of salary errors	0	11	0	0	0
Total number of lines with one or more of the seven problem types listed above[a]	24	61	36	27	29
Total disciplines and course levels	228	573	270	424	189
Problem rate	10.5%	10.6%	13.3%	6.4%	15.3%

[a]Does not subtotal from figures above, because some lines contain multiple problem types.

data are from different terms or years, small errors can become magnified, and results (particularly ratios) can be badly distorted.

Also calculated at the bottom of table 4.1 is a "problem rate" for each institution calculated by dividing the number of potential inconsistencies by the total of all disciplines and course levels for each institution. This problem rate ranged from 6.4 percent at Purdue to 15.3 percent at Stony Brook, averaging 9.9 percent for all institutions in the pilot test. Thus about 1 of every 10 discipline/course levels contained a potential problem or error. While this may seem like a large occurrence of problem areas, most of them were readily explainable when examined by the institutional representatives. For example, the type 1 error, salary but no student credit hour (SCH), occurred in disciplines where a faculty member was assigned, but students were registered with a course prefix that indicated a different discipline. Likewise the type 2 error, SCH but no salary, was often the result of a university not recognizing the cost of faculty salaries, for example, in military science. Type 3 errors (SCH $\leq$ 50 hours) occurred in the event of extremely small discipline or

course-level offerings. High productivity ratios (type 5 error) were often the result of extremely low person units (type 6 error). Institutions were instructed to examine each potential problem area and make a correction to the data set where necessary. As a result of this step, many of the institutions generated new student and/or faculty data sets before moving on to the next step in the pilot test.

The visual inspection of the credit hours, compensation, person units, and productivity ratios for each discipline and course level showed that errors or problems in combining the faculty and student data sets were very common, although not necessarily serious in terms of absolute magnitudes. Institutions need to be alerted to this fact and be prepared to spend some staff time locating and resolving mismatches, inconsistencies, and errors. It would be helpful if the IEP software automatically edited and summarized the data in the same way that the visual edit was done here. Suggested editing rules are those for which errors or problems were recorded in the list in table 4.1. One large source of error in the data examined here was the use of current student data with

faculty activity data from former years. It is recommended that institutions, if at all possible, use faculty and student data from the same terms and years. If it is necessary to use the two data sets from different years, then problems will continue to arise in two instances: (1) where a very low credit hour is paired with a relatively high compensation figure (which will inflate unit costs) and vice versa and (2) where no credits were produced but compensation dollars have been allocated to the course level and vice versa.

STUDY GROUP RECOMMENDATIONS:

Step 4 was basically designed as a technical step to match the consistency of the student and faculty files at each of the individual institutions. This was done, and a number of inconsistencies were found and pointed out to the institutional representatives. Most of the errors were discovered to be oversights on their part or occurrences for which there was an acceptable explanation. For instance, in most cases, Military Science (1800) produced a mismatch between student credit hours and faculty service months, because the faculty time was for the most part "donated" by the armed

services and therefore the compensation and service months were not recorded in the institutional records. Even though the problem rates were relatively high (6.4 percent to 15.3 percent), the institutions felt the types and magnitude of the errors were minimal and could easily be corrected. The study group recommends, however, that a reconciliation of student and faculty data be performed before introducing the expenditure data into the analysis.

CONCLUSION:

The data examined here, while diverse, appeared sufficiently consistent and reasonable that proceeding with this test of information exchange among major research universities seemed appropriate.

STEP 5

TOPIC: Collection and analysis of institutional expenditure data and production of modified direct cost data.[4]

OBJECTIVE: To aid the institutions in crossing over their current funds expenditure data to the IEP activity structure and to analyze the results for consistency and completeness.

GENERAL IEP PROCEDURES: The general IEP procedures are discussed on pages 2.14-2.42 of Technical Report 65 (2nd edition). The general procedures do not attempt to distinguish among sources of funds, nor do they attempt to maintain separate object of expenditure categories.

ADDITIONAL MRU PROCEDURES: One of the original charges to the MRU study group was to attempt to differentiate costs by source of funds. Consequently, the pilot-test group agreed to codify their expenditures data into four categories of current funds:

- General Funds (GEN)--Primarily unrestricted funds arising from state appropriations and student tuition income.
- Restricted Funds (RES)--Primarily gifts, grants, and contracts that are restricted by the funding agency or grantor.

4. The University of Washington data were added to the analysis at this point in the pilot test.

- Indirect Cost Recovery (ICR)--The indirect-cost portion of grants and contracts.

- Auxiliary Funds (AUX)--Funds generated from services provided to students, faculty, or staff for which a fee is charged that is directly related to but not necessarily equal to the cost of the service. Auxiliary enterprises are essential elements in support of the educational program and conceptually should be regarded as self-supporting. Examples of auxiliary enterprises typically include housing and food services, college unions, college stores, faculty clubs, recreational facilities, and frequently, intercollegiate athletics.

In addition, each university classified its current-funds expenditures into one of the following object-of-expenditure categories:

- Academic Salaries (ACAD.SAL)--The gross salaries (exclusive of any fringe benefits) paid to employees holding an academic appointment. This category includes graduate assistants, postdoctoral students, as well as those individuals holding temporary or part-time appointments.

- Academic Fringe Benefits (ACAD.FRG)--The fringe benefits paid to the academic staff. Fringe benefits typically include expenditures for:

  - Social security
  - Retirement
  - Medical insurance
  - Life insurance
  - Disability insurance
  - Unemployment compensation
  - Workmen's compensation
  - Other benefits such as fee remissions and scholarships for staff and staff dependents

- Nonacademic salaries (STAF.SAL)--The gross salaries (exclusive of any fringe benefits) paid to employees not holding an academic appointment. This category includes salaries paid to managerial and technical support staff, clerical and service staff, and work-study students (both the institution's 20 percent portion as well as the federal government's contribution of 80 percent).

- Nonacademic Fringe Benefits (STAF.FRG)--The fringe benefits paid to the nonacademic staff. (See above list for typical fringe-benefit expenditures.)

- Supplies and Expenses (S&E.EXP)--Include the following types of current-funds expenditures:

  Travel
  Telephone
  Honoraria
  Association dues
  Purchased publications (nonlibrary and subscription)
  Mailing expenses
  General office and instructional supplies
  Office equipment
  Instructional or educational equipment (capital and noncapital items budgeted on a recurring basis, including repair)

  Expenditure items not appearing on this list, such as utilities, should appear initially as a cost in a support-activity center.

Table 5.1 was later added to clarify which expenditures were to be considered a direct cost of the user department and which were to be classified initially in a support account.

TABLE 5.1

RECOMMENDED TREATMENT FOR SELECTED OBJECTS OF EXPENDITURE

Object of Expenditure	Direct Cost	Support Cost Center
Academic Computing Support	✓	
Administrative Computing		6.3
Mail--Postage	✓	
Mail--Personnel		6.4
Motor Pool	✓	
Physical Plant--Dept. Request	✓	
Physical Plant--Janitorial		6.5
Physical Plant--Major Repair		6.5
Printing, Copying	✓	
Rental of Building and Equipment	✓	
Security		6.4
Telephone--Installation	✓	
Telephone--Tolls	✓	
Telephone--Service		6.4
Travel	✓	
Utilities--Auxiliary	✓	
Utilities		6.5

COLLECTION TIME PERIOD: Approximately nine months were allowed for the entire direct-cost phase of the cost study. This included collecting expenditure data from the institutions, checking it for consistency and completeness, running the initial set of allocations, and producing the direct-cost reports.

ANALYSIS OF THE DATA: As in earlier steps, each institution was asked to submit a protocol statement explaining how the IEP procedures were implemented on their campus. In addition, each institution was asked to prepare a statement reconciling their total current funds expenditures as recorded in their financial statements to those expenditures reported in the MRU-IEP cost study. Table 5.2 is an example of the reconciliation statement prepared by Purdue University. These reconciliation and protocol statements were analyzed to pinpoint differences or inconsistencies among the six universities that might have occurred during this implementation step. Table 5.3 records those differences that were evident from the institutional statements and from discussions with study-group members.

TABLE 5.2

March '78

PURDUE UNIVERSITY
1975-76 MRU Cost Study
Reconciliation

Campus: West Lafayette	Unrestricted Fund	ICR Fund	Restricted Fund	Auxiliary Fund	Total All Funds
I. Financial Report Expenditures	91,985,150		51,826,472	23,130,936	166,942,558
II. Expenditure Adjustments					
A. Fee Remissions					
1. Staff and Graduate Assistants	4,298,878		-	-	4,298,878
2. Institutional and Statutory	1,484,781		-	-	1,484,781
Total Fee Remissions	5,783,659				5,783,659
B. Imputed Fringe Benefits	2,653,376		-	-	2,653,376
C. Transfers	2,425,725		(1,077,454)	4,398,696	5,746,967
D. Regional Campus Admin. (23 Fund) Elimination	(20,786)		-	-	(20,786)
E. Indirect Cost Recovery	(6,823,534)	6,823,534	-	-	-0-
Subtotal - Expenditure Adjustments	4,018,440	6,823,534	(1,077,454)	4,398,696	14,163,216
III. Gross Adjusted Financial Report Expenditure	96,003,590	6,823,534	50,749,018	27,529,632	181,105,774

TABLE 5.3

INSTITUTIONAL DIFFERENCES IN COLLECTING EXPENDITURE DATA
SUMMARIZED FROM INSTITUTIONAL PROTOCOL STATEMENTS

Procedure	Colorado	Illinois	Kansas	Purdue	Stony Brook	Washington
Treatment of indirect cost recovery (ICR)	Distributed pro rata according to 1975-76 ICR cost study	Budgeted independently of negotiated ICR formula	Budgeted independently of negotiated ICR formula	Distributed in same manner as indirect costs were generated	Distributed in same manner as indirect costs were generated	Did not attempt to break out ICR funds combined with General Funds
Academic computing expenditures	Adjustments made to include as direct costs based on usage periods	Recorded as direct expenditures in the accounting records; no amortization of equipment	Recorded as direct expenditures in the accounting records; equipment is leased	Recorded as direct expenditures in the accounting records; equipment is leased	Adjustments made to include as direct costs based on usage records	Recorded as direct expenditures in the accounting records; no amortization of equipment
Imputed fringe benefits	Adjustments made for fringe benefits paid by state	Adjustments made for fringe benefits paid by state	No adjustment was necessary	Adjustments made for fringe benefits paid by state	Adjustments made for fringe benefits paid by state	No adjustment was necessary
Tuition waivers as fringe benefits	Resident and nonresident tuition waivers included at the average rate	Resident portion included; nonresident portion not recognized as cost	Resident portion included; nonresident portion not recognized as cost	Resident and nonresident tuition waivers included at the average rate	Resident and nonresident tuition waivers included at the average rate	Resident and nonresident tuition waivers included at the average rate
Elimination of interfund or interdepartmental transfers	Interfund transfers were eliminated	Financial reports were prepared at net; no adjustments were necessary	Financial reports were prepared at net; no adjustments were necessary	Financial reports were prepared at net; no adjustments were made for interfund transfers	Interfund transfers were eliminated	Financial reports were prepared at net; no adjustments were necessary
Allocation of central administration expenditures	Yes, based on gross expenditures of the regional campuses	Yes, based on gross expenditures of the regional campuses; universitywide academic units were excluded	Yes, most university-wide functions were already allocated as a part of the operating budget	Yes, based on gross expenditures of the regional campuses	Yes, a pro rata portion of central administrative expenditures was included	Not applicable
Health science professions	Organized as a separate campus and therefore excluded	Organized as a separate campus and therefore excluded	Organized as a separate campus and therefore excluded	Not applicable	Adjustments made to exclude health-science-center costs from cost study	Included in cost study
Student hospital expenditures	Recorded as Auxiliary Funds	Recorded as Auxiliary Funds	Recorded as Auxiliary Funds	Recorded as Auxiliary Funds		2/3 General Funds 1/3 Auxiliary Funds
Capitation grants for health-science educ.	Recorded as Restricted Funds	Recorded as Restricted Funds	Recorded as Restricted Funds	Recorded as Restricted Funds	Recorded as Restricted Funds	Recorded as Restricted Funds
Organized activities related to instruction and research	Primarily recorded as Auxiliary Funds	Recorded as Auxiliary Funds	Not applicable	Recorded as Restricted Funds	Recorded as General Funds	Recorded as General Funds

The pilot-test group decided it would be necessary to perform a series of preliminary allocations at the departmental level before direct costs could be compared among the six universities. The group felt these preliminary allocations were necessary to partially offset the differences arising out of step 3--the collection of the faculty-activity data. Six different instruments were used to collect the faculty data. Some of them were more comprehensive than others in the type of activities surveyed. This had the net effect of drawing dollars out of instruction into cost centers that might be termed instruction-related activities. These included such activities as Departmental Research (2.3), Academic Administration (4.6), Course and Curriculum Development (4.7), Professional Development (4.8), and Academic Advising/Counseling (1.9). The following table illustrates the magnitude of these instruction-related activities for the six pilot-test institutions.

The allocations were made according to the following decision rules.

- Academic Advising/Counseling (1.9)--Allocate to all activity centers within 1.1 Instruction (excluding doctoral dissertation) by four-digit HEGIS and course level on the basis of student credit hours.

TABLE 5.4

UNMODIFIED DIRECT COSTS OF

INSTRUCTION-RELATED ACTIVITIES

(In Thousands of Dollars and as Percentages of Total Direct Costs)

Instruction-related Activity	Colorado	Illinois	Kansas	Purdue	Stony Brook	Washington
Academic Advising/ Counseling (1.9)	- -	$1,038 0.4%	- -	$3,597 2.2%	- -	$12,708 5.7%
Departmental Research (2.3)	$3,116 3.2%	$6,226 2.6%	$3,203 4.6%	$2,295 1.4%	$3,321 5.2%	$16,707 7.4%
Academic Administration (4.6)[a]	$5,518 5.8%	$14,327 6.0%	$4,660 6.7%	$10,123 6.3%	$5,826 9.0%	$20,295 9.0%
Course and Curriculum Development (4.7)	$ 938 1.0%	- -	$1,141 1.6%	- -	- -	$4,358 1.9%
Professional Development (4.8)	$1,868 1.9%	$4,387 1.8%	$2,431 3.5%	$2,362 1.6%	$1,404 2.2%	$3,569 1.6%

[a]Only the departmental administration was allocated at this point in the cost study.

- Course and Curriculum Development (4.7)--Allocate to all activity centers within 1.1 Instruction (excluding doctoral disseration) by four-digit HEGIS and course level on the basis of faculty person units.

- Departmental Research (2.3)--Allocate to all activity centers within 1.1 Instruction (except lower-division course level) by four-digit HEGIS discipline and within fund group. The basis for the allocation is faculty salaries (which include T.A. salaries in this cost

study). Lower-division instruction was excluded from the allocation base, because much of the lower-division instruction at MRUs is performed by teaching assistants who typically are not engaged in departmental research; hence the cost of departmental research should not be attributable to their efforts.

- Professional Development (4.8)--Allocate to Instruction, Research, and Public Service by four-digit HEGIS on the basis of faculty salaries within each fund group.

- Academic Administration (4.6)--Allocate only the four-digit HEGIS (departmental) Academic Administration to Instruction, Research, and Public Service by total direct costs within each fund group. Exception: ICR and RES. ACAD. ADMIN. costs were allocated on the sum of ICR and RES. 1.0, 2.0, and 3.0. The remainder of the 4.6 dollars were allocated in a later step.

In addition, the following guidelines were established for making the recommended allocations.

- Timing of Allocations--These allocations were made after the crossover of expenditure data (step 5) but prior to the calculation of direct unit costs (step 6). This allowed the group to examine the distribution of expenditures as designated by the individual institutions but at the same time created a more consistent data base before direct unit costs were calculated.

- Sequence of Allocations--These allocations were made independently of each other; that is, they were not made in a step-down fashion. The costs of performing sequential allocations for this particular set of allocations appeared to outweigh any gain in the precision of the data that might have resulted from a two- or three-step allocation process.

- Level of Data Aggregation--The allocations were made at the four-digit HEGIS level. The data were later summarized at the two-digit HEGIS level for display and analysis purposes.

- Terminology--Strictly speaking, once the allocation process had begun, we were no longer discussing "direct costs," as costs were no longer directly assigned to a final cost objective. In subsequent steps, they will be referred to as modified direct costs.

The first step in the analytical process was to produce a report for each institution displaying its fiscal-year expenditures in Program Classification Structure (PCS) format by fund group (Exhibit 5A). The first column represents the total unmodified direct costs for each activity center; the second column contains the general funds dollars, the third column the auxiliary funds, the fourth column the restricted funds, and the fifth column the indirect-cost-recovery funds. The sixth column is basically a control total against which to check the first column. The percentages in this report are based on columnar totals. It should be noted that this report truncates the activity center listing after 6.9. This was done so that the percentages could be based on a common set of activities for all institutions. Those activity centers beyond 6.9 are not true activity centers but rather holding accounts for reconciliation purposes. For the most part, these additional activity centers (7.1 through 9.9) can be ignored for the remainder of the study.

The second step in the analysis was to perform the series of departmental allocations outlined earlier to arrive at modified direct costs. A report (exhibit 5B) was produced for each institution displaying the amount of unmodified direct costs (prior to allocations), the amount of modified direct costs (after allocations), the amount allocated (the difference between columns 1 and 2), and the percent difference based on the unmodified direct costs. Table 5.5 illustrates the effect of these departmental allocations on the primary programs of each of the pilot institutions. The important thing to be learned from this table is that large amounts of dollars were shifted from the support areas (primarily academic support and departmental research) into the primary programs of the institution. General Academic Instruction (1.1) received most of these departmental support dollars ranging from $7.3 million for Stony Brook to $43.5 million for Washington. This had the effect of increasing the direct instructional costs by increments ranging from 28.9 percent at Illinois to 134 percent at Washington. This wide range can be attributed in part to the differing FAA survey techniques employed at the pilot institutions (see step 3). Illinois and Purdue used primarily an assignment technique that tended to restrict

TABLE 5.5

AMOUNT AND PERCENT INCREASE OF PRIMARY ACTIVITY CENTERS AS A RESULT OF DEPARTMENTAL ALLOCATIONS
(In Thousands of Dollars)

PCS Activity Center	Colorado	Illinois	Kansas	Purdue	Stony Brook	Washington
General Academic Instruction (1.1)	$9,327 *48.0%*	$15,951 *28.9%*	$10,658 *58.7%*	$15,626 *38.7%*	$7,323 *51.4%*	$43,580 *134.1%*
Community Education (1.3)	- -	$ 54 *13.0%*	- -	- -	- -	- -
Institutes/Research Centers (2.1)	$ 335 *4.4%*	$ 2,453 *8.0%*	$ 633 *13.2%*	$ 1,081 *8.1%*	$1,476 *145.6%*	- -
Individual Project Research (2.2)	- -	$ 2,179 *8.8%*	$ 221 *4.5%*	$ 1,017 *4.1%*	$ 755 *8.6%*	$ 8.853 *16.5%*
Patient Services (3.1)	- -	$ 129 *16.2%*	- -	- -	- -	- -
Community Services (3.2)	$ 490 *9.1%*	$ 2,581 *114.8%*	$ 12 *0.7%*	- -	$ 326 *23.6%*	- -
Cooperative Extension Services (3.3)	- -	$ 516 *3.2%*	- -	- -	- -	- -
Public Broadcasting (3.4)	- -	$ 99 *43.3%*	- -	- -	- -	- -

the amount of faculty compensation reported in the academic support areas. The other four institutions used a self-reporting technique that had the opposite effect. The study group felt that this series of allocations was necessary to bring the pilot-test institutions into a common base from which to proceed with the cost study.

Next, a report was produced for each institution that displayed the modified direct cost in PCS format by fund group (exhibit 5C). Here the funds are arranged in a slightly different order than they were for unmodified direct costs. The first column displays the total direct cost for each activity center; the second column displays the direct costs found in the general funds; the third column contains the indirect-cost-recovery funds; the fourth column is a subtotal of the general and ICR funds; the fifth column contains the restricted funds, and the sixth column the auxiliary funds. The pilot-test group decided to subtotal the general and ICR funds, because institutional practice varied with respect to treatment of ICR funds. While all institutions recognized ICR funds as a separate source of revenue, only two (Illinois and Kansas) budgeted and reported expenditures of ICR funds as separate from their general appropriated funds. The other pilot-test institutions

prorated their ICR funds to the academic and support units that generated the indirect costs according to their negotiated formulas. Because two different methods were used for attributing ICR funds to academic and support units, it was decided that a more valid comparison could be made by examining the subtotal of general and ICR funds.

STUDY GROUP RECOMMENDATIONS:

1. Departmental allocations. Because of the lack of consistent FAA data, a series of allocations was made at the departmental level for Academic Advising/Counseling (1.9), Course and Curriculum Development (4.7), Departmental Research (2.3), Professional Development (4.8), and Academic Administration (4.6). The pilot-test group and staff found these departmental allocations to be time consuming and costly. Most of these allocations could have been avoided if a more tightly structured faculty-activity analysis with common categories and a common reporting method had been adopted for all institutions at the beginning of the cost study. In the absence of a uniform FAA, some departmental allocations will continue to be necessary to compensate for the differences in survey techniques among participating institutions.

2. Reconciliation of cost-study data to financial statements. Each institution was asked to reconcile its expenditure data submitted in step 5 to its published financial statements. This reconciliation process was important for two reasons. First, it gave the data collector the assurance that all expenditure items were accounted for in the cost study. Second, the reconciliation statements were the basis for determining whether certain expenditures and transfers had been handled in a consistent manner. The study group found the reconciliation statements to be an essential part of the MRU cost study and strongly recommends their use in any future cost studies.

3. Source of funds. One of the criticisms of the original IEP cost study was that it did not recognize costs by source of funds. The MRU study attempted to correct this deficiency. All expenditure items were separated during the account crossover into four fund groups: general funds, indirect-cost-recovery funds, restricted funds, and auxiliary funds. The study group found that in four of the institutions, the expenditures made from ICR funds were not

separately budgeted and reported. While the schools could identify the ICS funds in total, they had no separate expenditure-fund code to identify them, and hence the expenditures were co-mingled with general fund expenditures. The manner in which they were broken out for this cost study was to separate from general funds amounts equal to the ICR totals and allocate those amounts to the academic and support departments in roughly the same proportions as they were generated. For this reason, ICR and general funds were combined for this set of displays but will be maintained as separate fund groups throughout the remainder of the study.

4. Object of expenditure. Another criticism of the original IEP cost study is that it did not distinguish among objects of expenditure. The MRU cost study recognized five expenditure categories: academic salaries, nonacademic salaries, academic fringe benefits, nonacademic fringe benefits, and supplies and services. A sixth object for graduate-student salaries is recommended if this study is replicated. While it is recognized that these objects of expenditure are important for explanatory purposes, it became increasingly cumbersome and expensive to carry this amount of

detail through discipline unit costing, program unit costing and full costing. Therefore the study group reluctantly collapsed object-of-expenditure data into a single total for the remainder of the cost study. However, the pilot institutions still believe that object-of-expenditure data are useful in understanding differences among unit costs, and such data should be available if practical.

CONCLUSION:

Through the series of departmental allocations to correct for the dissimilar faculty-activity data and through the careful analysis of each school's expenditure data and reconciliation of those data to the institution's financial statements, the pilot-test group felt reasonably confident that they could proceed with the remainder of the study.

EXHIBIT 5A

TABLE 3

UNMODIFIED DIRECT COSTS (IN THOUSANDS OF $)
BY PCS AND FUND

9/15/78

INSTITUTION: ILLINOIS

	TOTAL UNMODIFIED DIRECT COST	GENERAL FUNDS	AUXILIARY FUNDS	RESTRICTED FUNDS	ICR FUNDS	TOTAL FUNDS
TOTAL	237.736	137.604	36.310	54.906	.911	237.736
PERCENT	100.0	100.0	100.0	100.0	00.0	100.0
PCS						
PROG						
INSTRUCTION						
PCS						
1.1 GEN ACAD INST.	55.108	53.628	.1	1.046	384	55.108
PERCENT	23.2	39.0	.1	1.9	4.3	23.2
1.3 COMMUN.ED	417	404	01	131	01	417
PERCENT	.2	.3	.01	.01	.01	.2
1.4 STUDENT/ADVSNG	1.038	969	01	691	01	1.038
PERCENT	.4	.7	.01	.1	.01	.4
ORGANIZED RESEARCH						
PCS						
2.1 INST/RES CNTRS	30.513	6.805	01	22.521	1.187	30.513
PERCENT	12.8	4.9	.01	41.0	13.3	12.8
2.2 INDIV/PROJ	24.878	4.471	364	18.213	1.824	24.878
PERCENT	10.5	3.3	1.01	33.2	20.5	10.5
2.3 DEPT RES	6.226	6.223	01	01	01	6.226
PERCENT	2.6	4.5	.01	.01	.01	2.6
2.4	891	01	01	01	891	891
PERCENT	.4	.01	.01	.01	10.0	.4
PUBLIC SERVICE						
PCS						
3.0 PUBLIC SERVICE	01	01	01	01	01	0
PERCENT	.01	.01	.01	.01	.01	.0
3.1 PATIENT SERV	792	280	430	791	21	792
PERCENT	.3	.2	1.2	.1	.01	.3
3.2 COMMUNITY SERV	2.250	1.596	11	650	31	2.250
PERCENT	.9	1.2	.01	1.2	.01	.9
3.3 COOP/EXTENSION	16.356	7.608	01	8.748	01	16.356
PERCENT	6.9	5.5	.01	15.9	-.01	6.9
3.4 PUBLIC BROADC	228	134	01	84	111	228
PERCENT	.1	.1	.01	.2	.1	.1
ACADEMIC SUPPORT						
PCS						
4.1 LIBRARIES	7.220	6.389	01	345	486	7.220
PERCENT	3.0	4.6	.01	.6	5.4	3.0
4.2 MUSEUM/GALLERY	285	174	01	108	31	285
PERCENT	.1	.1	.01	.2	.01	.1

EXHIBIT 5A (Continued)

TABLE 3

UNMODIFIED DIRECT COSTS (IN THOUSANDS OF $)
BY PCS AND FUND

9/15/78

INSTITUTION: ILLINOIS - CONTINUED

	TOTAL UNMODIFIED DIRECT COST	GENERAL FUNDS	AUXILIARY FUNDS	RESTRICTED FUNDS	ICR FUNDS	TOTAL FUNDS
PCS						
PROG						
ACADEMIC SUPPORT						
PCS						
4.3 AUDIOVISUAL...	621	577	01	24	20	621
PERCENT.....	.3	.4	.01	.01	.2	.3
4.4 COMPUTING.....	33	33	01	01	01	33
PERCENT.....	.01	.01	.01	.01	.01	.0
4.5 ANCILLARY.....	1.510	1,343	01	167	01	1.510
PERCENT.....	.6	1.01	.01	.3	.01	.6
4.6 ACAD ADMIN....	14.327	10.615	1.723	1.585	404	14.727
PERCENT.....	6.0	7.7	4.7	2.9	4.5	6.0
4.8 ACAD PRSNL DVL	4.387	3.758	91	450	170	4.387
PERCENT.....	1.8	2.7	.01	.8	1.9	1.8
STUDENT SERVICE						
PCS						
5.1 STDNT SRVC ADM	341	262	01	69	11	341
PERCENT.....	.1	.2	.01	.1	.1	.1
5.2 SOC/CLTR DEVLP	2.400	2.061	01	150	189	2.400
PERCENT.....	1.0	1.5	.01	.3	2.1	1.0
5.3 COUNS/CAREER .	766	748	01	7	11	766
PERCENT.....	.3	.5	.01	.01	.1	.3
5.4 FIN AID ADMIN.	405	336	01	32	37	405
PERCENT.....	.2	.2	.01	.1	.4	.2
5.5 STDNT AUX SERV	34.933	1.181	33,734	11	7	84.933
PERCENT.....	14.7	.9	92.9	.01	.1	14.7
INSTITUTIONAL SUPPORT						
PCS						
6.1 FACL MNGMNT...	2.144	2.003	01	73	69	2.144
PERCENT.....	.9	1.5	.01	.1	.8	.9
6.2 FISCAL OPER...	2.598	2.030	01	21	566	2.598
PERCENT.....	1.1	1.5	.01	.01	6.3	1.1
6.3 GEN ADMIN SERV	3.960	3.316	01	29	615	3.960
PERCENT.....	1.7	2.4	.01	.1	6.9	1.7
6.4 LOGISTICAL ...	2.015	1.779	01	7	230	2.015
PERCENT.....	.8	1.3	.01	.01	2.6	.8
6.5 PHYS PLANT....	18.236	16.575	01	11	1.660	18.236
PERCENT.....	7.7	12.0	.01	.01	18.6	7.7

EXHIBIT 5A (Continued)

TABLE 3

UNMODIFIED DIRECT COSTS (IN THOUSANDS OF $)
BY PCS AND FUND

9/15/78

INSTITUTION: ILLINOIS - CONTINUED

	TOTAL UNMODIFIED DIRECT COST	GENERAL FUNDS	AUXILIARY FUNDS	RESTRICTED FUNDS	ICR FUNDS	TOTAL FUNDS
PCS						
PROG						
INSTITUTIONAL SUPPORT						
PCS						
6.7 PUBLIC REL....	924	797	0	9	117	924
PERCENT.....	.4	.6	.0	.0	1.3	.4
6.8 STDNT ADMT/REC	1,935	1,506	0	416	13	1,935
PERCENT.....	.8	1.1	.0	.8	.1	.8

EXHIBIT 5B

TABLE4B

TOTAL OF ALL FUNDS DOLLARS
BEFORE(UNMODIFIED) AND AFTER(MODIFIED) ALLOCATION OF
RELATED INSTRUCTIONAL ACTIVITY DOLLARS

9/15/78

INSTITUTION: ILLINOIS

	UNMODIFIED DIRECT COSTS	MODIFIED DIRECT COSTS	DIFFERENCE	PERCENT DIFFERENCE
TOTAL	256,709	256,709	0	0.0
PCS				
PROGRAMS	0	0	0	**
1.1 GEN ACAD INST	55,108	71,059	15,951	28.9
1.3 COMMUNED	417	471	54	13.0
1.9 STUDENT ADVSNG	1,038	0	-1,038	-100.0
2.1 INST/RES CNTRS	30,513	32,966	2,453	8.0
2.2 INDIV/PROJ	24,978	27,057	2,179	8.8
2.3 DEPT RES	6,226	0	-6,226	-100.0
2.4	891	0	-891	-100.0
3.0 PUBLIC SERVICE	0	0	0	**
3.1 PATIENT SERV	792	920	129	16.2
3.2 COMMUNITY SERV	2,250	4,831	2,581	114.8
3.3 COOP/EXTENSION	16,356	16,872	516	3.2
3.4 PUBLIC BROADC	228	327	99	43.3
4.1 LIBRARIES	7,220	7,220	0	.0
4.2 MUSEUM/GALLERY	285	297	12	4.3
4.3 AUDIOVISUAL	621	621	0	.0
4.4 COMPUTING	33	33	0	.0
4.5 ANCILLARY	1,510	1,510	0	.0
4.6 ACAD ADMIN	14,327	2,744	-11,583	-80.8
4.8 ACAD PRSNL DVL	4,387	150	-4,237	-96.6
5.1 STDNT SRVC ADM	341	341	0	.0
5.2 SOC/CLTR DEVLP	2,400	2,400	0	.0
5.3-COUNS/CAREER	766	766	0	.0
5.4 FIN AID ADMIN	405	405	0	.0
5.5 STDNT AUX SERV	34,933	34,933	0	.0
6.1 EXEC MNGMNT	2,144	2,144	0	.0
6.2 FISCAL OPER	2,598	2,598	0	.0
6.3 GEN ADMIN SERV	3,960	3,960	0	.0
6.4 LOGISTICAL	2,015	2,015	0	.0
6.5 PHYS PLANT	18,236	18,236	0	.0
6.7 PUBLIC REL	924	924	0	.0
6.8 STDNT ADMT/REC	1,935	1,935	0	.0
7.1 INDEP/INSTIT	1,305	1,305	0	.0
8.1 SCHOLARSHIPS	3,000	3,000	0	.0
8.2 FELLOWSHPS	3,082	3,082	0	.0
9.1 COST PURCHASES	2,955	2,955	0	.0
9.3 CAPT COSTS	3,557	3,557	0	.0

EXHIBIT 5C

TABLE 2

MODIFIED DIRECT COSTS (IN THOUSANDS OF $)
BY PCS AND FUND
PERCENTAGE DOWN COLUMN (WITHIN FUND)
9/15/78

INSTITUTION: ILLINOIS

	TOTAL DIRECT COST	MODIFIED DIRECT GENRAL FUNDS COSTS	MODIFIED DIRECT ICR FUNDS COSTS	SUBTOTAL (GEN+ICR)	MODIFIED DIRECT RESTRICTED FUNDS	MODIFIED DIRECT AUXILIARY FUNDS
TOTAL	237.736	137.609	8.911	146.520	54.906	36.310
PERCENT	100.0	100.0	100.0	100.0	100.0	100.0
PCS						
PROG						
INSTRUCTION						
PCS						
1.1 GEN ACAD INST.	71.059	69.088	461	69.549	1.250	260
PERCENT	29.9	50.2	5.2	47.5	2.3	.7
1.3 COMMUN.ED	471	454	01	454	171	0
PERCENT	.2	.3	.01	.3	.01	.0
1.9 STUDENT ADVSNG	01	01	01	01	01	0
PERCENT	.01	.01	.01	.01	.01	.0
ORGANIZED RESEARCH						
PCS						
2.1 INST/RES CNTRS	32.966	7.637	1.833	9.470	23.496	0
PERCENT	13.9	5.5	20.6	6.5	42.8	-.0
2.2 INDIV/PROJ	27.057	5.512	2.439	7.951	18.587	420
PERCENT	11.4	4.0	27.4	5.4	34.0	1.2
2.3 DEPT RES	01	01	01	01	01	0
PERCENT	.01	.01	.01	.01	.01	.0
2.4	01	01	01	01	01	0
PERCENT	.01	.01	.01	.01	.01	.0
PUBLIC SERVICE						
PCS						
3.0 PUBLIC SERVICE	01	01	01	01	01	0
PERCENT	.01	.01	.01	.01	.01	.0
3.1 PATIENT SERV	920	407	21	409	801	431
PERCENT	.4	.3	.01	.3	.1	1.2
3.2 COMMUNITY SERV	4.831	2.526	51	2.531	927	1.373
PERCENT	2.0	1.8	.1	1.7	1.7	3.8
3.3 COOP/EXTENSION	16.872	7.992	141	8.006	8.866	0
PERCENT	7.1	5.8	.2	5.5	16.1	.0
3.4 PUBLIC BROADC.	327	230	111	241	871	0
PERCENT	.1	.2	.1	.2	.2	.0
ACADEMIC SUPPORT						
PCS						
4.1 LIBRARIES	7.220	6.389	486	6.875	345	0
PERCENT	3.0	4.6	5.4	4.7	.6	.0

EXHIBIT 5C (Continued)

TABLE 2

MODIFIED DIRECT COSTS (IN THOUSANDS OF $)
BY PCS AND FUND
PERCENTAGE DOWN COLUMN (WITHIN FUND)
9/15/78

INSTITUTION: ILLINOIS - CONTINUED

PCS / PROG	TOTAL DIRECT COST	MODIFIED DIRECT GENRAL FUNDS COSTS	MODIFIED DIRECT ICR FUNDS COSTS	SUBTOTAL (GEN+ICR)	MODIFIED DIRECT RESTRICTED FUNDS	MODIFIED DIRECT AUXILIARY FUNDS
ACADEMIC SUPPORT						
PCS						
4.2 MUSEUM/GALLERY	297	174	15	189	108	0
PERCENT	.1	.1	.2	.1	.2	.0
4.3 AUDIOVISUAL	621	577	20	597	24	0
PERCENT	.3	.4	.2	.4	.0	.0
4.4 COMPUTING	33	33	0	33	0	0
PERCENT	.0	.0	.0	.0	.0	.0
4.5 ANCILLARY	1,510	1,343	0	1,343	167	0
PERCENT	.6	1.0	.0	.9	.3	.0
4.6 ACAD ADMIN	2,744	2,507	102	2,610	41	92
PERCENT	1.2	1.8	1.1	1.8	.1	.3
4.8 ACAD PRSNL DVL	150	146	0	146	5	0
PERCENT	.1	.1	.0	.1	.0	.0
STUDENT SERVICE						
PCS						
5.1 STDNT SRVC ADM	341	262	11	273	69	0
PERCENT	.1	.2	.1	.2	.1	.0
5.2 SOC/CLTR DEVLP	2,400	2,061	189	2,250	150	0
PERCENT	1.0	1.5	2.1	1.5	.3	.0
5.3 COUNS/CAREER	766	748	11	759	7	0
PERCENT	.3	.5	.1	.5	.0	.0
5.4 FIN AID ADMIN	405	336	37	373	32	0
PERCENT	.2	.2	.4	.3	.1	.0
5.5 STDNT AUX SERV	34,933	1,181	2	1,184	11	33,734
PERCENT	14.7	.9	.1	.8	.0	92.9
INSTITUTIONAL SUPPORT						
PCS						
6.1 EXEC MNGMNT	2,164	2,007	68	2,072	73	0
PERCENT	.9	1.5	.8	1.4	.1	.0
6.2 FISCAL OPER	2,598	2,030	566	2,596	2	0
PERCENT	1.1	1.5	6.3	1.8	.0	.0
6.3 GEN ADMIN SERV	3,960	3,316	615	3,931	29	0
PERCENT	1.7	2.4	6.9	2.7	.1	.0
6.4 LOGISTICAL	2,015	1,779	230	2,008	7	0
PERCENT	.8	1.3	2.6	1.4	.0	.0

EXHIBIT 5C (Continued)

TABLE 2

MODIFIED DIRECT COSTS (IN THOUSANDS OF $)
BY PCS AND FUND
PERCENTAGE DOWN COLUMN (WITHIN FUND)
9/15/78

INSTITUTION: ILLINOIS - CONTINUED

	TOTAL DIRECT COST	MODIFIED DIRECT GENRAL FUNDS COSTS	MODIFIED DIRECT ICR FUNDS COSTS	SUBTOTAL (GEN+ICR)	MODIFIED DIRECT RESTRICTED FUNDS	MODIFIED DIRECT AUXILIARY FUNDS
PCS						
PROG						
INSTITUTIONAL						
SUPPORT						
PCS						
6.5 PHYS PLANT....	18,236	16,575	1,660	18,235	1	0
PERCENT.....	7.7	12.0	18.6	12.4	.0	.0
6.7 PUBLIC REL....	924	797	117	914	9	0
PERCENT.....	.4	.6	1.3	.6	.0	.0
6.8 STDNT ADMT/REC	1,935	1,506	13	1,519	416	0
PERCENT.....	.8	1.1	.1	1.0	.8	.0

STEP 5 APPENDIXES

PROTOCOL STATEMENTS

FOR

UNIVERSITY OF COLORADO

UNIVERSITY OF ILLINOIS

UNIVERSITY OF KANSAS

PURDUE UNIVERSITY

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

UNIVERSITY OF WASHINGTON

UNIVERSITY OF COLORADO

Protocol Statement

Step 5

The University of Colorado Account Crossover Module (ACM) procedures include some areas where MRU-IEP guidelines could not be strictly adhered to. Following is a discussion of how these areas were handled, and the impact they will have, as we see it, on the project. In addition, some other problem areas are identified that we feel have been handled in a manner consistent with MRU-IEP guidelines.

Indirect Cost Recovery (ICR)

At the University of Colorado, Indirect Cost Recoveries (ICR) are revenue items and do not have related identifiable expenditure entries in the accounting system. In accordance with the MRU-IEP guidelines, general fund expenditures were reduced by the amount of ICR revenues, based on the 1975-76 ICR reports, pro rata across all appropriate cost centers in instruction, academic support, general administration, state-funded research, student services, physical plant, and capital outlay. These same amounts were then shown as expenditures from ICR funds by cost center.

Computing Expenditures

Under the MRU-IEP guidelines, computing expenditures were to be recorded as direct cost to instruction. At the University of Colorado, these costs were not recorded as expenditures to the academic departments. Academic computing expenditure information for each department was obtained from the Computing Center, and the appropriate amounts were added to the academic expenditure data

in the general ledger. The sum of these expenditures was then deducted from Computing Center expenditures.

Workmen's Compensation and Unemployement Insurance

Workmen's compensation and unemployment insurance are paid for separately by the state and not recorded in the University of Colorado accounting system. Estimated amounts of the value of these benefits were added to the general ledger in an attempt to adhere to MRU-IEP guidelines.

Tuition Waivers as Fringe Benefits

Graduate students employed by instructional departments already have the value of their tuition waivers expensed in the University of Colorado accounting system. Certain graduate students working on sponsored research received waivers of the nonresident versus resident tuition differences. These were noted, and the appropriate changes were made to the institution's general ledger to reflect these waivers as expenditures.

Duplicate Reporting in General Ledger

In 1975-76, the University of Colorado financial systems duplicated some revenues and expenditures due to accounting practices. This occurred primarily in auxiliary enterprises. Examples of areas where this problem occurred are as follows:

1. ICR reimbursement treated as revenue in sponsored programs
2. Student fees
3. Interdepartmental transfers
4. Service enterprises--such as residence halls, the motor pool, and print shop

To control the amount of expenditures shown in the 1975-76 financial report, approximately $16 million of revenues and expenses were removed from the general ledger due to this problem.

Noninstructional Cros Records

ACM Cros Records for all noninstructional accounts were generated by computer program using a table of account ranges mapped into Program Classification Structure categories. This method lacks the relatively greater precision offered by manual preparation of these CROS records but was employed because of time contraints.

Inference

Although the handling of ICR expenditure data will differ among institutions, particularly at the detail level, it is anticipated that most differences can be washed out when dealing with the sum of the data. Overall, the Boulder Campus ICR represents 3 percent of expenditures. In the area of instruction, however, it only represents 1 percent of the expenditures, and so is not regarded as a major problem.

The method of creating noninstructional ACM Cros Records may result in some Program Classificature Structure coding that is not consistent with MRU-IEP guidelines.

TABLE 5A.1

1975-76 NCHEMS MRU-LEP COST STUDY

University of Colorado - Boulder Campus

Reconciliation

	(Unrestricted) General Fund	ICR Fund	Restricted Fund	Auxiliary Fund	Total All Funds
I. Total starting General Ledger (Expenditures)	57,234,186	2,887,159	22,669,869	40,277,932	123,069,146
II. Expenditure Adjustments:					
A. Elimination of interdepartmental charges & credits:					
1. General Fund	(-356,585)				(-356,585)
2. Bookstore				(-836,224)	(-836,224)
3. Housing				(-6,414,273)	(-6,414,273)
B. Other Adjustments:					
1. Organized Activities Accrual Adjustment				230,845	230,845
2. Miscellaneous Adjust. (Stu Union, Univ. Clb., other)				(-24,022)	(-24,022)
3. Revolving Fund Adjustments				(-4,609,760)	(-4,609,760)
4. General Fund Overhead to ICR	(-3,004,093)	3,004,093			—
5. Restricted Fund ICR Reversal		(-2,887,159)			(-2,887,159)
6. Salary Adj. & Income Trsfrs. to Expense			(-51,579)		(-51,579)
7. Excess of Receipts Over Transfers; Salary adj; and Balance of ICR Rev. (Prorata)			(-1,031,269)		(-1,031,269)
8. Reconciliation Adjustments (Prorata)	(-22,271)	9,881	(-58,903)	30,225	(-41,068)
Total Expenditure Adjustments:	(-3,382,949)	126,815	(-1,141,751)	(-11,623,209)	(-16,021,094)
III. Actual Final Adjusted General Ledger (AGL)	53,851,237	3,013,974	21,528,118	28,654,723	107,048,052
IV. Actual 1975-76 Financial Report/Request Budget ICR/ and including est. Workmens Compensation	53,850,461	3,014,153	21,527,448	28,655,465	107,047,527
V. Difference Between Final AGL and Actual Fin. Report (Due to prorata adj.)	776	(-179)	670	(-742)	525

5.30

UNIVERSITY OF ILLINOIS

Protocol Statement

Step 5

Preparation of the General Ledger File

The University of Illinois prepares a year-end summary Comptroller's Report File, which contains the fiscal-year expenditures by several objects of expenditure for each University account. An account is identified by a 10-digit code defined as follows:

1-- Campus code (General University, Urbana-Champaign, Medical Center, Chicago Circle)

2-3-- Fund code (used for mapping University of Illinois funds to MRU-IEP funds)

4-7-- College-department (an organizational unit identifier)

8-- Function (used for mapping expenditures to the Functions in the Financial Statement, not used in MRU-IEP)

9-10-- Project (used for internal control purposes, not used in MRU-IEP

Salaries

The Comptroller's File contains total expenditures for salaries and wages in each account but does not discriminate between type of employee (academic versus nonacademic). Thus the data collected in the Personnel Data Module (PDM) step of the study were used to determine academic salaries and staff salaries were forced to be the remaining amount shown in the Comptroller's file. However, the PDM is based on a "snapshot" of academic-staff activity (and salaries); therefore neither

the academic salaries nor the residual staff salaries are exact. Furthermore, the fund codes maintained in the faculty-activity survey do not match exactly to those in the financial statements. This accounts for the reconciliation between these two data systems noted in the reconciliation tables (tables 5A.2, 5A.3, and 5A.4). Neither of the two difficulties noted above should create any significant distortions in the ACM data.

Fringe Benefits

Two major types of fringe benefits are included in the financial statements:

1. Retirement contributions (employer)
2. Imputed value of tuition and fee waivers

However, these benefits are reported as lump sums for each campus, rather than being associated with the individuals receiving the benefits of their specific departments (accounts). In addition, there are other fringe benefits that never appear in the financial statements, most notably the State of Illinois payments for health, dependent, and life insurance. In order to overcome these problems, the retirement and tuition fee waivers were eliminated from the Comptroller's File, and factors were applied (which depended upon fund and type of employee) to the academic and nonacademic fringe benefits, which now include retirement, tuition/fee waivers, and the fringe benefits not included in the financial statements. This procedure could introduce the following error in these values. No attempt was made to estimate the distribution of graduate-assistant salaries by account, since these data no longer exist after the PDM.

TABLE 5A.2

University of Illinois
1975-76 NCHEMS MRU Cost Study
Reconciliation of Financial Statements
Urbana-Champaign Campus

	Unrestricted		Restricted		Total
	State Appropriations	Other			
1. Expenditures from Financial Statement	$132,515,693	$51,584,591	$58,057,280		$242,157,564
	General	Restricted	ICR	Auxiliary	Total
2. Expenditures Mapped to MRU Funds	$132,515,693	$58,057,280	$8,412,595	$43,171,996	$242,157,564
3. Imputed Value of Fringe Benefits Not Included in Financial Statements	3,018,104	--	--	--	3,018,104
4. Adjustments for Differences between Financial Statements and Faculty Activity Reports	(228,059)	201,369	22,506	4,184	--
5. Urbana-Champaign General Ledger Sent to A.C.M.	$132,305,738	$58,258,649	$8,435,101	$43,176,180	$242,175,668

TABLE 5A.3

University of Illinois
1975-76 NCHEMS MRU Cost Study
Reconciliation of Financial Statements
General University

	Unrestricted		Restricted		
	State Appropriations	Other			Total
1. Expenditures from Financial Statement	$10,734,034	$5,292,367	$1,310,926		$17,337,321
	General	Restricted	ICR	Auxiliary	Total
2. Expenditures Mapped to MRU Funds	$10,734,034	$1,310,926	$1,457,024	$3,835,342	$17,337,326
3. Expenditures Excluded for General University Teaching, Research and Service Departments	(1,276,041)	(1,165,569)	(44,527)	(3,834,751)	(6,320,888)
4. Imputed Fringe Benefits not Reported in Financial Statements	517,868	--	--	--	517,868
5. Adjustments for Differences between Financial Statements and Faculty Activity Survey	(8,858)	3,409	5,449	--	--
6. General University General Ledger Sent to A.C.M.	$ 9,967,003	$ 148,766	$1,417,946	$ 591	$11,534,306

TABLE 5A.4

University of Illinois
1975-76 NCHEMS MRU Cost Study
Reconciliation of Financial Statements

	General	Restricted	ICR	Auxiliary	Total
1. Champaign-Urbana Expenditures Sent to A.C.M.	$135,305,738	$58,258,649	$8,435,101	$43,176,180	$245,175,668
2. General University Expenditures Sent to A.C.M.	9,967,003	148,766	1,417,946	591	11,534,306
3. Total Expenditures Sent to A.C.M.	145,272,741	58,407,415	9,853,047	43,176,771	256,709,974
4. Rounding in A.C.M.	(995)	(151)	(13)	(3)	(1,162)
5. Expenditures Distributed in A.C.M.	145,271,746	58,407,264	9,853,034	43,176,768	256,708,812
6. General University Overheads Allocated to 9.9 in A.C.M.[a]	(4,366,596)	(66,337)	(640,332)	(75)	(5,073,340)
7. Net Expenditures Distributed to Urbana-Champaign by A.C.M.	$140,905,150	$58,340,927	$9,212,702	$43,176,693	$251,635,472

[a] 9.9 is a holding account for general university overheads allocated to the other University of Illinois campuses. This account will be eliminated for the MRU cost study of Champaign-Urbana.

Graduate assistants do not qualify for retirement contributions; however, they represent the major portion of tuition/fee waivers. To the extent that these two factors do not counterbalance each other, those accounts with greater/lesser actual graduate-assistant salaries than average will receive disproportionate shares of fringe benefits. Once again, this should not result in major distortions of the ACM data and probably even lesser distortions after the allocation of overheads, since the primary initial distortions will be between the academic units (relatively heavy users of graduate assistants) and the support units, rather than between the academic units themselves.

Treatment of the General University Administration

The University of Illinois is a multi-campus system (Chicago Circle, Medical Center, Urbana-Champaign) with a central administrative unit called the General University Administration (GUA). The GUA houses three types of activities:

1. Certain University-wide instruction, research, and public service units
2. The president and other central officers and their staffs
3. University-wide administrative-support functions, especially business and financial affairs and administrative data processing.

The first of these, the instruction, research, and public service units, were eliminated from the General Ledger File as being a type of fourth "campus." The total expenditures for the remaining accounts were included in the General Ledger File (plus the additional fringe benefits for these units) sent to ACM. However, in ACM a pro rata share of these expenditures (based upon the expenditures at Chicago Circle, the Medical Center, and the GUA "campus" units) was distributed to an artificial holding account 9.9, which will not be costed

back against the Urbana-Champaign campus. The remaining expenditures were distributed to the appropriate X.Y activities as if they were expenditures of the Urbana-Champaign campus. The results of this procedure are documented in the reconciliation tables.

Indirect Cost Recovery

The University of Illinois budgets and reports expenditures of Indirect Cost Recovery (ICR) funds by organizational unit as separate funds from the general appropriated funds (state general revenue funds and tuition income). A general formula is used to allocate ICR funds to the General University, the campus that generated the funds, and the college and department that generated the funds generated meaning where the research contract was housed. The campus administration, in turn, budgets its share to various campuswide units (O & M Physical Plant, Library). The percentage allocation of ICR funds to the various academic and support units in fiscal 1976 did not correspond in any one-to-one relationship with the formula negotiated to produce the ICR add-on to research contracts. The differences between the formula and the actual pattern of expenditures are summarized in table 5A.5. While some of these differences (especially Academic Units and O & M Physical Plant) are fairly large in absolute dollars or as a percentage of ICR expenditures, O & M Physical Plant is the only area where there is a major difference when viewed in the perspective of total expenditures, and, even this difference (7.78 percent) is not of an overwhelming magnitude.

One additional convention should be noted with respect to ICR funds. The faculty activities in the PDM were used to spread the expenditures in the General Ledger File to the Program Classification Structure (PCS) for the academic

TABLE 5A.5

UNIVERSITY OF ILLINOIS
INDIRECT COST RECOVERY
DIFFERENCES BETWEEN EXPENDITURE PATTERNS
AND NEGOTIATED AMOUNTS

	Actual ICR Expenditures	Negotiated ICR Formula	Differences	Differences as a % of ICR Expenditures	Total Expenditures	Differences as a % of Total Expenditures
Academic Units 1.X, 2.X 3.X and 4.X excluding Library (4.1)	$4,902,091	$4,098,731	803,360	16.39	$159,754,713	.50
Library	485,598	479,982	5,616	1.16	7,219,872	.08
Student Services and Student Aid (5.X, 8.X)	555,958	232,160	323,798	58.24	44,761,309	.72
Administrative Units (6.1-6.4, 6.7, 6.8)	1,609,250	1,323,865	285,385	17.73	13,576,457	2.10
O & M Physical Plant (6.5)	1,659,804	3,077,963	(1,418,159)	(85.44)	18,235,621	(7.78)
Total	$9,212,701	$9,212,701	-0-		$243,547,972	

units. In some cases, a particular academic unit may have used all of its ICR funds for nonacademic salaries or supplies and expenses. Hence, no PDM records existed to use as a basis for proration of the expenditures. Whenever this occurred in an academic unit, the ICR expenditures were assigned arbitrarily to a psuedo-PCS category--2.4--with the intention of allocating 2.4 to 2.1 and 2.2 in the next phase of the IEP project.

UNIVERSITY OF KANSAS

Protocol Statement

Step 5

Account Crossover Module (ACM) Development

The development of the Account Crossover Module at the University of Kansas utilized the Annual Financial Report for FY 1976, the year-to-date payroll tape, and a tape of other operating expenditures by account, by object, and by fund. Specific focus was on operating expenditures and research grants. Entries in the financial reports, onto which the Program Classification Structure (PCS) had been mapped previously, were identified by a unique account code. This code facilitated the distribution of accounts to appropriate PCS categories.

Major adjustments to the ACM included:

1. Exclusion of the University Medical Center accounts
2. Allocation of accounts for summer school, visiting, university and distinguished professors to the respective instructional departments
3. Assignments of training grants to a PCS of 1.6 and the appropriate four-digit HEGIS number.
4. Assignment of general, federal, and private research grants to four-digit HEGIS categories within 2.0 .

The University payroll tape, which contains both salary and fringe-benefit information, and the University general-ledger tape, which contains other operating expenditures (supplies and expenses) provided the data that were included in ACM.

All expenditures were coded by object-of-expenditure or job codes that allowed expenditures to be assigned to the agreed-upon expenditure categories. Furthermore, all expenditures were coded by source of funds--general, restricted, ICR, or auxiliary.

Fringe Benefits

All fringe benefits were paid by the University and were recorded in departmental accounts according to actual expenses.

Indirect Cost Recovery Funds

ICR funds were not necessarily allocated according to the pattern in which the overhead rate was determined. Funds were treated similarly to general funds, but some effort was made to support those activities contributing to the overhead rate.

Central Administration

While the Chancellor and part of his staff are funded entirely from the Lawrence campus, no allocation of these expenses was made to the Medical Center.

TABLE 5A.6

UNIVERSITY OF KANSAS

RECONCILIATION STATEMENT

FY 1976

Total Operating Expenses	$ 72,597,238.80
Less:	
Auxiliary Enterprises	5,577,629.33
Local Administered Scholarships	112,743.50
Remission of Fees	266,252.00
Service Clearing Work Study Wages	33,836.19
Accts. w/o department numbers	3,000.00
Adjusted Operating Expenditures	$ 66,603,777.78
Operating Expenditures Accounts	
Salary Differences (FY 1976 Financial Statement less ACM Crossfile Records)	$ 1,407,524.81
Less:	
#2942 - Named Professors	172,496.82
#2914 - Distinguished Professors	55,101.49
#2540 - Summer Session	950,541.37
#2176 - Theatre	157,508.87
Net Salary Difference	$ 71,876.26

Adjusted Operating Expenditures plus Net Salary Difference = $66,675,654.04

Adjusted Operating Expenditures + Net Salary Difference	$ 66,675,654.04
Plus:	
Bookkeeping Accounts	10,060,431.95
Capital Improvements	1,300,372.91
Basic Educational Opportunity Grants	752,882.50
Residence Halls	5,577,094.33
Service Clearing	3,297,978.65
Capital Construction	6,341,416.76
Miscellaneous Student Senate	627.45
Miscellaneous Accounts	4,434.53
	94,010,893.12
Less: ACM Cross Record Amount	94,009,229.71
Net Difference between Financial Statement and ACM	$ 1,663.41

PURDUE UNIVERSITY

Protocol Statement

Step 5

I. Preparation of General Ledger

The construction of the General Ledger used in the cost study took place in two phases. Phase I reconciled the cost-study general-ledger expenditure totals with the University's financial report, Statement of Current Expenditures (schedule II). Phase 2 involved a series of adjustments necessary to comply with the guidelines outlined by the study group.

Reconciliation

Reconciliation of the General Ledger to the University's financial report was necessary because of manual entries made to the financial-report file at year-end after the accounting file was created. The reconciliation entries brought into balance expenditures by current unrestricted, restricted, and auxiliary fund groups.

Adjustments

A. Fee Remissions

Fee remissions are shown as a reduction of revenue in Purdue's financial report; therefore they were added to the General Ledger expenditure file to conform to the account-crossover guidelines. Remitted graduate-student and staff fees were obtained from bursar records and charged to the department accounts supporting the staff.

B. Imputed Fringe Benefits

Payments made by the State of Indiana for clerical and service employees' social security and public-employee retirement were included in the department accounts supporting the employees. Imputed staff-benefit records were obtained from a University Contract Administration Office document entitled "Survey of PERF Participants."

C. Transfers

Mandatory and monmandatory transfers among fund groups were analyzed and adjusted to insure that expenditures were recorded in the proper fund category. This review of transfers made during the year helps to avoid overstating or understating student program costs.

D. Reallocation of Regional Campus Administration Account

Expenditures from the central regional campus-administration account were allocated to Purdue's three regional campuses based on gross expenditures, and the central account was closed out.

E. Indirect Cost Recovery (ICR)

The distribution of income received to offset the indirect costs associated with sponsored research, service agreements, and work-study administration was made based upon how Purdue's indirect cost rate was determined. The effect of the distribution was to reduce unrestricted current fund expenditures in various support areas, such as Physical Plant, Library, and General Administrative services, and shift them to an ICR fund group.

II. Preparation of Account Crossover Module

A. Personnel Data Module (PDM) Produced Crossover Instructions

The majority of academic accounts were crossed over to activity centers via the PDM. The only cost components to be crossed over to respective course levels were academic salaries and academic fringe benefits. The other cost components within the academic accounts were crossed over in lump sum to the major PCS and HEGIS code for academic departments. A special Data Management Module (DMM) program developed by Indiana University will be used to crossover the lump sum in these components to the proper course level within the 1.0 area.

B. Crossover of Other Accounts

1. Crossover of specific funds--All funds that could be crossed over to specific PCS categories were machine created via a program written for use in preparing the state study. For example, all sponsored research funds (50-63, 68 in Purdue's accounting system) were automatically crossed to 2.2.

2. Crossover of unrestricted accounts not included in PDM--Accounts not crossed over in the PDM were assigned manually to the proper activity centers.

C. Creation of Parameter Identifier Names

Parameter identifier names (PID names) were attached to each crossover record via a program written at Purdue. Fund numbers and detail class dictated the PID name associated with each crossover record.

III. Problems Associated with Creation of Account Crossover

A. Assignment of Costs to Fringe Benefit PIDs

In Purdue's accounting system, fringe benefits are recorded regardless of staff classification. Therefore it was difficult to separate faculty fringe benefits and staff fringe benefits. The PDM update CROS-FILE feature was used to adjust several fringe benefits from the general ledger total. Unfortunately, for many academic accounts, this PDM feature could not be used; therefore all fringe benefits in those accounts were assigned to the staff fringe-benefit parameter. The use of the ARTH feature in the PDM will be used to assign dollars to the academic fringe-benefit PID based on an average fringe-benefit percentage for faculty staff.

B. Distribution of Costs to Course Levels within 1.0. Category

Several faculty activities included in Purdue's PDM cannot be directly associated with course levels and are therefore only assigned to the 1.1. PCS and HEGIS category. Teaching support, counseling, and departmental administration are examples of these activities. Distribution of costs assigned only to an instructional cost center to the proper course levels will be assigned in the DMM using the Indiana University allocation program.

TABLE 5A.7

March 1978

PURDUE UNIVERSITY
1975-76 MRU Cost Study
Reconciliation

Campus: West Lafayette	Unrestricted Fund	ICR Fund	Restricted Fund	Auxiliary Fund	Total All Funds
I. Financial Report Expenditures	91,985,150		51,826,472	23,130,936	166,942,558
II. Expenditure Adjustments					
A. Fee Remissions					
1. Staff and Graduate Assistants	4,298,878		-	-	4,298,878
2. Institutional and Statutory	1,484,781		-	-	1,484,781
Total Fee Remissions	5,783,659				5,783,659
B. Imputed Fringe Benefits	2,653,376		-	-	2,653,376
C. Transfers	2,425,725		(1,077,454)	4,398,696	5,746,967
D. Regional Campus Admin. (23 Fund) Elimination	(20,786)		-	-	(20,786)
E. Indirect Cost Recovery	(6,823,534)	6,823,534	-	-	-0-
Subtotal - Expenditure Adjustments	4,018,440	6,823,534	(1,077,454)	4,398,696	14,163,216
III. Gross Adjusted Financial Report Expenditure	96,003,590	6,823,534	50,749,018	27,529,632	181,105,774

5.49

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

Protocol Statement

Step 5

Account Crossover Module (ACM) generation at Stony Brook was for the most part a straight-forward and interesting but time-consuming exercise. The first objective was to identify and eliminate Health Sciences and Summer School accounts from the general ledger in all fund groups to assure consistency with earlier Student Data Modules (SDM) and Personnel Data Modules (PDM). The second objective was to pursue a study of the remaining accounts in the General Fund group included in the ACM that serve the health-sciences and residence operations as well as the Main Campus. Many accounts in Student Services, Maintenance and Operations (M & O), General Administration (GA), General Instructional Support (GIS), and Auxiliary incur costs relating in part to the Health Sciences and Residence functions. These accounts were not prorated in our regular accounting ledgers during 1975-76, but more recent procedures on campus reflect distributions of these accounts to Main Campus, Health Sciences, and Residence Operations. The same principles of cost sharing were employed in the ACM modules based on 1975-76 data and using various parameters such as FTE, student headcount, OGSF, employees, expenditures, and such. The portion of expenditures distributed to the Health Sciences was subsequently removed from the ledgers and not included in the ACM. Portions attributed to Residence Operations were crossed over to PCS 5.5 of the Program Classification Structure (PCS).

Residence and Student Health functions classified in the General Fund group were transferred to Auxiliary in accordance with MRU conventions.

Preparation of the Account Crossover Module

Most General Fund academic accounts were crossed over to the ACM directly in accordance with the previous PDM process. Certain nonacademic accounts were rescaled in the PDM to prevent the total expenditures of the account from flowing to Instruction (1.0). In the rescale process, only a portion of salaries was crossed over to Instruction. The balance of the account was crossed to the appropriate noninstructional PCS category. In cases of academic accounts, total expenditures, including nonacademic salaries, fringe benefits, supplies and equipment, and recharges, were crossed over to activity centers in the same proportions as faculty contact hours reported in the PDM. A small number of General Fund academic accounts not crossed by the PDM were crossed manually in the ACM. The PCS and HEGIS codes and level were assigned in accordance with the mission that the account served within the University. General Fund nonacademic accounts, Restricted, ICR, and Auxiliary accounts were crossed over manually in the ACM in in accordance with the guidelines found in the NCHEMS IEP Activity Structure (Technical Report 63).

General Funds

The preparation of the ledger for the General Fund expenditures was accomplished in two phases.

Phase I

Individual year-end (March 31, 1976) PSR regular employee records, academic and nonacademic, were received from SUNY Central and summarized by account number. Programs then calculated fringe-benefit costs on each individual,

based on salary and employee selections of health insurance, retirement, and other benefits, and summarized these costs by account numbers. This created four of the five categories of expenditures for MRU.

Other expenditures were then added to the academic and nonacademic categories. Stony Brook accounting expenditure reports by account number were used in the process. The categories are as follows:

a. Temporary service personnel salaries were included in the appropriate category by account number. (Fringe benefits were not calculated or included in MRU.)

b. College Work Study expenditures--state and federal portions included as nonacademic salary by account number.

c1. Tuition waivers/fee remissions--waivers of all state-funded graduate students were included as fringe benefits per MRU guidelines. Individual FUND records were generated based on FTE as follows:

	Waiver $[5]	FTE
1/2 time	$ 675	.12-.13
3/4 time	1,015	.18-.19
Full time	1,350	.25

Waivers of other employees not included as data were not readily available by account number.

c2. Tuition waivers/fee remissions of all research--graduate students supported by restricted funds were also included in the same manner. However, the expense is carried as an unrestricted state expense in keeping with MRU guidelines.

[5]Mid-point between in-state and out-of-state tuition charges.

Phase II

Supplies and Expenses

Stony Brook accounting expenditure reports were used to cost this category. Individual categories of supply and equipment expenses as well as individual categories of recharges (except computing services) were obtained by account number from this source. Computing-services expenditures were then obtained from the Computer Center, whose records displayed the total annual expenditures charged back to all user departments--both instructional and administrative. These two sources then provided supplies and equipment, recharge, and computing expenditures by account number.

ICR

Indirect cost recoveries (ICR) are generated by the campus-sponsored research efforts administered through the Research Foundation of SUNY. All ICR is therefore accumulated by the Central Office with only a minor portion reverting to the campus for administering the fiscal and logistical operation of those programs.

For the purpose of MRU, all ICR funds were used to replace state appropriations in the same functions and proportions as they were generated. An example is the distribution of the departmental administration portion of ICR to the academic departments by their relative ratio of sponsored research activity. State-funded expenditures were therefore reflected net of Stony Brook's contribution of ICR monies to the State of New York.

Restricted

The preparation of the general ledger for this fund group was relatively straightforward for Stony Brook. This group consists solely of dollars funded through the Research Foundation of SUNY. Year-end (March 31, 1976) expenditures were provided to us by the Foundation on computer tape by account number. Fringe benefits were included but not by the breakdown of Academic/Nonacademic. Additional effort was required to obtain this breakdown accurately in keeping with the requirements of MRU.

The account numbers contain codes that reveal the intention of the grant; whether instructional, research, and such and the PCS category was assigned in accordance with these codes. For those expenditures crossed to PCS category 1.0, course level was further studied and then appropriately assigned.

Auxiliary

Auxiliary expenditures included those funds other than the general state funds and funds channeled through the Research Foundation. They were classified as unrestricted and restricted in our annual report but were included as Auxiliary in the ACM. Residence and Student Health functions classified in the General Fund group were transferred to Auxiliary in accordance with MRU conventions. Included also in this category were the Stony Brook Foundation, Faculty Student Association, fellowships and scholarships such as BEOG and SEOG, and the law-enforcement program. Costs of goods for sale were also included in the PCS category 9.1 in accordance with MRU conventions. Other scholarship programs such as the state and federal portion of the Educational Opportunity Program were included in the General Fund unrestricted category.

Other

The expense of SUNY Central lodged against the Stony Brook campus was included in the General Fund PCS category 6.9. The Health Science Center (HSC) component was not included.

The expense of the SUNY Research Foundation lodged against the Stony Brook campus was included in the Restricted PCS category 6.9. The HSC component was not included.

TABLE 5A.8

State University of New York at Stony Brook
1975-76 MRU Cost-Study Reconciliation

2/21/78
3/15/78 revised

	General Funds	ICR Funds	Restricted Funds	Auxiliary Funds	Total
Financial Report Expenditures	$79,621,110	$	$13,524,412	$	$93,145,522
Expenditure Adjustments					
Transfers:					
A. ICR Offset of State Appropriations	(1,708,376)	1,708,376			-
B. Reclassification of Campus Research Administration Costs	(459,902)		459,902		-
C. Reclassification of the Stony Brook Foundation	(107,971)		(331,385)	438,356	-
D. Reclassification of the Faculty Student Association	(1,527,086)			1,527,086	-
E. Reclassification of Stu Health & Residence Operations	(5,967,202)			5,967,202	
Additions:					
A. S.U.N.Y. Central Expenditures	656,410				656,410
B. Research Foundation Central Expenditures			491,816		491,816
C. Financial Aid Programs	432,407			810,331	1,242,738
D. Student Government Organization				869,270	869,270
E. College Work Study Program (Federal Share)	488,761				488,761
F. Fee Remissions:					
1. State Funded Students	1,118,138				1,118,138
2. Research Funded Students	319,275				319,275
Deductions:					
A. Indirect Costs Shown as Expenditures on Financial Reports			(2,234,833		(2,234,833)
B. Fringe Benefit Rate Adjustment (Est. vs. Actual) & HSC	(6,888,082)				(6,888,082)
C. Summer Session	(230,019)				(230,019)
D. Income Fund Reimbursable Accounts (Costs Inc. Elsewhere)	(810,203)				(810,203)
E. Health Science Center Costs Excluded:					
1. Stony Brook Foundation Restricted Accounts				(95,422)	(95,422)
2. Campus Research Administration Costs			(166,961)		(166,961)
3. Sponsored Research			(3,992,273)		(3,992,273)
4. Allocation of Campus Costs to HSC for Student Services, G.A., G.I.S., M&O, and Residence Halls	(4,591,000)				(4,591,000)
5. Income Fund Reimbursable Accounts	(389,078)				(389,078)
6. State Funded H.S.C. Expenditures	(11,838,295)				(11,838,295)
MRU Expenditures	$48,118,887	$1,708,376	$7,750,678	$9,517,823	$67,095,764

UNIVERSITY OF WASHINGTON

Protocol Statement

Step 5

1. Expenditure records were extracted from the Financial Accounting System (FAS) history files. This provided detail at the object-of-expenditure level.

2. Accounts for the Joint Graduate Center at Richland, Washington, were bypassed.

   Staff benefits were bypassed based on object-of-expenditure code. These were added to the MRU-IEP files as a percentage of salary. The main reason for this approach was that fringe benefits could be matched to an academic department and consequently a HEGIS code.

3. The detail reports that are used to prepare the financial statement were studied, and a reconciliation program was written. This program read the extracted expenditure file (input to the Account Crossover Matrix (ACM) and summarized the known differences by category and fund source.

4. The expenditure file (input GENL-FILE) was partitioned into three separate files. These were (1) academic salaries, (2) staff salaries, and (3) supplies and expenses. Six crossover runs were made against each partition and the results merged. Four of these runs used manually prepared crossover commands; the other two used slightly modified Personnel Data Module files.

5. The FAS expenditure records contain a three-digit fund code. A conversion table was included in our extract program. This table has an error (see table 5A.9, row 7). This relates to the difference in fund source between our MRU-IEP cost study and the Financial Statement (see table 5A.9, row 8). The Financial Statement classified source of funds by budget number, which reflects how funds were budgeted. Our method should reflect more closely how the money was actually spent.

6. The object-of-expenditure code was extracted from the accounting system.

TABLE 5A.9

9/21/78

UNIVERSITY OF WASHINGTON

1975-76 MRU-IEP COST STUDY

RECONCILIATION

	GEN	AUX	RES	TOTAL
1. Reported in MRU-IEP	118,801,330	24,618,722	90,148,076	233,568,128
2. Inputed Fringe Benefits	(11,882,536)	(3,151,418)	(6,102,012)	(21,135,966)
3. Uncrossed	1,592,174	(154,126)	675,309	2,113,357
4. Total (Input to ACM)	108,510,968	21,313,178	84,721,373	214,545,519
5. Joint Grad Center (bypassed)	-0-	85,081	837,181	922,262
6. Fringe Benefits (bypassed)	13,406,757	2,916,551	5,707,191	22,030,499
7. Extract Program Error	-0-	-0-	-0-	-0-
8. Fund Code Definition				
a. GEN	11,000,223	(10,405,623)	(594,600)	-0-
b. AUX	(69,211)	69,211	-0-	-0-
9. TOTAL	132,848,737	13,978,397	90,671,145	237,498,279
10. Financial Statement	131,824,136	14,365,585	90,054,577	236,244,298
11. Difference (unreconciled)	1,024,601	(387,188)	616,568	1,253,981

5.61

STEP 6

TOPIC: Calculation and analysis of direct unit costs for academic disciplines and student programs.

OBJECTIVE: To aid the institutions in the calculation of direct unit costs and to assist the study group in making comparisons of their direct-unit-cost data.

GENERAL IEP PROCEDURES: A unit cost is simply the cost of an activity or service divided by the number of units of that activity or service produced within a given time period. The purpose of expressing costs in terms of units of activity is to facilitate comparisons--with a predetermined cost, a cost of past activities, or the cost of a similar unit of activity in another organization. In this study, the agreed-upon unit of activity for instruction was the semester credit hour, except for the doctoral dissertation where each enrollment was initially counted as a single unit. Steps 1 and 2 facilitated the collection and analysis of the credit-hour information, that is, the denominator of the unit-cost equation; steps 3, 4, and 5 were concerned with the collection and analysis of the cost data or the numerator of the equation. Step 6 was the first attempt to merge these data files and, as a result, produce unit-cost data for each of the

two-digit HEGIS discipline categories and for each of the course levels within those HEGIS discipline categories. Likewise, through the use of the Instructional Work Load Matrix produced in step 2, modified direct unit costs were produced for each student program and each student level within those student programs. Specific instructions for computing direct instructional unit costs can be found on pages 2.39 through 2.42 of the second edition of Technical Report 65.

ADDITIONAL MRU PROCEDURES:

The pilot-test institutions requested that their modified direct unit cost (MDUC) be displayed by academic discipline and course level, by student program and student level, and by FTE student by student level. In order to produce the latter display, a common definition of FTE student was needed; for the purposes of the pilot test, the following full-time equivalencies were used:

- 30 student credit hours for lower division, upper division, and first professional
- 24 SCH for graduate I
- 18 SCH for graduate II

Doctoral-dissertation units were merged into the graduate II definition by equating each dissertation enrollment to nine student credit hours at the graduate II level. This, in effect, equated two

semesters work on the dissertation to a full-time graduate II workload.

COLLECTION TIME PERIOD: No new data were collected in this step.

ANALYSIS OF THE DATA: Several questions were addressed in this phase of the study dealing with modified direct unit costs. These questions were concerned with whether and by how much unit costs varied across institutions, across course levels, across student levels, across two-digit HEGIS disciplines, and across two-digit HEGIS student programs.

The first step in the analytical procedure was to produce tables 6.1 and 6.2, which highlight institutional differences and similarities by course level and student level. Means were computed for the six institutions as well as a cost range indicating the difference between the low and the high values. In addition, ratios were calculated for each course and student level using lower-division unit costs as the base within each institution. Several general observations can be made by examining the data in these two tables.

- As course level increased, variability among institutions increased. Thus undergraduate discipline unit costs differed from the mean by no more than 21 percent, while at the graduate level, variations from the average as wide as 65 percent were observed. Viewed

TABLE 6.1

COMPARISON OF DISCIPLINE UNIT COSTS BY INSTITUTION AND COURSE LEVEL

Based on Modified Direct Costs (Gen+ICR Funds)

Course Level	Institution[a]						Mean	Low Value	High Value	Range (High-Low)
	A	B	C	D	E	F				
Lower division	$ 30	$ 33	$ 25	$ 31	$ 23	$ 34	$ 29	$ 23	$ 34	$ 11
% of the mean	*103%*	*114%*	*86%*	*107%*	*79%*	*117%*	*100%*	*79%*	*117%*	*38%*
Base factor	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*			
Upper division	$ 50	$ 50	$ 60	$ 63	$ 44	$ 53	$ 53	$ 44	$ 63	$ 19
% of the mean	*94%*	*94%*	*113%*	*119%*	*83%*	*100%*	*100%*	*83%*	*119%*	*36%*
Ratio to base	*1.7*	*1.5*	*2.4*	*2.0*	*1.9*	*1.6*	*1.8*			
Graduate I	$ 70	$173	$106	$ 81	$ 95	$106	$105	$ 70	$173	$103
% of the mean	*67%*	*165%*	*101%*	*77%*	*90%*	*101%*	*100%*	*67%*	*165%*	*98%*
Ratio of base	*2.3*	*5.2*	*4.2*	*2.6*	*4.1*	*3.1*	*3.6*			
Graduate II	$105	$196	$137	$176	$115	$116	$141	$105	$196	$ 91
% of the mean	*74%*	*139%*	*97%*	*125%*	*82%*	*82%*	*100%*	*74%*	*139%*	*65%*
Ratio to base	*3.5*	*5.9*	*5.5*	*5.7*	*5.0*	*3.4*	*4.9*			
Dissertation	$ 56	$130	$ 98	$192	$134	$168	$130	$ 56	$192	$136
% of the mean	*43%*	*100%*	*75%*	*148%*	*103%*	*129%*	*100%*	*43%*	*148%*	*105%*
Ratio to base	*1.9*	*3.9*	*3.9*	*6.2*	*5.8*	*4.9*	*4.5*			
All grad. levels	$ 76	$165	$107	$123	$107	$122	$117	$ 76	$165	$ 89
% of the mean	*65%*	*141%*	*91%*	*105%*	*91%*	*104%*	*100%*	*65%*	*141%*	*76%*
Ratio to base	*2.5*	*5.0*	*4.3*	*4.0*	*4.7*	*3.6*	*4.0*			

Note: Health-professions data have been excluded.

[a]Because of the confidentiality of the data in step 6, institutional names have been replaced with an institutional code.

TABLE 6.2

COMPARISON OF STUDENT PROGRAM UNIT COSTS BY INSTITUTION AND STUDENT LEVEL

Based on Modified Direct Costs (Gen+ICR Funds)

Student Level[a]	Institution						Mean	Low Value	High Value	Range (High-Low)
	A	B	C	D	E	F				
Lower division	$ 33	$ 37	$ 31	$ 38	$ 23	$ 36	$ 33	$ 23	$ 38	$ 15
% of the mean	*100%*	*112%*	*94%*	*115%*	*70%*	*109%*	*100%*	*70%*	*115%*	*45%*
Base factor	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*			
Upper division	$ 45	$ 52	$ 50	$ 53	$ 39	$ 50	$ 48	$ 39	$ 53	$ 14
% of the mean	*94%*	*108%*	*104%*	*110%*	*81%*	*104%*	*100%*	*81%*	*110%*	*29%*
Ratio to base	*1.4*	*1.4*	*1.6*	*1.4*	*1.7*	*1.4*	*1.5*			
Master's	$ 69	$143	$101	$ 90	$ 82	$100	$ 98	$ 69	$143	$ 74
% of the mean	*70%*	*146%*	*103%*	*92%*	*84%*	*102%*	*100%*	*70%*	*146%*	*76%*
Ratio to base	*2.1*	*3.9*	*3.3*	*2.4*	*3.6*	*2.8*	*3.0*			
Doctoral	$ 68	$153	$ 86	$164	$119	$132	$120	$ 68	$164	$ 96
% of the mean	*57%*	*128%*	*72%*	*137%*	*99%*	*110%*	*100%*	*57%*	*137%*	*80%*
Ratio to base	*2.1*	*4.1*	*2.8*	*4.3*	*5.2*	*3.7*	*3.6*			

Note: Health-professions data have been excluded.

[a]First-professional program data have been excluded because of insufficient data.

another way, lower- and upper-division costs had ranges of only $11 and $19 respectively across all institutions, while at the graduate level differences between institutions averaged $91 or more.

- Generally, rankings across institutions from lowest to highest were the same or within one or two ranks of each other using either program or discipline unit costs.
- Student-program and discipline-unit costs were both much more stable across institutions at the undergraduate levels than at the graduate level.
- Roughly, over all institutions, upper-division courses cost twice as much per credit hour ($53) and graduate courses cost four times as much ($117) as lower-division course ($29). The corresponding amounts for student programs were: lower division ($33), upper division ($48), master's ($98), and doctoral ($120).
- As course level increased, variation in ratios across institutions increased: for example, the ratios of upper-division to lower-division costs were between 1.5 and 2.4 across institutions, while for dissertation credits, the ratios were between 1.9 and 6.2. There was somewhat less variation in the student program data.

After viewing the data aggregated across disciplines and student programs, the data were exampled by two-digit HEGIS category. Since there were 24 HEGIS categories and 5 course and student levels, the large volume of data made it very difficult to assess similarities and differences. Tables 6.3, 6.4, 6.5, and 6.6 were prepared to highlight discipline and student-program unit-cost comparisons. Eleven discipline and student-program categories were selected

that were common to all six institutions. These common disciplines and programs were then ranked from lowest to highest cost, with 1 denoting the lowest cost and 11 denoting the highest cost. The first table, 6.3, shows the three least expensive disciplines (in terms of modified direct unit costs) by institution and course level. Several discipline similarities in rank ordering are evident across institutions:

- Psychology and social sciences were among the lowest unit-cost disciplines at the undergraduate level for every institution except one.
- At the graduate levels, education was uniformly the least expensive discipline for all institutions except one (one institution did not offer Graduate II-level courses in education).
- At the graduate level, psychology was again among the three least expensive disciplines in 8 of the 12 (two levels by six institutions) possible cells where it could appear.
- Letters was among the three least expensive disciplines in 6 of the 12 graduate level cells.
- In general, the least expensive disciplines were in the social sciences and humanities areas.

In Table 6.4, showing the three highest-cost disciplines by course level, similarities were not quite as striking as in table 6.3, but patterns were still evident:

- At the undergraduate level, fine arts and engineering together accounted for two-thirds of all the entries; physical sciences also appeared frequently.

TABLE 6.3

LOWEST UNIT-COST DISCIPLINES COMMON ACROSS INSTITUTIONS

Based on Modified Direct Costs (Gen+ICR Funds)

Course Level	Rank	Institution A	B	C	D[a]	E	F
Lower division	1	Psychology	Psychology	Math	Engineering	Psychology	Social Sci.
	2	Social Sci.	Math	Psychology	Psychology	Social Sci.	Psychology
	3	Math	Computer Sci.	Social Sci.	Social Sci.	Math	Letters
Upper division	1	Psychology	Psychology	Psychology	Social Sci.	Education	Psychology
	2	Letters	Biology	Social Sci.	Psychology	Social Sci.	Social Sci.
	3	Social Sci.	Computer Sci.	Letters	Letters	Psychology	Biology
Graduate I	1	Education	Education	Education	Education	Education	Education
	2	Psychology	Computer Sci.	Letters	Computer Sci.	Social Sci.	Letters
	3	Letters	Math	Psychology	Psychology	Biology	Psychology
Graduate II	1	Education	Education	Education	Psychology	Education	Engineering
	2	Psychology	Fine Arts	Psychology	Letters	Social Sci.	For. Lang.
	3	Letters	For. Lang.	Letters	Math	Psychology	Education

[a]Institution D did not report cost data at the graduate II level for education and fine-arts courses.

TABLE 6.4

HIGHEST UNIT-COST DISCIPLINES COMMON ACROSS INSTITUTIONS

Based on Modified Direct Costs (Gen+ICR Funds)

Course Level	Rank	Institution A	B	C	D[a]	E	F
Lower division	11	Engineering	Engineering	Engineering	Education	Computer Sci.	Fine Arts
	10	Biology	Fine Arts	Computer Sci.	Computer Sci.	Fine Arts	Engineering
	9	Fine Arts	Letters	Fine Arts	Physical Sci.	Education	Physical Sci.
Upper division	11	For. Lang.	Physical Sci.	Physical Sci.	Math	Math	Physical Sci.
	10	Physical Sci.	Engineering	Engineering	Fine Arts	Fine Arts	Engineering
	9	Fine Arts	For. Lang.	Math	Computer Sci.	Engineering	For. Lang.
Graduate I	11	Math	Psychology	Math	For. Lang.	Physical Sci.	Biology
	10	Physical Sci.	Physical Sci.	Physical Sci.	Biology	Engineering	Physical Sci.
	9	Engineering	For. Lang.	Biology	Fine Arts	Psychology	Computer Sci.
Graduate II	11	Computer Sci.	Math	Computer Sci.	Physical Sci.	Math	Math
	10	Physical Sci.	Biology	Math	Engineering	Letters	Computer Sci.
	9	Math	Physical Sci.	Engineering	Computer Sci.	Biology	Physical Sci.

[a]Institution D did not report cost data at the graduate II level for education and fine arts.

- At the graduate level, physical sciences was among the three most expensive disciplines in three-fourths of the cells.
- In general, the sciences and engineering were the highest unit-cost disciplines across all levels.

This analysis was repeated for student-program data, but the results did not differ significantly from the discipline data and therefore are not reported here.

The next analysis examined the ratios of unit costs across the 11 discipline and student-program categories common to the six institutions. This analysis was conducted separately by course level (lower division, upper division, graduate I, graduate II, and dissertation) and student level (lower division, upper division, master's, doctoral; first-professional program data were excluded because of insufficient data across the program categories). Two examples are included in this report. Table 6.5 displays the discipline ratios for lower-division courses, and table 6.6 contains the student-program ratios for the master's-degree programs. Again, several general observations can be made by examining these data.

- In general, the high-cost disciplines were roughly two and a half to three times more expensive than the low-cost disciplines. This held true generally for all institutions although there were specific instances where an institution reported a discipline cost five or six times the base-figure cost.

TABLE 6.5

RATIOS OF DISCIPLINE COSTS ACROSS COURSE LEVELS

Based on Modified Direct Costs (Gen+ICR)

Course Level: Lower Division

Discipline	Institution A		Institution B		Institution C		Institution D		Institution E		Institution F		Six-Institution Average	
	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]
04 Biology	$ 44	2.2	$ 34	2.1	$ 26	1.9	$ 19	1.6	$ 25	2.5	$ 32	1.9	$ 30	1.9
07 Computer Science	36	1.8	22	1.4	43	3.1	59	4.9	53	5.3	23	1.4	39	2.4
08 Education	20	1.0	41	2.6	34	2.4	76	6.3	29	2.9	35	2.1	39	2.4
09 Engineering	46	2.3	65	4.1	47	3.4	12	1.0	28	2.8	49	2.9	41	2.6
10 Fine Arts	44	2.2	45	2.8	36	2.6	28	2.3	52	5.2	54	3.2	43	2.7
11 Foreign Languages	42	2.1	36	2.3	32	2.3	34	2.8	26	2.6	33	1.9	34	2.1
15 Letters	28	1.4	44	2.8	24	1.7	39	3.3	28	2.8	26	1.5	32	2.0
17 Mathematics	23	1.2	20	1.3	14	1.0	33	2.8	21	2.1	28	1.6	23	1.4
19 Physical Sciences	41	2.1	36	2.3	31	2.2	40	3.3	29	2.9	46	2.7	37	2.3
20 Psychology	21	1.1	16	1.0	14	1.0	15	1.3	10	1.0	18	1.1	16	1.0
22 Social Sciences	22	1.1	22	1.4	18	1.3	18	1.5	14	1.4	17	1.0	19	1.2
Range	$20-46	1.0-2.3	$16-65	1.0-4.1	$14-47	1.0-3.4	$12-76	1.0-6.3	$10-53	1.0-5.3	$17-54	1.0-3.2	$16-43	1.0-2.7

Note: Based on 11 discipline categories common to all six institutions.

[a]Based on the lowest-cost discipline for each institution.

TABLE 6.6

RATIO OF STUDENT PROGRAM COST ACROSS STUDENT LEVELS

Based on Modified Direct Costs (Gen+ICR)

Student Level: Master's

Student Program	Institution A		Institution B		Institution C		Institution D		Institution E		Institution F		Six-Institution Average	
	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]	Unit Cost	Ratio[a]
04 Biology	$118	3.4	$167	1.5	$159	2.3	$125	1.7	$ 83	1.2	$156	2.3	$135	1.9
07 Computer Science	86	2.5	126	1.1	97	1.4	74	1.0	105	1.6	110	1.6	100	1.4
08 Education	35	1.0	111	1.0	68	1.0	--	--	67	1.0	69	1.0	70	1.0
09 Engineering	141	4.0	187	1.7	126	1.9	111	1.5	130	1.9	123	1.8	136	1.9
10 Fine Arts	99	2.8	121	1.1	108	1.6	148	2.0	95	1.4	106	1.5	113	1.6
11 Foreign Languages	100	2.9	168	1.5	103	1.5	157	2.1	100	1.5	100	1.4	121	1.7
15 Letters	79	2.3	158	1.4	80	1.2	88	1.2	128	1.9	94	1.4	105	1.5
17 Mathematics	147	4.2	184	1.7	220	3.2	94	1.3	153	2.3	119	1.7	153	2.2
19 Physical Sciences	202	5.8	248	2.2	176	2.6	161	2.2	132	2.0	200	2.9	187	2.7
20 Psychology	70	2.0	165	1.5	89	1.3	92	1.2	122	1.8	120	1.7	110	1.6
22 Social Sciences	77	2.2	158	1.4	97	1.4	112	1.5	92	1.4	115	1.7	109	1.6
Range	$35-202	1.0-5.8	$111-248	1.0-2.2	$68-220	1.0-3.2	$74-161	1.0-2.2	$67-153	1.0-2.3	$69-200	1.0-2.9	$70-187	1.0-2.7

Note: Based on 11 discipline categories common to all six institutions.

[a]Based on the lowest-cost discipline for each institution.

- The range in the cost ratios increased as course level increased (1.0-2.7 for lower division, 1.0-3.0 for upper division, 1.0-3.3 for graduate I, 1.0-3.2 for graduate II and 1.0-6.9 for dissertation).
- This finding also held true for program costs, but the cost ratios were more tightly clustered, and they did not increase as rapidly as for discipline costs. (The corresponding ratios for program costs were 1.0-1.5 for lower division, 1.0-1.7 for upper division, 1.0-2.7 for master's, and 1.0-2.7 for doctoral.)
- As borne out in the earlier analysis, the rankings of disciplines/student programs were relatively consistent from institution to institution.

The final analysis examined modified direct unit costs in terms of their components--dollars per service month and SCH per service month. Figures similar to figures 6.1, 6.2, and 6.3 were produced for several of the two-digit HEGIS clusters. Engineering is shown as an example. In figure 6.1, unit costs per credit hour are plotted by course level for each of the six institutions. These data show a definite upward trend in cost data as course level increases. The data appear to be relatively stable at the undergraduate levels but fluctuate widely at the graduate levels. In figure 6.2, faculty workloads are examined in terms of SCH per service month. The general pattern of decreasing numbers of SCH per service month is exhibited, although there are fluctuations among institutions. The final figure, which examines expenditures per service month, shows increasing dollars

FIGURE 6.1

MODIFIED DIRECT COST OF DISCIPLINE CREDIT HOURS, GEN/ICR FUNDS

DOLLARS PER CREDIT HOUR BY LEVEL OF COURSE

Engineering (09)

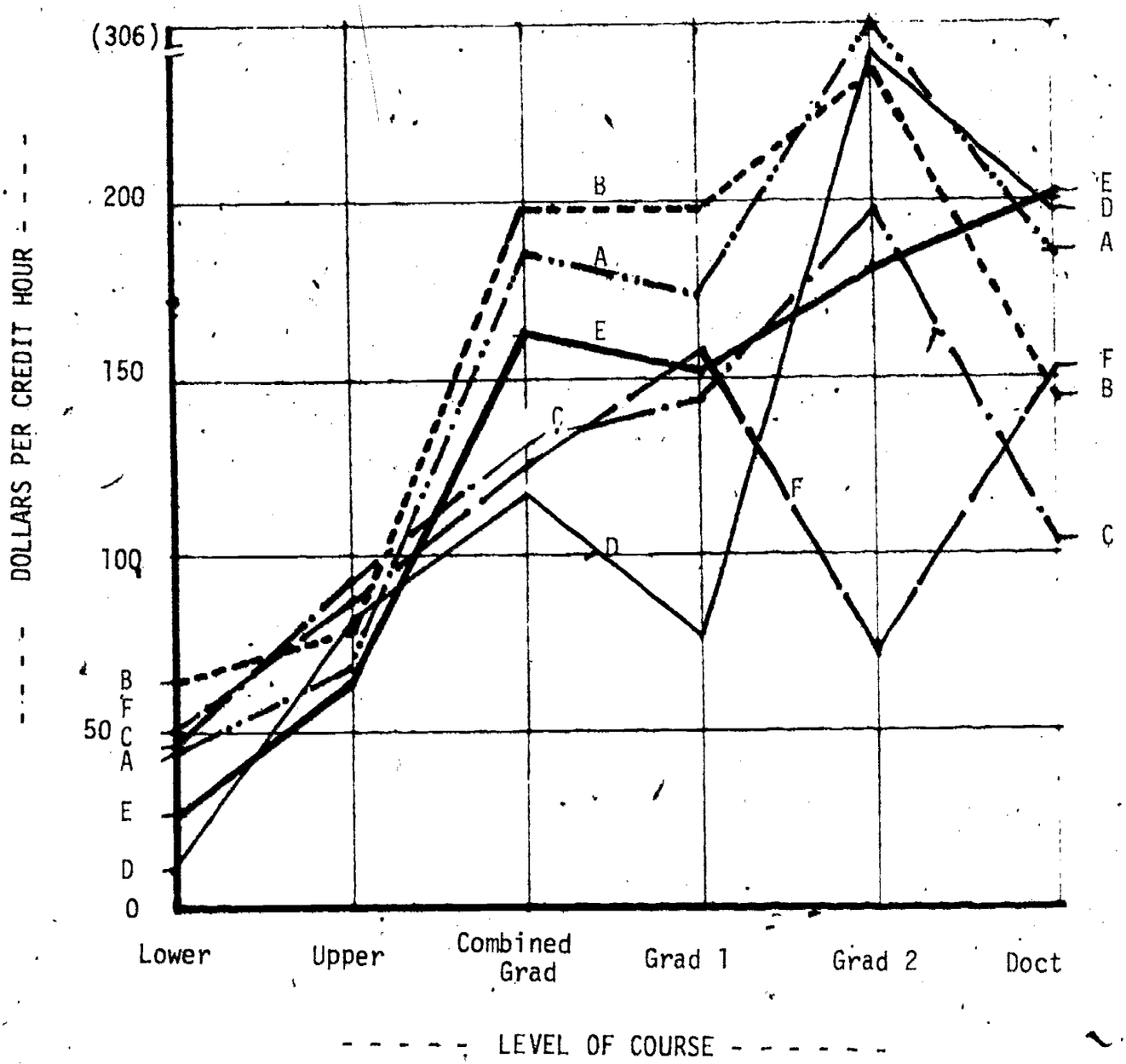


FIGURE 6.2

DISCIPLINE CREDIT HOURS PER SERVICE MONTH BY LEVEL OF COURSE

Engineering (09)

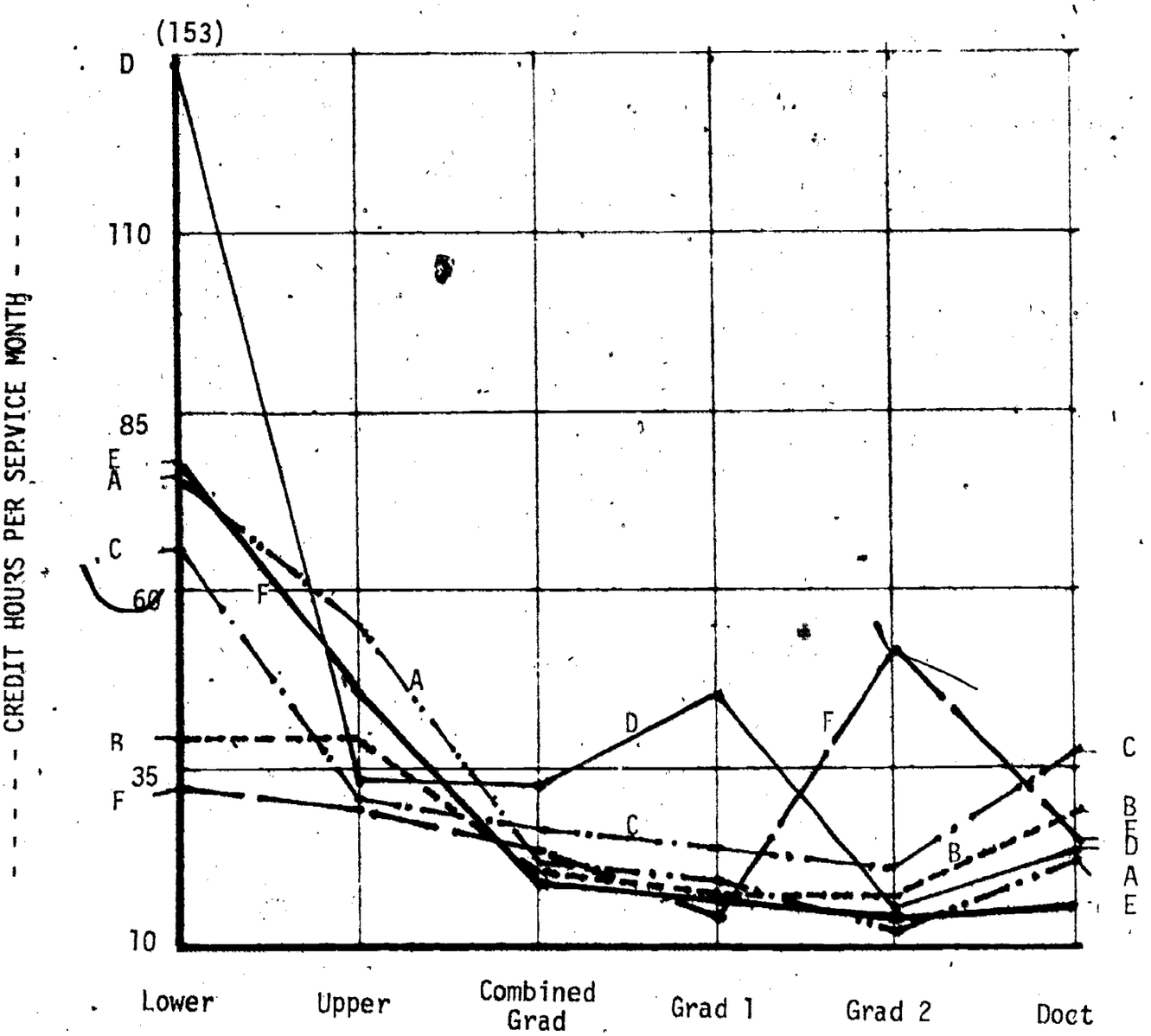
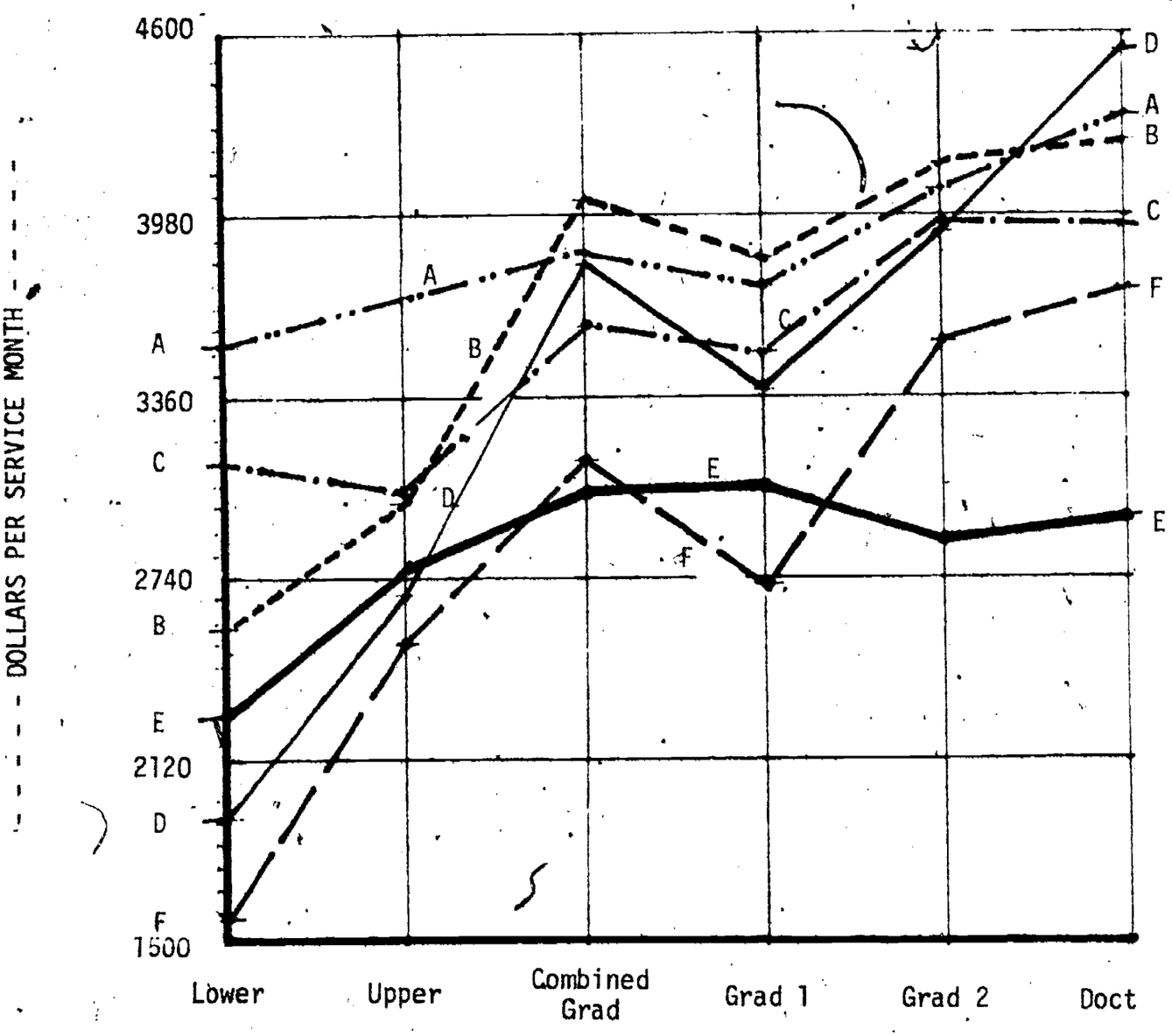


FIGURE 6.3

MODIFIED DIRECT COST, GEN/ICR FUNDS

DOLLARS PER SERVICE MONTH BY LEVEL OF COURSE

Engineering (09)



per service months as course level increases. There appears to be substantial dollar differences among the six institutions across all course levels in the engineering disciplines. The point to be made here is that even if unit-cost data appear to be similar on the surface, the underlying components may behave in dissimilar ways.

STUDY GROUP RECOMMENDATIONS:

1. Course levels. Five course levels were used in the collection of the data: lower division, upper division, graduate I, graduate II, and dissertation. The data analyzed in this step appeared to be relatively consistent at the undergraduate levels but less consistent at the graduate levels. Data at the dissertation level showed wide fluctuations across institutions and across disciplines. The pilot institutions had difficulty in making consistent course-level distinctions at the graduate level. They recommend, however, that the five course levels be maintained and that consideration be given to adding a sixth level for first-professional course work, if the programs warrant it.

2. Student levels. MRU data-collection procedures also specified five student levels: lower division, upper division, first professional, master's,

and doctoral. Again the data were more consistent at the undergraduate levels than at the graduate levels. However, in this case, the pilot institutions found it easier to distinguish between graduate student levels (the master's candidate versus the doctoral candidate) than between graduate course levels. The first-professional level was used selectively in specified fields (primarily law and some of the health professions, although for the most part, the health professions were eliminated from the study). On the basis of these findings, the study group recommends five student levels, maintaining separate levels for master's, doctoral, and first-professional students.

3. Discipline costs versus student program costs. The data showed that student-program costs were somewhat more consistent than discipline costs across institutions, implying that student-level designations were more consistent than course-level designations. The differences in variability of costs between the two data sets were small, however. The study group was of the opinion that discipline costs were more appropriate for institutional-management use, and student-program costs were appropriate for external comparisons.

4. HEGIS categories. At the two-digit level, there was a reasonable degree of consistency of data across institutions for both academic disciplines and student programs. Those disciplines (programs) that were expensive at one institution tended to be high cost at the other five institutions and vice versa. No analyses were conducted to examine the variability of cost data within the two-digit clusters. It was hypothesized by the study group that had these analyses been conducted, a further division of some of the two-digit clusters might be appropriate. (For example, separating Physical Education from the 800 series and dividing Fine Arts into Music, Art, and Theatre). The study group recommends a modified two-digit HEGIS structure for making cost comparisons as described in step 1.

CONCLUSION: The results of these limited analyses suggest that the data are reasonably comparable when examined across institutions, across course levels, and across two-digit HEGIS clusters. This statement is based on a range of variability of ± 20 percent of the mean at the undergraduate levels and ± 40 percent of the mean at the graduate levels. It is unclear whether this was due to differing faculty-activity analyses, to differing

allocation strategies, or some combination of the two. The study group, while not endorsing the accuracy of the data, was reasonably comfortable with the results of this step and agreed to proceed to the full costing steps.

STEP 7

TOPIC: Collection of assignable square feet and allocation of indirect costs

OBJECTIVE: To aid the institutions in allocating their indirect costs to final cost objectives and to assess the consistency of the allocation process across the six universities.

GENERAL IEP PROCEDURES: Direct unit costs were produced as the result of step 6. Before full unit costs could be produced (step 8) each institution had to perform a series of allocations distributing their indirect cost pools to those cost centers previously designated as final cost objectives. In IEP, the final cost objectives fall principally within the three primary programs--instruction, research and public service--but also include some of the student support services that are normally treated as auxiliary services, such as dormitories, food services, and intercollegiate athletics. All other cost centers are considered indirect and are therefore allocated to the final cost objectives as part of this step. The study group decided to exclude the capital-cost portion of the general IEP study (pp. 2.43-2.47 of Technical Report 65, second edition), basing their decision in part on the following considerations:

- No existing policies for amortizing and replacing capital assets exist within the universities except possibly within the auxiliary enterprises.
- Current IEP procedures based on historical costs introduce cost variances that do not necessarily reflect differences in educational services.
- Differences in accounting and property-management practices may make it difficult to identify capital equipment items with particular academic disciplines and PCS programs.
- Conceptual problems exist with combining costs based on current operating funds with those that attempt to measure capital-asset acquisition and utilization. Such a combination might undermine the utility of the data.

ADDITIONAL MRU PROCEDURES:

After reviewing the allocation procedures contained in the general IEP cost study, the study group made the following modifications.

- All libraries were to be treated as a single cost center with the exception of the law library, which was allocated only to the Law discipline (1400).
- All direct costs were to read modified direct costs to reflect the allocation that were made in step 5.
- Audiovisual Services, Computing Support (the remainder after all direct charges), and Ancillary Support were allocated on the basis of modified direct costs. Collecting usage data was infeasible.
- Academic Administration was allocated in a hierarchical fashion with departmental academic administration allocated first (step 5), then college or school academic administration (Business School, Engineering School), and finally campuswide academic administration).
- The allocation procedures cannot be generalized when dealing with Auxiliary Enterprises. Accounting practices differ across the six pilot-test

institutions, and expenditures for some auxiliaries bear more indirect costs than do others. Therefore when making allocations of indirect costs to auxiliaries, care was exercised not to duplicate the indirect costs of any of the support services.

Table 7.1 reflects the set of recommended allocation parameters that was used in the calculation of full unit costs. Institutions were given the opportunity to state on an exception basis deviations from the generally accepted procedures. While each institution listed a number of exceptions, it was extremely difficult to summarize these deviations across the six pilot institutions. Table 7.2 has been included to illustrate one school's list of exceptions to the general procedures. Most of these arose because of the group's effort to make allocations within fund groups. This decision sometimes caused an institution to specify a different allocation basis than that generally recommended. Another reason for exceptions was the varying treatment of auxiliary enterprises from university to university. In some cases, supporting services were totally charged out to auxiliaries as part of the institution's regular accounting entries; in those cases, no additional allocations needed to be made. In other institutions, auxiliaries were only partially "full-costed" and therefore required additional allocations as part of this step. While the general methodology established

TABLE 7.1

INFORMATION EXCHANGE PROCEDURES FOR MAJOR RESEARCH UNIVERSITIES
RECOMMENDED ALLOCATION PARAMETERS AND RECIPIENT ACTIVITY CENTERS

Activity Center	Suggested Parameter	Recipient Activity Center: Instruction (1.1 only)	Recipient Activity Center: Instruction, Research, & Public Service	Recipient Activity Center: All Eligible Final Cost Objectives[a]
1.0 Instruction	Final Cost Objective[a]			
2.0 Research	Final Cost Objective[a]			
3.0 Public Service	Final Cost Objective[a]			
4.1 Libraries	Modified Direct Costs[b]		X	
4.2 Museums & Galleries	Modified Direct Costs		X	
4.3 Audiovisual Services	Modified Direct Costs		X	
4.4 Computing Support (remainder)	Modified Direct Costs		X	
4.5 Ancillary Support	Modified Direct Costs		X	
4.6 Academic Administration (remainder)	Modified Direct Costs		X	
5.1 Student Service Administration	Semester Credits	X		
5.2 Social & Cultural Development	Semester Credits	X		
5.3 Counseling & Career Guidance	Semester Credits	X		
5.4 Financial Aid Administration	Semester Credits	X		
5.5 Student Auxiliary Services	Final Cost Objectives[a]			
5.6 Intercollegiate Athletics	Final Cost Objective[a]			
6.1 Executive Management	Modified Direct Costs			X
6.2 Fiscal Operations	Modified Direct Costs			X
6.3 General Administrative Services	Modified Direct Costs			X
6.4 Logistical Services	Modified Direct Costs			X
6.5 Physical Plant Operations	Assignable Square Feet			X
6.6 Faculty & Staff Auxiliary Services	Final Cost Objective[a]			
6.7 Public Relations & Development	Modified Direct Costs			X
6.8 Student Recruitment, Admissions & Records	Semester Credits	X		
6.9 Central Office Operations	Modified Direct Costs			X

[a] Final Cost Objectives eligible to receive allocated costs are all subprograms 1.0, 2.0, and 3.0, and subprograms 5.5, 5.6, and 6.6.

[b] All libraries are to be treated as a single cost center with the exception of the Law library, which will be allocated only at the Law discipline (1400).

TABLE 7.2

UNIVERSITY OF COLORADO EXCEPTIONS TO NCHEMS FULL-COST ALLOCATIONS

Source of Fund and Sending PCS[a]		Source of Fund and Receiving PCS		Discipline	Allocation Basis	
GEN	4.3 and 4.7	GEN	1.1 (only)	All	GEN	1.1 Modified Direct Costs
ICR	4.1 through 6.9	ICR	1.1 through 3.2	All	RES	1.1 through 3.2 Modified Direct Costs
RES	4.1 through 6.9	RES	1.1 through 3.2	All	RES	1.1 through 3.2 Modified Direct Costs
AUX	5.2 and 5.3	AUX	5.5 (only)	N/A	AUX	5.5 Modified Direct Costs
AUX	4.1 through 4.8	AUX	3.2 (only)	N/A	AUX	3.2 Modified Direct Costs
AUX	6.0 through 6.9	AUX	3.2 (only)	N/A	AUX	3.2 Modified Direct Costs

[a]The sending PCS always excludes final-cost objectives 5.5, 5.6, and 6.6, as well as PCS 7.2 and 9.2.

the intent for the full cost allocation, each institution had to lend its own interpretation to the procedure to make it meaningful for that particular school. If careful attention had not been paid to these exceptions, the validity of the full cost data would have been substantially reduced.

COLLECTION TIME PERIOD: Approximately six months were allowed to complete the full cost portion of the study (steps 7 and 8).

ANALYSIS OF THE DATA: The only new data collected in this step were the assignable square feet (ASF) data, which were collected to provide an allocation basis for Physical Plant Operations (6.5). Table 7.3 is a summary of each institution's assignable square feet by Program Classification Structure (PCS) major function. The relative amounts of space committed to each function roughly paralleled the percentages of total expenditures committed to those same functional areas.

Basically, each school summarized these data from their space inventories, deleting space assigned to independent operations, health care, residential space, and any other space for which a direct charge for plant operations and maintenance had already been made. The remaining space was assigned to

major programs within the PCS. Instructional space was disaggregated by two-digit HEGIS categories (four-digit HEGIS categories in some cases) on the basis of these space inventories and within two-digit HEGIS categories, it was further disaggregated to course level on the basis of student credit hours. The ASF thus distributed because the basis for charging plant operations and maintenance to the various academic units (disciplines and course levels) for the purpose of arriving at full costs.

The study group considered two procedural questions beyond those already discussed. The first dealt with making allocations within fund groups versus making allocations across fund groups. The second alternative would have the effect of collapsing fund groups at this point in the analysis. The second procedural question the group addressed was whether to perform the allocations in a step-down approach versus a one-step approach. The step-down approach would group indirect costs into four cost pools (physical-plant operations, all other institutional support, student services, and academic support) and would establish a sequence for making the allocations. The one-step approach would make the allocations as if they were simultaneous, allowing for no interactions among the indirect cost centers.

TABLE 7.3.

FACILITIES ANALYSIS

	Colorado	Illinois	Stony Brook	Kansas	Purdue	Washington
Total ASF	4,087.2		2,960.6	3,303.9	7,708.4	6,694.1
Less: 1.0 Ind. Op	(190.7)		0.0	(27.4)	(646.9)	(40.9)
Unassigned	0.0		(92.7)	(33.2)	(132.5)	(0.1)
800 Health Care	(18.6)		(12.1)	(25.6)	(50.0)	(204.8)
900 Residential	(1,237.8)		(998.2)	(822.8)	(3,178.1)	(1,040.2)
000 Unclassified	(21.9)		0.0	(8.4)		(107.7)
Space for Academic Operations	2,618.2	5,976.4	1,857.6	2,386.5	3,700.9	5,300.4
Instruction asf	986.3	2,431.1	751.9	795.8	1,643.2	1,776.7
%	*37.7%*	*40.7%*	*40.5%*	*33.4%*	*44.4%*	*33.5%*
Research asf	554.5	1,243.0	385.8	340.9	760.9	1,263.0
%	*21.2%*	*20.8%*	*20.8%*	*14.3%*	*20.6%*	*23.8%*
Public Service asf	16.4	252.2	31.6	12.7	73.8	117.2
%	*0.6%*	*4.2%*	*1.7%*	*0.5%*	*2.0%*	*2.2%*
Academic Support asf	289.1	818.6	442.9	480.3	405.5	728.3
%	*11.0%*	*13.7%*	*23.8%*	*20.1%*	*11.0%*	*13.7%*
Student Services asf	570.0	758.4	91.3	565.2	406.0	801.4
%	*21.8%*	*12.7%*	*4.9%*	*23.7%*	*11.0%*	*15.1%*
Institutional Support asf	201.9	473.1	154.1	191.6	411.5	613.8
%	*7.7%*	*7.9%*	*8.3%*	*8.0%*	*11.1%*	*11.6%*
	2,618.2	5,976.4	1,857.6	2,386.5	3,700.9	5,300.4
	100.0%	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*[a]

[a] Does not sum to 100 due to rounding.

2.7

Because each of these choices was independent of the other, there were really four alternative procedures to test: four funds, four step (4F4S); four funds, one step (4F1S); one fund, four steps (1F4S); and one fund, one step (1F1S). Each of these alternatives was tested on one institution's data, keeping the allocation parameters and the allocation basis constant. The results of this test are displayed in table 7.4. The dollar figures and the percentages represent the amounts in each of the activity centers after the full cost allocations were made. By comparing the amounts in any one activity center across the four columns, one can gauge the effect the allocation method had on the final distribution of dollars. By examining the results of this test, the study group concluded that the four allocation procedures tested did not materially affect the final results. There was some minor shifting of dollars from instruction into research and public service under methods 3 and 4 (the collapsing of the fund groups). As a further consideration, the study group wanted to maintain the integrity of the four fund groups throughout the cost study. Therefore they chose to make the full cost allocations using the simpler, one-step approach, but to allocate each fund group separately (4F1S). The one exception to this rule

TABLE 7.4

TEST OF FOUR ALTERNATIVE ALLOCATION PROCEDURES
(In Thousands of Dollars)

PCS Activity Center	4F4S	4F1S	1F4S	1F1S
1.1 General Academic Instruction	$105,478 *41.10%*	$103.893 *40.48%*	$ 99,844 *38.89%*	$ 99,398 *38.72%*
1.3 Community Education	$ 628 *.24%*	$ 645 *.25%*	$ 597 *.23%*	$ 618 *.24%*
2.1 Institutes/Research Centers	$ 38,480 *14.99%*	$ 39,250 *15.29%*	$ 40,410 *15.74%*	$ 41,446 *16.15%*
2.2 Individual Project Research	$ 31,451 *12.86%*	$ 32,054 *12.49%*	$ 32,779 *12.77%*	$ 33,567 *13.08%*
3.1 Patient Services	$ 1,409 *.55%*	$ 1,490 *.58%*	$ 1,411 *.54%*	$ 1,523 *.59%*
3.2 Community Services	$ 5,657 *2.20%*	$ 5,731 *2.23%*	$ 5,736 *2.23%*	$ 5,850 *2.26%*
3.3 Cooperative Extension	$ 19,009 *7.41%*	$ 19,163 *7.47%*	$ 19,604 *7.64%*	$ 19,858 *7.74%*
3.4 Public Broadcasting	$ 381 *.15%*	$ 384 *.15%*	$ 374 *.15%*	$ 378 *.15%*
5.5 Student Auxiliary Services	$ 35,163 *13.70%*	$ 35,105 *13.68%*	$ 36,993 *14.41%*	$ 35.105 *13.68%*
7.1 Independent Operations	$ 1,305 *.51%*	$ 1,305 *.51%*	$ 1,305 *.51%*	$ 1,305 *.51%*
8.1 Scholarships	$ 3,000 *1.17%*	$ 3,000 *1.17%*	$ 3,000 *1.17%*	$ 3,000 *1.17%*
8.2 Fellowships	$ 3,082 *1.20%*	$ 3,082 *1.20%*	$ 3,082 *1.20%*	$ 3,082 *1.20%*
9.0 Holding Accounts	$ 11,585 *4.51%*	$ 11,585 *4.51%*	$ 11,585 *4.51%*	$ 11,585 *4.51%*
TOTALS[a]	$256,628 *99.99%*	$256,687 *100.01%*	$256,720 *99.99%*	$256,715 *100.02%*

[a]Totals for the four methods do not agree due to rounding differences and some minor allocations not reported in this table.

was that indirect cost recovery (ICR) funds were allocated to final cost objectives on the basis of restricted funds + ICR dollars. The intent here was to allocate the ICR dollars back to academic units in a manner that closely approximated the way in which they were generated. All other support costs were allocated solely within fund groups

By examining table 7.5, the impact of the full cost allocations on the final cost objectives can readily be observed. As would be expected, most of the support dollars flowed into the Instruction programs (roughly three out of every four support dollars). The remainder were spread across the Research, Public Service and Auxiliary Service programs. The impact that the allocations had on the instruction programs varied from institution to institution. Stony Brook and Colorado received the greatest percentage increments (73.1 percent and 65.0 percent respectively) with Purdue receiving the least (39.8 percent). The other three institutions increased the cost of their instructional programs by roughly 50 percent through the full cost allocation process. Differences among the six institutions can be directly attributable to the amounts that the institutions assigned to the support areas during the account crossover. As learned in step 5, Colorado had

TABLE 7.5

AMOUNT AND PERCENT INCREASE OF FINAL COST OBJECTIVES AS A RESULT OF FULL-COST ALLOCATIONS
(In Thousands of Dollars)

Final Cost Objective	Colorado	Illinois	Kansas	Purdue	Stony Brook	Washington
General Academic Instruction (1.1)	$18,718 *65.0%*	$36,739 *51.7%*	$15,350 *53.3%*	$22,288 *39.8%*	$15,763 *73.1%*	$39,235 *51.6%*
Community Education (1.3)	- -	$ 201 *42.7%*	$ 387 *36.6%*	$ 78 *4.3%*	$ 27 *31.7%*	$ 600 *25.5%*
Preparatory Adult Education (1.4)	- -	- -	$ 71 *27.9%*	- -	- -	$ 45 *21.4%*
Institutes/Research Centers (2.1)	$ 1,462 *18.4%*	$ 4,002 *12.1%*	$ 1,505 *27.7%*	$ 3,435 *23.8%*	$ 1,364 *54.8%*	$ 573 *37.8%*
Individual Project Research (2.2)	$ 1,666 *16.3%*	$ 2,460 *9.1%*	$ 2,005 *39.3%*	$ 4,979 *19.4%*	$ 2,977 *31.2%*	$ 5,382 *8.6%*
Patient Services (3.1)	- -	$ 739 *80.3%*	- -	- -	- -	$ 1,947 *28.7%*
Community Services (3.2)	$ 1,505 *25.6%*	$ 1,036 *21.4%*	$ 553 *33.6%*	$ 227 *9.3%*	$ 913 *53.4%*	$ 1,228 *30.7%*
Cooperative Extension Services (3.3)	- -	$ 2,789 *16.5%*	- -	$ 703 *7.3%*	- -	- -
Public Broadcasting (3.4)	- -	$ 56 *17.0%*	$ 90 *45.1%*	$ 61 *31.0%*	- -	$ 340 *22.5%*
Student Auxiliary Services (5.5)	- -	$ 234 *0.7%*	- -	- -	$ 1,084 *16.1%*	$ 4,423 *35.5%*
Intercollegiate Athletics (5.6)	$ 237 *10.2%*	- -	$ 24 *11.7%*	$ 32 *1.1%*	- -	$ 736 *27.7%*

SOURCE: Computer print-out table 15B.

reported proportionately larger expenditures in the Student Service area, and Stony Brook had expended relatively more dollars in the Institutional Support program. The expenditure patterns noted in step 5 would account for the relatively larger amounts being allocated to Instruction for these two universities.

Allocations outside of the instructional area do not reveal much consistency among the six pilot-test institutions. Some universities, notably Stony Brook and Washington, allocated support dollars to Student Auxiliary Services; the other universities chose not to make these allocations. Presumably support costs for the remaining institutions had been fully accounted for as part of their regular accounting entries. The Research programs received varying amounts of support dollars ranging from roughly a 9 percent increase for project research at Illinois and Washington to a 55 percent increase for Institutes and Research Centers at Stony Brook. Likewise, Community Service costs increased from a low of 9 percent at Purdue to a high of nearly 55 percent at Stony Brook. These differences, while large, were not examined in depth, because it was primarily the instructional costs that were being analyzed. If analyses were to be conducted in the noninstructional areas, the parameters

and allocation processes should be reexamined in light of the data presented in table 7.5.

STUDY GROUP RECOMMENDATIONS:

1. Capital costs for the most part were excluded from the MRU-IEP cost study due to the lack of existing procedures for calculating capital costs and conceptual problems with combining capital and current-operating costs. Assignable-square-feet data by major function were exchanged among the pilot-test institutions in lieu of this procedure.

2. The study group adopted the IEP full cost procedures with minor modifications (see table 7.1). However in implementing these procedures, the pilot-test institutions found it necessary to add further clarification to the procedures before support costs could be allocated in a meaningful way.

3. Full cost allocations were made within fund groups (General, Restricted, ICR, and Auxiliary), but using a direct, one-step approach rather than the more complicated step-down methods typically employed in full cost studies. The study group found the direct allocation method simpler to use,

and the added steps did not materially affect the results.

4. There were variations among the six institutions in the extent to which support costs such as physical plant and administration were already allocated as part of the institution's accounting policies. This was particularly true in regard to auxiliaries. Each institution provided specific allocation decision rules to adjust for these variations.

5. IEP does not readily provide for allocating academic-administration cost centers, such as college deans' offices, back to disciplines. It was necessary to make separate allocations to appropriately assign college costs to disciplines before making campuswide allocations of central costs.

6. IEP does not have an adequate tracking mechanism to trace costs from their support categories to the final cost objectives. Final cost figures should be broken down by contributing support categories, such as libraries, student services, physical-plant operations, and institutional support.

CONCLUSION:

No major problems were encountered when using the IEP full costing procedures except for the modifications already noted. Full cost data are not particularly useful for internal management purposes, because large amounts of data are compressed into a single figure thereby complicating the analysis rather than simplifying it. However, full cost data may be useful for interinstitutional comparisons, because the effects due to institutional differences in accounting practices, organizational structures, and internal funding levels for indirect cost centers are eliminated or significantly reduced in the full costing process.

STEP 8

TOPIC: Calculation and analysis of full unit costs for academic disciplines and student programs.

OBJECTIVE: To aid the institutions in the calculation of full unit costs and to assist the study group in making comparisons of their full unit-cost data.

GENERAL IEP PROCEDURES: The procedures in step 8 were identical to those described in step 6 with the exception that full cost data rather than direct cost data were used as the numerator of the costing equation.

ADDITIONAL MRU PROCEDURES: IEP recommends two units to express full costs--the discipline credit hour and the student-program credit hour. In addition, full costs were displayed by FTE student, which resulted in an FTE-student definition consistent with step 6.

ANALYSIS OF THE DATA: In analyzing the full unit costs calculated in this step, the central focus was on assessing differences and similarities between these costs and the direct unit costs calculated in step 6. Most of the tables shown in this step are similar to those in step 6 except that full costs were

used instead of direct costs. Throughout these tables, the principal question of interest was: Are the results shown here consistent with the corresponding results in step 6 tables? If not, where did the differences occur, and what factors might have created them?

In order to have a frame of reference for full and direct unit-costs variation across institutions, student programs and academic disciplines, tables 8.1 and 8.2 were prepared. These tables give the ratios of full to direct unit costs by course level and student level respectively. (The differences between full and direct costs are referred to as support or indirect costs.) Some comments concerning these tables are:

- Across all institutions, full costs were approximately 60 percent greater than direct costs at the undergraduate levels and 50 percent greater than direct costs at the graduate levels.
- Institutions varied in the amounts and percentages by which they increased their costs as a result of the full cost allocation procedures. For example, at lower-division instruction, the percentage of increase ranged from 49 percent at Institution B to 100 percent at Institution D. Likewise at the graduate I level, the range was from 36 percent to 75 percent. Generally, those institutions that employed a faculty-assignment method increased their unit costs the least, and those with a faculty self-reporting method increased the most.

TABLE 8.1

DISCIPLINE FULL UNIT COSTS AS A PERCENTAGE OF DIRECT UNIT COSTS

(Gen+ICR Funds)

Course Level	F/D[b]	Institution[a] A	B	C	D	E	F	Mean
Lower division	F	$ 47	$ 49	$ 42	$ 62	$ 39	$ 54	$ 49
	D	$ 30	$ 33	$ 25	$ 31	$ 23	$ 34	$ 29
	%	*157%*	*149%*	*168%*	*200%*	*170%*	*159%*	*169%*
Upper division	F	$ 76	$ 72	$ 98	$101	$ 70	$ 81	$ 83
	D	$ 50	$ 50	$ 60	$ 63	$ 44	$ 53	$ 53
	%	*152%*	*144%*	*163%*	*160%*	*159%*	*153%*	*157%*
Graduate I	F	$104	$235	$172	$142	$145	$159	$160
	D	$ 70	$173	$106	$ 81	$ 95	$106	$105
	%	*149%*	*136%*	*162%*	*175%*	*153%*	*150%*	*152%*
Graduate II	F	$152	$261	$221	$270	$170	$168	$207
	D	$105	$196	$137	$176	$115	$116	$141
	%	*145%*	*133%*	*161%*	*153%*	*148%*	*145%*	*147%*
Dissertation	F	$ 85	$182	$160	$262	$195	$240	$187
	D	$ 56	$130	$ 98	$192	$134	$168	$130
	%	*152%*	*140%*	*163%*	*136%*	*146%*	*143%*	*144%*
All grad. levels	F	$112	$227	$175	$194	$160	$180	$175
	D	$ 76	$165	$107	$123	$107	$122	$117
	%	*147%*	*138%*	*164%*	*158%*	*150%*	*148%*	*150%*

Note: Health-professions data have been excluded.

[a]Because of the confidentiality of the data in step 8, institutional names have been replaced with an institutional code.

[b]F=Full Cost
D=Modified Direct Cost

TABLE 8.2

PROGRAM FULL UNIT COSTS AS A PERCENTAGE OF DIRECT UNIT COSTS
(Gen+ICR Funds)

Student Level	F/D[a]	Institution A	B	C	D	E	F	Mean
Lower division	F	$ 50	$ 54	$ 52	$ 71	$ 44	$ 57	$ 55
	D	$ 33	$ 37	$ 31	$ 38	$ 23	$ 36	$ 33
	%	*152%*	*146%*	*168%*	*187%*	*191%*	*158%*	*167%*
Upper division	F	$ 69	$ 75	$ 78	$ 89	$ 62	$ 77	$ 75
	D	$ 45	$ 52	$ 50	$ 53	$ 39	$ 50	$ 48
	%	*153%*	*144%*	*156%*	*168%*	*159%*	*154%*	*156%*
Master's	F	$102	$197	$165	$154	$127	$148	$149
	D	$ 69	$143	$101	$ 90	$ 82	$100	$ 98
	%	*148%*	*138%*	*163%*	*171%*	*155%*	*148%*	*152%*
Doctorate	F	$ 99	$212	$140	$242	$175	$191	$177
	D	$ 68	$153	$ 86	$164	$119	$132	$120
	%	*146%*	*139%*	*163%*	*148%*	*147%*	*145%*	*148%*

Note: Health-professions data have been excluded.

[a]F=Full Cost
D=Modified Direct Cost

- Institutional variability was also evident when examining the student-program data (table 8.2). The corresponding percentage ranges for lower-division Instruction were 46 percent to 91 percent and for graduate I Instruction, 38 percent to 71 percent.

- Across course levels, the percentage of full to direct costs decreased monotonically from an average of 169 percent at the lower-division level to 144 percent at the dissertation level. This decrease was similar across student levels (from 167 percent to 148 percent) and generally the same within institutions across either student or course levels. One of the most likely explanations for this pattern derives from the fact that support costs for the Student Services program were allocated on the basis of credit hours. Since credit hours decreased as level increased, one would expect the relative proportion of student support costs to direct costs to decrease also.

Next, modified direct unit costs were correlated with full unit costs for all course levels and student levels within each institution. By looking at the correlation coefficients in table 8.3, it can readily be seen that the pairs of observations are highly correlated. Except for one institution, all correlation coefficients are .95 or greater. This finding would indicate that the allocation parameters used in step 7 (MDUC, FAC SAL, SCH, ASF) were highly interrelated with modified direct unit costs. It would also suggest that if a unit-cost comparison were being made to highlight instructional program or level differences within an institution, modified direct costs would serve as well as full costs.

TABLE 8.3

CORRELATION COEFFICIENTS FOR MODIFIED DIRECT UNIT COSTS WITH FULL UNIT COSTS (Gen+ICR Funds)

	[redacted]tions					
	A	B	C	D	E	F
Discipline						
Lower	.97	.97	1.00	.99	.97	.99
Upper	.98	1.00	1.00	.95	.96	.97
GI	1.00	.99	1.00	.81	.99	.99
GII	1.00	.98	1.00	.79	.99	.99
Dissertation	1.00	.99	1.00	1.00	.99	.95
All Levels	.99	.99	1.00	.96	.99	.99
Student programs						
Lower	.98	.95	1.00	.94	.96	.96
Upper	.98	.98	1.00	.96	.98	.98
Master's	1.00	.98	1.00	.90	.99	.98
Doctoral	.99	.99	1.00	.97	.99	.98
All Levels	1.00	.99	1.00	.97	1.00	.99

Given this information as background, tables 8.4 and 8.5 were prepared showing discipline and student-program full unit costs by institution and level and were then compared to the corresponding tables for modified direct costs in step 6 (tables 6.1 and 6.2). Generally, the results obtained for full costs across institutions were quite similar to those obtained for direct costs. In order to reach this conclusion, institutions were first ranked from lowest (one) to highest (six) across the six institutions at each course or student level. For both student program and discipline data, the rank position of institutions using full cost data was always the same as, or within one position of, direct cost rankings (with one exception in each case). From these similarities in rankings of institutions across student programs, disciplines, and levels and from tables 8.1, 8.2, and 8.3, it can be concluded that full and modified direct cost data produce nearly the same results when using IEP procedures.

These same data were examined for discipline or student-level differences by calculating the ratios in tables 8.4 and 8.5 and comparing them to the corresponding modified direct cost ratios. In all cases, the ratios of higher-division costs to

TABLE 8.4

COMPARISON OF DISCIPLINE UNIT COSTS BY INSTITUTION AND COURSE LEVEL

Based on Full Costs (Gen+ICR Funds)

Course Level	Institution A	B	C	D	E	F	Mean	Low Value	High Value	Range (High-Low)
Lower division	$ 47	$ 49	$ 42	$ 62	$ 39	$ 54	$ 49	$ 39	$ 62	$ 23
% of the mean	*96%*	*100%*	*86%*	*127%*	*80%*	*110%*	*100%*	*80%*	*127%*	*47%*
Base factor	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*			
Upper division	$ 76	$ 72	$ 98	$101	$ 70	$ 81	$ 83	$ 70	$101	$ 31
% of the mean	*92%*	*87%*	*118%*	*122%*	*84%*	*98%*	*100%*	*84%*	*122%*	*38%*
Ratio to base	*1.6*	*1.5*	*2.3*	*1.6*	*1.8*	*1.5*	*1.7*			
Graduate I	$104	$235	$172	$142	$145	$159	$160	$104	$235	$131
% of the mean	*65%*	*147%*	*108%*	*89%*	*91%*	*99%*	*100%*	*65%*	*147%*	*82%*
Ratio to base	*2.2*	*4.8*	*4.1*	*2.3*	*3.7*	*2.9*	*3.3*			
Graduate II	$152	$261	$221	$270	$170	$168	$207	$152	$270	$118
% of the mean	*73%*	*126%*	*107%*	*130%*	*82%*	*81%*	*100%*	*73%*	*130%*	*57%*
Ratio to base	*3.2*	*5.3*	*5.3*	*4.4*	*4.4*	*3.1*	*4.2*			
Dissertation	$ 85	$182	$160	$262	$195	$240	$187	$ 85	$262	$177
% of the mean	*45%*	*97%*	*86%*	*140%*	*104%*	*128%*	*100%*	*45%*	*140%*	*95%*
Ratio to base	*1.8*	*3.7*	*3.8*	*4.2*	*5.0*	*4.4*	*3.8*			
All grad. levels	$112	$227	$175	$194	$160	$180	$175	$112	$227	$115
% of mean	*64%*	*130%*	*100%*	*111%*	*91%*	*103%*	*100%*	*64%*	*130%*	*66%*
Ratio to base	*2.4*	*4.6*	*4.2*	*3.1*	*4.1*	*3.3*	*3.6*			

Note: Health-professions data have been excluded.

TABLE 8.5

COMPARISON OF STUDENT PROGRAM UNIT COSTS BY INSTITUTION AND STUDENT LEVEL

Based on Full Costs (Gen+ICR Funds)

Student Level[a]	Institution A	B	C	D	E	F	Mean	Low Value	High Value	Range (High-Low)
Lower division	$ 50	$ 54	$ 52	$ 71	$ 44	$ 57	$ 55	$ 44	$ 71	$ 27
% of the mean	*91%*	*98%*	*95%*	*129%*	*80%*	*104%*	*100%*	*80%*	*129%*	*49%*
Base factor	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*			
Upper division	$ 69	$ 75	$ 78	$ 89	$ 62	$ 77	$ 75	$ 62	$ 89	$ 27
% of the mean	*92%*	*100%*	*104%*	*119%*	*83%*	*103%*	*100%*	*83%*	*119%*	*36%*
Ratio to base	*1.4*	*1.4*	*1.5*	*1.3*	*1.4*	*1.4*	*1.4*			
Master's	$102	$197	$165	$154	$127	$148	$149	$102	$197	$ 95
% of the mean	*69%*	*132%*	*111%*	*103%*	*85%*	*99%*	*100%*	*68%*	*132%*	*64%*
Ratio to base	*2.0*	*3.7*	*3.2*	*2.2*	*2.9*	*2.6*	*2.7*			
Doctoral	$ 99	$212	$140	$242	$175	$191	$177	$ 99	$242	$143
% of the mean	*56%*	*120%*	*79%*	*137%*	*99%*	*108%*	*100%*	*56%*	*137%*	*81%*
Ratio to base	*2.0*	*3.9*	*2.7*	*3.4*	*4.0*	*3.4*	*3.2*			

Note: Health-professions data have been excluded.

[a]First-professional data have been excluded because of insufficient data.

lower division costs were lower (or in a few cases, the same) for full unit costs than for modified direct unit costs. Another way of stating this finding is that the ratios were more tightly clustered in full costs than they were in direct costs. This result is simply another view of the same phenomenon observed in tables 8.1 and 8.2 where percentages of full to direct unit costs decreased as level increased. Since tables 8.1 and 8.2 showed that a greater proportion of support costs were allocated to the lower-division levels, it follows that the ratios of other levels to lower division will be smaller using full unit costs than when using modified direct unit costs.

The final comparison between full and direct cost data was made at the two-digit HEGIS category level. Tables 8.6 and 8.7 were prepared showing the lowest- and highest-cost disciplines based on full unit costs. These tables were compared to the results from the corresponding step 6 tables (6.3 and 6.4). The lists of the highest and lowest three disciplines were inspected for occurrences of the same three disciplines in both the full and direct cost tables and for the same ordering of these disciplines. The test was repeated for the student-program data, but the corresponding tables have not been reproduced in this report.

TABLE 8.6

LOWEST UNIT-COST DISCIPLINES COMMON ACROSS INSTITUTIONS
Based on Full Costs (Gen+ICR Funds)

Course Level	Rank	Institution A	B	C	D[a]	E	F
Lower division	1	Psychology	Psychology	Math	Social Sci.	Psychology	Social Sci.
	2	Social Sci.	Math	Psychology	Biology	Social Sci.	Psychology
	3	Math	Social Sci.	Social Sci.	Psychology	Math	Computer Sci.
Upper division	1	Psychology	Psychology	Psychology	Social Sci.	Social Sci.	Psychology
	2	Letters	Biology	Social Sci.	Psychology	Education	Social Sci.
	3	Social Sci.	Computer Sci.	Letters	Letters	Psychology	Computer Sci.
Graduate I	1	Education	Education	Education	Education	Education	Education
	2	Psychology	Computer Sci.	Letters	Computer Sci.	Social Sci.	Letters
	3	Letters	Math	Psychology	Letters	Computer Sci.	Psychology
Graduate II	1	Education	Education	Education	Letters	Education	Engineering
	2	Psychology	Fine Arts	Psychology	Psychology	Social Sci.	For. Lang.
	3	Letters	For. Lang.	Letters	Math	Psychology	Education

[a]Institution D did not report cost data at the graduate II level for education and fine arts.

TABLE 8.7

HIGHEST UNIT-COST DISCIPLINES COMMON ACROSS INSTITUTIONS
Based on Full Costs (Gen+ICR Funds)

Course Level	Rank	Institution A	B	C	D[a]	E	F
Lower division	11	Engineering	Engineering	Engineering	Education	Fine Arts	Fine Arts
	10	Fine Arts	Education	Computer Sci.	Physical Sci.	Computer Sci.	Engineering
	9	Biology	Fine Arts	Fine Arts	Computer Sci.	Education	Physical Sci.
Upper division	11	For. Lang.	Physical Sci.	Physical Sci.	Fine Arts	Math	Fine Arts
	10	Physical Sci.	Engineering	Engineering	Physical Sci.	Fine Arts	Engineering
	9	Fine Arts	Education	Math	Math	Engineering	Physical Sci.
Graduate I	11	Math	Psychology	Math	Biology	Physical Sci.	Biology
	10	Physical Sci.	Physical Sci.	Physical Sci.	For. Lang.	Engineering	Physical Sci.
	9	Engineering	For. Lang.	Biology	Fine Arts	Psychology	Computer Sci.
Graduate II	11	Computer Sci.	Math	Computer Sci.	Engineering	Math	Math
	10	Physical Sci.	Biology	Math	Physical Sci.	Letters	Fine Arts
	9	Engineering	Physical Sci.	Engineering	Biology	Biology	Computer Sci.

[a]Institution D did not report cost data at the graduate II level for education and fine arts.

Full and direct unit cost data yielded the same rankings in almost all cases. In two of the institutions, there was only one occurrence where the rankings changed and in another institution, there were two occurrences. The greatest number of occurrences (nine) was in Institution D, which also had the lowest correlation coefficients in table 8.3. Generally, the few mismatches found between direct and full cost rankings were spread evenly across the disciplines and programs at all levels.

CONCLUSION:

For intrainstitutional analysis, very little was learned by progressing from modified direct cost data to full cost data. Full unit costs within an institution were generally proportional to modified direct unit costs with the ranges tending to narrow as course and student level increased. Variations in full to direct costs were noted across institutions, however. Presumably, these were due to institutional differences in faculty-activity reporting, accounting procedures, and internal differences in levels of funding support for indirect cost centers. The study group believes that the effects due to these institutional differences may have been minimized through the full cost procedures, thereby increasing the validity of the full cost data for interinstitutional comparisons.