Factors contributing to the use of computer-based information systems in student services

Genene Marie DeMaio

College of William & Mary - School of Education

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Factors contributing to the use of computer-based information systems in student services

DeMaio, Genene Marie, Ed.D.
The College of William and Mary, 1990

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FACTORS CONTRIBUTING TO THE USE OF COMPUTER-BASED INFORMATION SYSTEMS IN STUDENT SERVICES

A Dissertation
Presented to
The Faculty of the School of Education
The College of William and Mary

In Partial Fulfillment
Of the Requirement for the Degree
Doctor of Education

by
Genene Marie DeMaio
April 1990
FACTORS CONTRIBUTING TO THE USE OF
COMPUTER-BASED INFORMATION SYSTEMS
IN STUDENT SERVICES

by

Genene Marie DeMaio

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DEDICATION

This report is dedicated to my friend Kelly whose support throughout my educational pursuits has been appreciated.
ACKNOWLEDGEMENTS

Completing the requirements for the Doctor of Education has involved the direction, cooperation, and help of special persons. To them I wish to express my thanks.

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6. Mary Washington College—Results

**JMU Background Data**

- History of James Madison University
- Mission Statement
- Degrees Offered
- Operational Statistics
- The Campus and its Location
- Administration and Organization

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ABSTRACT

FACTORS CONTRIBUTING TO THE USE OF COMPUTER-BASED INFORMATION SYSTEMS IN STUDENT AFFAIRS

Genene M. DeMaio, EdD
The College of William and Mary in Virginia, May 1990

Chairman: Professor Roger G. Baldwin

The purpose of this study was to determine what factors facilitate and what factors inhibit computer use in the Student Affairs Divisions of James Madison University (JMU), Virginia Polytechnic Institute (VPI), and Mary Washington College (MWC). Information derived from the study was to be used to foster the use of CBISs in the planning and decision making process used by student affairs administrators in higher education institutions.

The population for this study was student affairs officials and related personnel deliberately selected from three Virginia public institutions. Those selected for the sample were interviewed and data were collected in response to six research questions. In addition, documents collected from each institution were analyzed and compared to the interviewees' remarks and perceptions.

The results identified factors that facilitate and inhibit computer use in student affairs. Accordingly, the following conclusions were drawn from the findings of this study.

1. MWC is in the beginning stages of automation with most
computer applications existing in their novice form. JMU is moving in the direction of state-of-art computing technology while VPI’s current status of CBISs has reached the level regarded as state-of-art.

2. The status of CBISs at MWC, JMU, and VPI is affected by the time period in which automation occurred.

3. Student affairs’ users at MWC, JMU, and VPI perceive CBISs positively, thus, they use the systems often.

4. Respondents believe using CBISs on the job simplifies tasks, helps monitor data flow, increases efficiency, makes output more professional, makes data more timely and accurate, improves the communication process, and does not significantly affect changes in policy.

5. No significant organizational changes have occurred at MWC or JMU because of computer use. Several organizational changes were identified at VPI.

6. The institution’s mission and size influence the direction colleges or universities take in regard to computer technology.

7. The student affairs’ respondents at all three institutions were generally satisfied with the microcomputer support and training they received.

8. All users mentioned mainframe computer support was slow and uneven and many outside influences seem to impact the quality of service in this area.

9. It is clear that at JMU and VPI the integrator’s role positively affects the use of computers by allowing for the smooth and easy transition of computer innovations.
10. The integrator, as described by the respondents, is one who acts as a liaison with the computer center and student affairs' office, identifies needs, selects resources, and alleviates the fear of using the computer by teaching, training, and consulting.

11. The integrator's professional background and personal characteristics include strengths in computer knowledge, communication, practical experience, political savvy, and analysis. Personal characteristics also include the willingness to learn new computer-related information and to share that knowledge, patience, empathy, listening skills, mediator skills, diplomacy, resourcefulness, and vision.

12. Institutions of higher education should identify the integrators on their campuses and promote and support their role.

13. Top leadership commitment is described by the respondents and the literature as a crucial factor facilitating computer use.

14. The lack of long range plans for the improved use of computers do not significantly affect the use of CBISs at MWC, JMU, or VPI.

Since very little research has been conducted on Student Affairs Divisions' use of CBISs, future research should focus on how data collected on students improve the effective operation of student affairs offices.

Genene Marie DeMaio
School of Education
The College of William and Mary in Virginia
FACTORS CONTRIBUTING TO THE USE OF
COMPUTER-BASED INFORMATION SYSTEMS
IN STUDENT AFFAIRS
Chapter One:
The Problem and Its Setting

The Significance of the Study

Over the past two decades, systems of higher education have become increasingly complex and more technological. Many new demands have arisen as institutions have experienced changes in patterns of student mix, course load and student course-taking behaviors; degree preference of students; and societal needs. Thus, there has been a growing emphasis on formal planning and decision-making and determining how organizations might better adapt to the future. In addition, increasing competition with business and industry for students to attend programs, larger numbers of part-time faculty, and more complex regulations and policies requiring tighter fiscal and programmatic accountability have supported the growing emphasis on formal planning and decision-making processes. Administrators in higher education institutions have responded to the pressures by both initiating formal planning processes and turning to new modes of creating and handling information. Among these new modes are the more versatile computer-based information systems (CBISs).

According to Brinkman (1984);

Computer-Based Information Systems should be able to do three things in support of management: First, they should provide access to much of the data and information needed for making decisions
and for understanding the workings of the organizations. Second, they should provide a medium, or set of alternative media, that allows data and information to be assembled, manipulated, analyzed, and reported. Third they should provide for the thought processes, for the relating of assumptions, concepts, facts, rules of thumb, and so on that are required for managerial understanding and decision making (p. 12).

Jones (1982), Keller (1983), Mayhew, (1979), Timm (1983), support the belief that institutional decision making requires an elaborate and precise information system. Furthermore, Mayhew (1979) theorized that institutions that accumulate impressive and good data and display them candidly are likely to be less vulnerable to political, legislative, or agency intrusion than institutions that appear secretive or whose officials appear to fake requisite information.

Even though many planning theorists agree that using an information system is a prerequisite for good planning, a trend in the literature indicates that the nature of higher education decision making has impeded the implementation of information systems. In other words, the data and analysis needed to generate information should be tailored to accommodate the situational needs of the user. For example, according to Timm (1983), "comprehensive systems were difficult, if not impossible to implement in higher education because decision making in higher education is diffuse, decentralized, and political in nature. Thus, trying to systematize all decision making in advance was the wrong approach" (p. 28). Others such as Ray Bachetti (1983) of Stanford and Dennis P. Jones (1982) of the National Center for Higher Education
Management Systems (NCHEMS) state that little is known about how
decisions are made in colleges and universities and even less is known
about how they should be made. Consequently, Bachetti and Jones report
a need for research aimed at documenting the higher education decision-
making process.

All administrators of higher education institutions examined in the
literature review addressed the need for more effective planning, and
student services administrators were no exception. The literature
showed, in fact, that the application of computer-based information
systems held a great promise for student affairs divisions. Computer-
based information systems assisted in labor-intensive work found in the
offices of admissions, financial aid, registrar, and placement as well
as with room assignments and enrollment management (Garland, 1985).
Furthermore, data collected on students improved the effectiveness of
assessment and evaluation of programs (Garland, 1985), enhanced student
services such as counseling, advisement, and career planning, and
helped to reduce attrition (Baldridge, Kemerer, and Green, 1982; Beal
and Noel, 1980; Stadtman, 1980). Racippo and Foxley (1980) added that
data collected on all facets of the higher education institution helped
to improve the use of existing resources.

The underlying assumption of this research is that computer-based
information systems increasingly are being used as a tool in the formal
planning and decision-making processes in institutions of higher
education. However, a review of the literature revealed that some
institutions use computer-based information systems more often in the
decision-making process than do other institutions. Further, the review
of literature revealed that very little research is conducted in student affairs divisions about their use of computer-based information systems. This is true even though the use of computer-based information systems was deemed important in student affairs divisions to capture vital statistics related to students, faculty, and the curriculum. Such statistics indeed are necessary in making quantitative and qualitative decisions for student affairs' planning.

An interesting research question, therefore, is why do some institutions use computer-based information systems more readily than others, particularly within the student affairs' offices? The answer to this question can foster the use of computer-based information systems in the planning and decision-making processes used by student affairs' administrators in higher education institutions.

The Principle Research Question

What factors facilitate and what factors inhibit the use of computer-based information systems in student affairs' planning and decision making?

Subsidiary Questions

1. What is the present status of computer-based information systems at selected public, four-year higher education institutions in Virginia?
2. How does the user's perception of technological innovation affect his or her use of computer-based information systems?
3. How do training and support affect the use of computer-based information systems?
4. How does an "integrator" or link person affect the use of computer-based information systems?

5. How does commitment by top institutional leadership affect the use of computer-based information systems?

6. How does a long-range institutional plan for improving the utilization of technology affect the use of computer-based information systems?

Definitions:

Academic Planning or Decision Making: The academic planning function involves the determination of goals and strategies, policies, programs, schedules, procedures, tools, techniques, and methods for achieving them. Planning is decision making for the future. Planning involves choosing among alternatives, and it encompasses innovation (Richman and Farmer, 1974, p. 13).

Computer-Based Information System: A computer based information system is a system designed to create and handle information and to provide support for those who manage organizations (Brinkman, 1984, p. 13).

Computer Support Service Departments: Work done or duties performed by those individuals reporting to computer departments. Services may include providing training and support, maintenance and repair of software and hardware, consulting, and operating computer laboratories.

Data Base: A collection of data organized in a manner which allows retrieval and use of that data (Shelly and Cashman, 1984, p. I.4).

Data Base Management System: Software packages, also called file
management systems, that allow users to define files, records within files, and data elements or fields within records in a relatively easy manner, and to provide a convenient method to access, update, and create reports from the data (Shelly and Cashman, 1984, I.4).

**Electronic Mail:** A software package that gives computer users the ability to send messages in the form of letters and memos to other personal computers connected to a network (Shelly and Cashman, 1984, I.6).

**Electronic Spreadsheet:** A software package that allows a user to develop a spreadsheet that contains both data and formulas (Shelly and Cashman, 1984, I.6).

**In-House Training:** Training tailored to meet the needs of a specific office and taught within that office.

**Integrated Software:** Software packages that combine functions such as word processing, electronic spreadsheet, graphics, data base management, and telecommunication into a single easy-to-use program.

**Integrator or link person:** A person in an institution who links the technical aspects of a decision-making process with the academic or non-technical aspects. An integrator or link person is one who is intimately acquainted with the data, the way the particular computer-based information system can work, and how the data are to be reported (Harris, 1983).

**Internal Documents:** Memos and other communication that are circulated inside an organization (Bodgan and Biklen, 1982, p. 101). Internal documents may include policy statements, memorandums, bulletins, catalogs, announcements, and self-study correspondence.
**Local Area Network:** A communication network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed (Shelly and Cashman, 1984, I.9).

**Mainframe:** A large centralized computer, with more processing capabilities than a minicomputer, which is able to store large volumes of data and provide access by numerous users (Shelly and Cashman, 1984, I.10).

**Office-Specific Software:** Specialized and prewritten software that is commercially designed for a precise office function or task.

**Personal Computer:** Small computer systems, also called microcomputers, with memory capacity and speeds less than the larger mainframes and minicomputers (Shelly and Cashman, 1984, I.12).

**Software Programs:** A series of instructions to perform input, arithmetic, logical, output, and storage operations (Shelly and Cashman, 1984, I.13).

**Technological Innovation:** A new method, idea, or device resulting from improvement in technical processes that increases productivity of machines and eliminates manual operations or operations done by older machines (Webster, 1963, p. 905).

**Word processing:** A software package that allows users to prepare letters and memos using the computer (Shelly and Cashman, 1984, I.17).
Chapter Two:

Review of Literature

Purpose and Organization

Three broad sources of literature were surveyed as background for a study of computer-based information systems (CBISs) in student affairs' planning: (1) literature on the history, principles, and effects of planning, (2) literature on the theoretical uses of computer-based information systems for academic, student affairs, and corporate planning purposes, and (3) literature on actual models and approaches that higher education institutions have used to link computer-based information systems with academic and student affairs' planning.

The review is organized topically into two main areas. First, the topic of planning is addressed beginning with a brief historical perspective related to academic institutions. Theoretical planning principles and the positive and negative implications of planning are presented.

Second, literature on computer-based information systems are reviewed from a historical perspective that links the concept of planning at colleges and universities with computer-based information systems. CBISs are defined and categorized and literature is presented on effective uses of such systems. An attempt is made to relate the CBIS to the appropriate type of academic planning. In addition,
examples of academic institutions that have successfully utilized different types of CBISs are cited.

Finally, a summary is presented that condenses the review of literature. Important facets of the use of computer-based information systems in higher education planning and decision making are highlighted and an analysis of the status of research and writing on the topic is included.

Planning: History, Principles, and Effects

Historical Perspective.

Prior to the 1960s, most [higher education] institutions were created and grew with no real plan other than a generally shared ideal as to what a collegiate institution should be. They simply reacted to the period of rapid expansion of higher education as best they could—which turned out to be remarkably successful. Buildings were built, faculties enlarged, and scholars were quickly trained for the research made possible by increasing federal support. The sheer magnitude of growth concealed the effects of the lack of planning... From the end of World War II until the late 1960s—growth, affluence, and optimism prevailed. Since all indexes were positive, leadership found no reason for close monitoring. Then, in the late 1960s, all of those indexes suddenly turned down (Mayhew, 1979, p. 111-112).

At this point, institutions made some illuminating discoveries. They discovered that administrators did not have the necessary knowledge of how their institutions functioned, they lacked the management tools to control the institutions, and they were without a
concise plan of action for the institutions to follow. Financial reserves were being used up, endowments dwindled, and tenured faculty increased. Even presidents were unaware of these changes and that higher education institutions were entering a new era. This era was characterized by Cheit (1971) as a type of depression.

In the 1970s, student demonstrations and occasional violence and disruption fostered a threat to institutional autonomy and often promised loss of esteem and confidence on the part of the public. Other factors that affected the campuses in the 1970s were stated by Keller (1983), Mayhew (1979), and others. These included: rising oil prices and fuel bills; double-digit inflation and increased cost of educational supplies, equipment and labor; rising health care costs and major medical care; new expenses for the handicapped; new affirmative action plans; increased lawsuits and increased size of legal staffs; and the rising cost of new computer equipment. In addition, Keller stated that "more detailed federal accounting procedures, the rise of state coordinating agencies and their voracious demands for data, and nervous state budget officials seeking greater accountability forced the expansion of white-collar institutional research, accounting, and reporting staffs" (1983, p.11). Overall, "in the mid-1970s, the institutions typically sought to stabilize their condition through the imposition of some rather primitive management and information systems" (Mayhew, 1979, p.113). Since colleges and universities preferred a management plan that has a passive, status-quo oriented style, the "laissez-fair" campus administration typically was found.

Institutions experienced changing patterns in student mix, degree
preference, course-load and student course-taking behaviors; increasing competition with business and industry for students; increasing numbers of part-time faculty; changing regulations and policies due to tighter fiscal accountability; and evolving societal needs. "Still, most colleges and universities lacked adequate planning, strong internal management, and a transparent set of academic objectives" (Keller, 1983, p. 25).

Some planning theorists contend that planning requires an elaborate and precise information system and better ways to arrive at effective decisions that, in turn, help to identify, appraise, and establish priorities to reallocate resources (Jones, 1982; Keller, 1983; Mayhew, 1979; Timm, 1983, and others). Furthermore, as Timm (1983) stated, "the increased public demand for additional accountability in higher education required institutions to demonstrate in a timely and convincing manner the effective and efficient planning, allocation, and utilization of public and private funds" (p. 27).

Principles of planning. According to Mayhew (1979) the growing literature on planning suggested a consensus on how planning should be done. Millett codified this consensus in his booklet, Planning in Higher Education (1977). Millett pointed out, however, that planning offers no immediate answers to problems but rather a rationalized approach to the future. Moreover, Keller (1983) stated that the old idea of planning, one that most people in academia still carry in their heads, largely has been discredited. He stated that "university executives have shied away from applying their analytical intellects and powers of persuasion to the design of their institutions’ future
because the field of planning itself has been in disarray for at least a dozen years" (p. 100). Principles of planning, therefore, need to be redefined in order to further the understanding and analysis of this topic. Specifically Richman and Farmer (1974, p. 19) defined planning as:

. . . the determination of goals and of the strategies, policies, programs, schedules, procedures, tools, techniques, and methods for achieving them. Planning is decision making for the future. Planning involves choosing among alternatives, and it encompasses innovation—one must do some planning in order to innovate effectively. Planning tends to be the most crucial function with regard to the organization's external environment.

Consequently, if one agrees that planning is indeed the most crucial function with regard to the organization's external environment, then further analysis of college and university planning is mandatory. Mayhew (1979) suggested that the broad concept of college and university planning is divided into several distinct phases such as:

. Anticipating the future
. Formulating strategic objectives
. Defining individual and social values
. Determining work objectives
. Inventorying current resources
. Calculating needed additional resources
. Developing work programs
. Making organizational arrangements
Mayhew further contended that institutional planning consists of seven major elements: (1) the statement of mission, (2) the external environment, (3) internal assumptions, (4) program objectives, (5) foundation plans, (6) budgets, and (7) evaluation plans. Millett (1977) stated that plans are organized in various ways and specific plans created for (1) instruction, (2) enrollment, (3) organizational structure, (4) personnel, (5) facilities, (6) management information, (7) income, (8) expenditures, and (9) evaluation. He believed that each program or subordinate unit is expected to plan for each of these elements in such a way that when the plans are reviewed and consolidated at higher levels, they constitute the total institution’s master plan.

Literature on higher education planning reveals that the faculty, department heads, deans, vice presidents, presidents, and governing boards perform all types of planning although in different proportions and at different levels of sophistication (Harmon, 1986; Jedamus, 1984; Jedamus & Peterson, 1980; Millett, 1977; Rourke and Brooks, 1966; Spague & Carlson, 1982). Constituents interested in the institution’s finances, physical plant, student affairs, and policy use various types of planning to analyze particular tasks, goals, or objectives. Levels of sophistication vary from low to high with operational planning at the low end, tactical planning somewhere in the middle, and strategic planning at the high end.

Operational planning includes structured, programmed decisions
that are of routine nature, well-defined, and value-free. Ideally, operational planning is directed to the accomplishment of specific tasks, completely automated, and objectively analyzed. Examples of operational planning include planning for registration, payroll, personnel, accounting, inventory, file organization, equipment maintenance, institutional food purchasing, and printing (Harmon, 1986; Jedamus, 1984; Sprague and Carlson, 1982).

Tactical planning includes semistructured, semi-programmed decision making and it encompasses short-range forecasting as well as decision making to assure effectiveness in the acquisition and use of resources. Tactical planning is directed toward the accomplishment of organizational objectives and is usually the responsibility of individual decision makers. Examples of tactical planning include analysis of instructional costs, comparative budgets, traffic patterns, admissions data, teaching loads, course loads, and grading patterns in departments (Harmon, 1986; Jedamus, 1984).

Strategic planning includes unstructured, "non-programmed decisions which are so unique, ill-defined and of such major consequence to the entire institution as to be solvable only through a collective and political process involving all of the affected personnel" (Harmon, 1986, p. 19). Strategic planning is directed toward the establishment, evaluation, and analysis of organizational objectives and policies. Examples of strategic planning include cost-benefit analysis of budgetary alternatives, space allocation, long-range forecasting, evaluation of plans of action, selection of resources, choice of objectives, and the development of policies.
In summary, principles of planning offer no immediate answer to a problem but rather a rationalized approach to the future. A redefinition of planning is called for by many planning theorists as the broad concept of planning is often misunderstood. Mayhew (1979) offered ways of categorizing the broad concept of planning into distinct phases ranging from anticipating the future to evaluating accomplishments. He further stated that each component of planning consists of seven major elements. Major elements include the mission, statement, external environment, internal assumptions, program objectives, foundation plans, budget, and evaluation plans. In addition, Millett (1977) organized plans by purpose or institutional concern such as instruction, enrollment, organizational structure, personnel, facilities, management information, income, and evaluation.

Another principle of planning revealed in the literature relates to the constituents interested in the planning of higher education institutions. As the literature suggests, all higher education constituents react to planning elements to different degrees and at different levels of sophistication. Levels of sophistication vary from low to high, with operational planning at the low end, tactical planning somewhere in the middle, and strategic planning at the high end. The key to good planning exists in the proper match between the correct form of planning and the specific planning objective or element.

Effects of planning. The planning literature discloses that in order for planning to be successful, the following factors are
important: the visible commitment of top organizational leadership; acceptance and support of the planning process by those with program responsibility; establishment of appropriate policies and procedures to support the plan; and the creation of a management information system to supply the data needs of the plan (Hipps, 1982; Hopkins & Massey, 1981; Mayhew, 1979; and others). Peterson (1980) suggested that successful planning processes have certain characteristics. They:

1. **identify critical issues** and problems confronting or likely to confront the institution
2. **assist others** in incorporating planning activities in their own realm of responsibility
3. **coordinate** planning activities
4. **develop plans** and alternatives
5. **assist in implementing** action plans (p. 118).

Mayhew (1979) stated that a plan serves as a device that socializes individuals, helps to create a sense of community, produces a collective memory, and facilitates the development of new innovations. He contends that

Thoughtful planning and wide dissemination of results is a means by which institutions, or systems of institutions, maintain some degree of autonomy and restrain somewhat the direct operation of political force on the academic establishment. The institution that accumulates impressive and good data and displays them candidly is likely to be less vulnerable to political, legislative, or agency intrusion than the institution that appears secretive or whose officials appear to fake requisite information"
In regard to the negative effects of planning, the literature indicates that planning involves change, and change moves people away from a known situation, place, or process which typically results in anxiety and fear (Thompson & Wright, 1986; Winstead, 1982). Further, fears about planned change arise because of concern that the information used for the decision situation may be oversimplified, indiscriminately used, or overly quantified (Hopkins & Massey, 1981). There is a recognition among planning theorists that planned change produces trauma and loss of security if not properly implemented.

In summary, successful planning involves top-leadership commitment, acceptance and support of the planning process by those with program responsibility, establishment of supportive policies and procedures, and use of a management information system to supply data needs of the plan. Further, successful planning is characterized as systematic, deliberate, and carefully implemented. A plan of this type typically assists others in coordinating activities and identifying critical issues.

According to the literature, the major deterrent to successful planning is the fear of change. Since all plans involve change and change moves people away from a known condition, planning theorists emphasize the need for open discussion of planning and decision-making processes in higher education. One tool mentioned as being successful in the planning and decision-making processes is a computer-based information system. How have computer-based information systems become tools in the planning processes of higher education, particularly in
student services? What types of computer-based information systems exist and how are they used in student services divisions? The following section of the literature review focuses on the answers to these questions.

**Computer-Based Information Systems: History, Scope, and Uses**

*Historical perspective.* The idea of using computer-based information systems for planning of higher education institutions is not new. Beginning in the 1950s, several events changed the complexion of planning in higher education institutions. First, the computer emerged with its promise of "handling vast quantities of data and analyzing complex systems in organization and societal units" (Keller, 1983, p. 103). Second, the concept of institutional research surfaced based on the need for "better and faster" information on which to make decisions. The demand for more information arose from within the institution by administrators and from outside the institutions by accrediting agencies, federal and state governments, and foundations. By the mid 1960s, the computer and institutional research functions melded together to form a more systematic, data-based management approach to planning. This approach was named management information systems and was "produced in part by the growing state and federal interest in long-range planning based on comprehensive data and in part by the introduction of computers into the administrative practices of institutions" (Mayhew, 1979, p. 92). The advent of computer management in higher education was also noted in a study conducted by Rourke and Brooks (1966) and published in their book, *The Managerial Revolution in Higher Education*. 
Also during the mid 1960s, higher education rapidly created computer-modeling schemes. A model was a representation of reality (as that reality was understood). The Comprehensive Analytical Method for Planning in University Systems (CAMPUS) model, developed by the Systems Research Group in Toronto, Canada, in 1965, calculated the resources necessary—faculty, equipment, space, dollars—for various enrollment levels. However, the literature pointed out that CAMPUS provided considerable flexibility in simulation but at a cost of greater requirements for data (Mayhew, 1979). Peat, Marwick, and Mitchell developed the System for Evaluating Alternative Commitments in Higher Education (SEARCH) used by smaller colleges. "One of the most widely-publicized systems during the late 1960s was the federally financed Resource Requirements and Prediction Model (RREM). The National Center for Higher Education Management Systems (NCHEMS) at the Western Interstate Commission on Higher Education (WICHE) made the model available" (Balderston, 1978, p. 235). This model was developed after an earlier model by George B. Weathersby of the University of California at Berkeley in 1967-68. Similarly, in 1969, William Massy of Stanford started Project INFO to design and test a computerized management information system to manage the university (Keller, 1983).

A number of surveys of model building for higher education are available. The most comprehensive one was constructed by Roger G. Schroeder (1973). "Schroeder divided the applications of management science to higher education into the following categories: (a) planning, programming, and budgeting systems; (b) management information systems; (c) resource allocation models, (d) models for
student planning; (e) faculty staffing models; and (f) optimization models" (cited in Hopkins and Massey, 1981, p. 9). The literature, however, indicates that one additional model should be added to Schroeder's list: educational planning models developed to aid system-wide administrators or government officials.

The literature suggests that there have been no successful efforts to model comprehensively two areas of decision making crucial to higher education. The first of these is the choice of academic disciplines in which the institution should excel. The second is the choice of criteria and measures for evaluating individual faculty members for appointment and promotion. Models related to faculty staffing, for example, do not assess the intellectual promise and intrinsic importance of fields and subfields or the qualifications of individual professors (Hopkins and Massey, 1981).

According to the literature, effective computer-based models share the following characteristics: simplicity, completeness on important issues; ease of control; stability in the face of minor deviations in input assumptions; adaptability to new, yet related, decision situations; and ease of communication with the user (Balderston, 1978; Mayhew, 1979; Hopkins & Massey, 1981).

In summary, computer-based information systems entered higher education institutions in the 1950s with a promise of providing "better and faster" information on which to make decisions. In the 1960s, computer-modeling schemes were initiated in an effort to better manage the university. Since then, many concepts for model building were developed, however, no one model or computer-based information system
has captured all the necessary data to answer all questions voiced by campus administrators or outside agencies. Seemingly, the best that the literature can present is a general list of characteristics that facilitate effective computer-based models.

**Defining the scope of computer-based information systems.**
Management information systems and modeling are two of the computer-based information systems used today in higher education. Offered below are definitions of an information system and six types of CBISs presently used in colleges and universities. Precise terminology is important as newer innovations tend to include some of the attributes of the previous generation of technology.

Computer-based information systems are systems designed to create and handle information and to provide support for those who manage organizations. Specifically, the word "information is that which informs, that which in some way reduces uncertainty while the word system refers to a network of structures and channels for recording, storing, retrieving, analyzing, and transferring data and information" (Brinkman, 1984, p. 13). According to Brinkman (1984) and McGrath (1986), six types of computer-based information systems presently are being used. The following list represents an evolution in the development of computer-based information systems. Accordingly, each computer-based information system possesses attributes of the preceding generation of technology.

1. Electronic Data Processing (EDP) refers to an electronic system that processes records, stores, maintains, and recalls data pertinent to the basic operation of an organization.
Typical EDP applications include student registration, library check outs, accounts payable, and donation accounting. Operational planners typically utilize EDP applications.

2. Management Information Systems (MISs) utilize comprehensive data bases, combine elements of various data files, and design highly structured information flows. They are geared to a series of reports that enable a manager to assess how well the organization is meeting its objectives. Examples of MIS applications include monthly budget reports, course enrollment reports, reports showing the number of majors or the cost per student credit-hour by department. In higher education, admissions and recruiting are often controlled by a MIS. Since MISs tend to be rigid and focus on routine reporting, they are best used at the operational level of planning.

3. Data Base Management Systems (DBMSs) are a set of software programs that allow a user to organize, maintain, and query data files and to generate custom-designed reports from those files. DBMSs permit the finding, extracting, and formatting of data into reports to be done quickly. Applications similar to those cited for MISs are also used with DBMSs. Accordingly, data base management systems typically are used for operational planning.

4. Modeling (or a simulation model) is used in higher education to represent situations in such a way that the effects of
varying a particular value or formula are ascertained. Examples of models included budget and enrollment forecasting, faculty pay models, or hiring and promoting models. A more specific model commonly employed is the electronic spreadsheet used as a tool for financial projections, budgeting, and planning. Modeling is used for any level of academic planning, however, its capabilities of "what if" or "how to" analysis are particularly useful for tactical and strategic planning.

5. Decision Support Systems (DSSs) refer to an interactive computer-based system that helps decision makers use data and models to solve relatively unstructured problems for strategic planning. DSSs are designed to work in conjunction with other processes and systems as part of an overall information system. An administrator develops a decision support system by including policy manuals, administrative guidelines, established political precautions, previous institutional procedures, and personal recollections and advice from trusted colleagues. A data base containing economic, demographic, and social trends within the service region of the institution is essential for policy analysis.

6. Group Decision Support Systems (GDSSs) refer to a system that enhances efficiency in retrieving, summarizing, displaying, and manipulating information. GDSSs incorporate models to aid multiple decision makers in complex calculations required in strategic planning. Many of the GDSSs that aid in strategic
decision making are variants of computer-supported conference rooms. Examples of GDSSs include electronic boardrooms, teleconferencing facilities, information centers, and decision conferencing rooms. According to McGrath (1986), some common components of GDSSs include personal computer terminals for each participant in the meeting, a public display screen for viewing by the whole group, computing and communications capability between all participants, and computer software for word processing, data base access and management, and graphics display. The objectives of computer-supported conference rooms are to make group decision making more effective by increasing both the efficiency of such meetings and participant satisfaction with the process (p. 67).

*Toward the effective use of computer-based information systems.*

According to Timm (1983), "comprehensive computer-based information systems are difficult, if not impossible, to implement in higher education because decision making in higher education is diffuse, decentralized, and political in nature. Hence, trying to systematize all decision making in advance is the wrong approach" (p. 28). In other words, data and analysis are needed to generate information that is, then, in turn, tailored to accommodate the situation. Others such as Ray Bachetti (1983) of Stanford and Dennis P. Jones (1982) of NCHEMS have stated that little is known about how decisions are made in colleges and universities and even less is known about how they should be made. Consequently, Bachetti and Jones reported a need for more
research aimed at documenting the higher education decision-making process.

Jones (1982) further stated that since colleges and universities cannot measure outputs of higher education it is difficult to estimate inputs. Thus, he surmised that higher education needs a new input/output model for information. In addition, Jones cited barriers to the use of CBISs which include: (1) information generated is not timely or accurately defined for the decision-making process, (2) top management holds low-level expertise regarding analytical techniques, (3) technicians lack perspectives necessary to focus informational requirements, and (4) quantitative measures do not effectively measure qualitative attributes of data.

Very few studies were discovered in the literature review that focus on the use of computer-based information systems in academic or student affairs divisions. One study, however, conducted by Farrell (1984), focused on resistance to implementation of computer-based information systems in the administration of higher education. A questionnaire surveyed top academic officials at each of 356 higher education institutions in the United States. Answers to the following questions were sought: (1) what characteristics of the upper tier of operating line officers are used to explain success or failure of computer-based information systems' implementation as measured by the systems used in decision making and (2) what organizational characteristics of colleges and/or universities correspond to an "institutional climate" which is conducive to successful implementation of computer-based information systems? Results of the survey showed
that there are substantial differences between analytic (natural science) and intuitive (humanities and social sciences) decision makers in their use, confidence, and attitudes concerning the use of computer-based information systems. Administrators with engineering, mathematics, and natural sciences backgrounds ranked at the top of the list for successful use of computer-based informational systems while administrators with humanities, business, education, social sciences, and educational administration backgrounds ranked at the bottom. In addition, Farrell found: (1) as years of experience increased in the same position at the institution, decision makers were less likely to use the computer-based information systems, (2) as presidential use of the systems increased, other decision makers were more likely to use computer-based information systems, (3) as funding occurred from within the institution to implement computer-based information systems, more use of computer-based information systems were likely to occur, (4) if the potential user held a positive pre-disposed attitude toward the computer-based information system, more use of the computer-based information system was likely to occur and more involvement in the decision-making process to purchase a computer-based information system was likely to occur, (5) as the decision makers' ages increased, decision makers were less likely to use computer-based information systems, and (6) as computer-based information systems that were tailored to meet the needs of the institution increased, more use of computer-based information systems were likely to occur within that institution.

Many institutions of higher education found it difficult to locate
administrative people who could mix a broad management perspective with technological and organizational skills. Few colleges and universities created the position of Chief Information Officer, Vice President for Information Services, or Associate Vice President for Computing and Related Technologies. This position is often nicknamed "Computer Czar". Fleit (1986) stated that 100 of the 3,700 higher education institutions in the U.S. have established the position of Computer Czar. The person selected for this position is usually pulled from outside the academic institution because a technical, computer-literate person is thought to be needed. Fleit stated that "the creation of this singular position was a signal. A signal on how an institution is dealing with one of the most important forces to hit higher education in its history—the force of technology" (p. 30). This signal often is not readily accepted in the academic hierarchy; and, consequently, further impedes the acceptance of the innovation. What most institutions need, Fleit stated, "is not a czar, but rather someone more benevolent, someone who helps educate others about the issues, but not necessarily about the technology, and someone who helps shape the future, but does not dictate its outcome" (p. 30).

A study of 25 participating institutions conducted in 1983 by Nancy Naron and Nolan Estes employed a multiple case study analysis approach in surveying the impact of technology on education. Sixteen public schools and nine colleges/universities were included. Information was gathered through the use of a lengthy questionnaire and a comprehensive telephone and/or site visit interview. Most institutions surveyed stated that it is important to have a long-range
plan for improving the utilization of technology. In addition, most institutions used committees to obtain financial resources, to obtain commitments from various groups, and to act as catalysts for facilitating desired programs. Academic and corporate literature concur with the findings that a detailed institutional plan is absolutely essential to the success of the CBIS (Coombes, 1986; Evancoe, 1985; Fleit, 1986; Kliem, 1986; LeDuc, 1986; Little & Temares, 1983; Lukesh, 1986; Lucas, 1986; Naron & Estes, 1985; Partow-Navid, 1987; Zastrocky, 1986).

Success of CBISs was also defined in the literature according to the data generated that were transformed into useful information. Jones (1982) stated that the computer-based information system should "yield information about the dynamics of the system of interrelations that embrace the institution, student, and the world about them" (p. 27). He further stated that information should be relevant, acceptable, timely, complete and accurate. Timm (1983) added to this list the qualities of reliability, validity, intelligibility, and quality.

A study conducted by Harris (1983) disclosed that in over 130 institutions, decision makers who held poor attitudes toward CBISs impeded the institution's technological progress. The study also revealed that decision makers without direct access to data (or those decision makers who chose to be supplied with data) needed the skill and ability of an intermediary party. The intermediary party was described as someone who was intimately acquainted with the data, the way the particular system worked, and how the data were reported. The literature revealed that this person was often called an integrator.
Personal skills of integrators include personal relation skills in addition to technical skills, a healthy respect for the complexity of the decision-making process, and an appreciation for nonquantitative measurement. The study recommended identification and development of the role of integrators in the institution and investment of resources in training middle and senior management to understand and use computers. Further the study calls for an examination of the ways quantitative information is reported to constituents of higher education and it identifies a need for studying both the decision-making process and the use of nonquantitative information.

Further traits that underlie successful use of CBISs were documented based upon a review of the theoretical literature in education and business. These traits include upper-level administrative or executive commitment (Epic, 1986; Er, 1987; Fleit, 1986; Lukesh, 1986; Lucas, 1986; Zastrocky, 1986), institutions' or corporate aspiration level consonant with its present mission or future objectives (Lukesh, 1986), an adequate support staff available for conducting reporting tasks (Lukesh, 1986), adequate computer training for faculty and staff (Coombes, 1986; Epich, 1986; Hanley, 1986; Helfgott, 1986; Henderson & Oscarson, 1986; Ledbetter, Cox & Snyder, 1986; Martin & Merle, 1986; Zastrocky, 1986), and ongoing communication of planned technology at all organizational levels (Epich, 1986; Kliem, 1986; Lucas, 1986; Lukesh, 1986).

According to the literature, advantages of computer-based information systems in planning include the following: (1) faster decisions or a greater number of decisions in a given time, (2)
improved decision-making effectiveness, (3) reduced cost of unavailable or poor information, (4) help in "selling" decisions, (5) ease of operation, access, and control, (6) flexibility to be readily modified and updated, (7) comprehensiveness of all important elements of the decision and (8) proper introduction into the organization (Fleit, 1986; Little & Temares, 1983; Lukesh, 1986; Timm, 1983; Zastrocky, 1986; and others).

Regrettably, the literature tenders no consensus on what facilitates the use of computer-based information systems in institutions of higher education. Very few studies were found that deal specifically with the use of computer-based information systems in academic or student affairs' planning. Some findings showed, however, that increasing age of the user, outside funding of the CBIS, a negative predisposition toward the technology, and an intuitive-type background of the user increase the chances of resistance to implementing and using computer-based information systems. Other research demonstrated that top-level commitment, tailor-made CBIS applications, a detailed, well-communicated institutional plan for the implementation and use of the CBIS, identification and development of the role of integrators, on-going training and support programs, and a sensitivity to the unique needs and mission of the college or university facilitate the use of computer-based information systems.

Examples of Institutions Using CBISs

The final area surveyed in the literature consisted of actual models and approaches that higher education institutions are employing to link computer-based information systems with planning and the
decision-making process. Several institutions were identified and are offered as examples which represent various uses of computer-based information systems. See Appendix A for examples of institutions using computer-based information systems.

Summary

Research on how the decision-making process is conducted by higher education institutions is recommended strongly in the literature reviewed. An ongoing theme in the literature is that both the planning and decision-making processes in many higher education institutions already use computer-based information systems of some type, however, these systems are of uneven quality. Future research on this topic is, therefore, deemed important. In the last three decades, computer-based information systems have become more prevalent, more analytical, and more strategic for planning purposes. An increased demand for accountability (for both public and private funds) by external interest groups have pushed institutions into providing timely and convincing plans that should prove effective and efficient. Furthermore, the literature reveals a consensus among planning theorists that thoughtful planning and a wide dissemination of results is a means by which institutions can maintain greater autonomy. An institution with impressive and accurate data that are displayed openly is likely to be less vulnerable to outside pressures than institutions which lack requisite information or appear secretive. Factors commonly cited that lead to the successful use of computer-based information systems in the planning process are summarized as follows:

1. Visibility: The CBIS must be observed by members of the
institution in order for it to be perceived as legitimate. Continued efforts to foster technology on the part of those who advocate the use of CBISs is important.

2. Participation: Commitment by top leaders for the support of the CBIS is very important. As many groups as possible (especially those with program responsibility) should be involved in the decision to implement a CBIS.

3. Communication: The objectives of the CBIS must be clearly communicated and understood—a detailed plan for technological use and improvement is necessary. The proper introduction of the CBIS into the organization is important—a trial basis may be necessary. Open discussion and constant feedback is important in order to lessen surprise and to ensure that all important elements of the decision-making process are included.

4. Compatibility: The CBIS must be in line with the norms, values, interests, and needs of the group. The CBIS must be in concordance with the mission of the institution. Appropriate policy and procedures are needed to ensure compatibility with the system.

5. Profitability: The innovation must be better than something that preceded it. The CBIS should provide a mechanism for faster decisions, improved decision-making effectiveness, and reduced cost of previously unavailable or poor information.

6. Flexibility and Timeliness: Information generated from the CBIS should be timely for the decision-making process,
adaptable to the situation, and simple to change. Ease of access and control are also important.

7. Reliability and Validity: Information generated should measure what it is intended to measure and the same results should be achieved on different attempts to attain the same data. Information should be relevant, intelligible, complete and accurate.

8. Support: The CBIS causes change in the institution, therefore, there is a need to redefine patterns of responsibility and performance of the group adopting the innovation. A need for training and support during the adjustment period of using new technology is important.

9. Integrator: An individual who links the academic and technical needs of the planning process is important. The literature indicates that the role of the integrator needs to be defined, promoted, and supported.

In conclusion, many issues as indicated by the review of literature are worthy of further study. For example, research is necessary that identifies characteristics of college and university administrators who could fill the new decision maker’s role—a role commonly found today that mixes technological expertise, management perspectives, and organizational skills. More efficient and effective recruiting for these new positions would then be possible. Still another research topic might focus on how data collected on students improves the effective operation of student affairs’ offices such as admissions, financial aid, registrar, counseling, placement, and
residence life. Further, a study that identifies the characteristics or behavior of people who hold a positive predisposition concerning CBISs may suggest a list of criteria that, when fostered, would help improve the use of CBISs in institutions of higher education. An additional research topic gleaned from the literature review might focus on the difference between analytic and intuitive decision makers in their use, confidence, and attitudes concerning the use of CBISs. Perhaps understanding distinctive thinking processes may lead to increased use of CBISs as well as changes in training and support programs. Finally, the literature review demonstrates that CBISs are an important tool in facilitating the planning and decision-making processes in higher education institutions. Why, then, do some institutions more readily than others use CBISs, particularly in student affairs' offices? The focus of this study is to determine what factors facilitate and what factors inhibit the use of CBISs in student affairs' planning and decision making.
Chapter Three:
The Research Design

The Rationale

In descriptive surveys such as questionnaires and interviews, the objective is to gather information that answers the research question posed. As Fox (1969) stated:

... in educational research there are two conditions which occurring together suggest and justify the descriptive survey: First, that there is an absence of information about a problem of educational significance, and second, that the information does exist and is accessible to the researcher (p. 424).

Aspects of the research problem were accessible through the utilization of the survey method. For example, a review of related literature indicated that several surveys had been conducted which attempted to determine what factors led to the successful implementation of computer-based information systems in higher education institutions. Still other surveys have focused on the impact of technology on education and the effect of decision makers' attitudes toward the use of computer-based information systems. No surveys were identified which focused specifically on the factors that facilitated or inhibited the use of computer-based information systems in student affairs' planning and decision making. Thus, both conditions as stated by Fox (that no evidence exists and the data are accessible) were met
and therefore justified use of the descriptive survey method.

The Sample

A review of the literature indicated a set of factors that contribute to the use of computer-based information systems in higher education as well as in the business world. (See pages 34-36 for a review.) Based on this set of criteria and an informal conversation with a staff member of the State Council for Higher Education in Virginia (SCHEV), four-year state institutions in Virginia were matched with the specified array of characteristics. Three institutions were deliberately selected based on the strength of their reputations for using computer-based information systems in planning and decision making generally. All three cases differed by institutional type, size, and mission; they included: Virginia Polytechnic Institute and State University (VPI & SU), James Madison University (JMU), and Mary Washington College (MWC).

A letter of introduction was sent to the chief student affairs' administrator of each of the selected institutions. This letter included a request for a recommendation of student affairs' directors and top administrators to be included in the study. See Appendix B for a copy of the letter of introduction. A follow-up letter of introduction detailing the purpose of the research was sent to those top student affairs' officials identified. See Appendix C for a copy of the follow-up letter. This list included eight student affairs' officials from VPI & SU, nine from JMU, and five from MWC, all of whom who were invited to participate in the research. Phone calls were made to each student affairs' official of each selected institution to
schedule a convenient time for an interview. All interviews were convened at the time scheduled with the exception of the Director of Admissions at JMU. The scheduled time was cancelled and several attempts to reschedule failed. Also included in the sample were key individuals linked to the student affairs' offices. These included persons in positions such as integrators within the individual student affairs' offices, outside consultants hired by the student affairs division, and administrative and academic computer center personnel. Classification of the twenty-five respondents participating in the interview process from each institution is illustrated in Table 1 which is found on the next page.

Data-Gathering Approach and Technique

A semi-structured interview technique was used to gather data from each participant. A pilot study was conducted in order to develop the interview and coding categories necessary for content analysis. Fixed-response questions, open-ended questions, and probes were constructed in advance. See Appendix D for a copy of the interview questions. According to Fox (1969), in an unstructured or semi-structured interview, "the interviewer was not restricted to the list of questions and was free to ask additional questions, to repeat questions, and to move off onto tangents that showed promise of providing information useful to the purpose of the research and likely to help answer the research question" (p. 546). The researcher employed this questioning strategy. Limitations of the interview technique employed included reliance on self reporting, reliance on participants' recall, and reliance on the interviewer to report unbiased results [response
### Table 1

Classification of Participants from JMU, VPI, and MWC

<table>
<thead>
<tr>
<th>Title</th>
<th>JMU</th>
<th>VPI</th>
<th>MWC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vice President for Student Affairs</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Assistant Vice President for</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Student Affairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dean of Students</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Director, Student Health</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Director, Career Planning and</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Placement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Director, Counseling</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Director, Financial Aid</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Director, Residence Life</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Director, Student Activities</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Computer Center Staff</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
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<td><strong>TOTAL</strong></td>
<td>11</td>
<td>9</td>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>
effect]. To control for these limitations, elements in the research situation were identified that may produce bias. A discussion of the research procedures with a few subjects from the respondent population who were not included in the sample helped to define the research from the respondent’s point of view. As mentioned above, a pilot interview was conducted with frequent probes of the respondents’ perceptions and feelings.

Each of the student affairs’ officials and other key individuals invited to participate in the research were interviewed. One interview form per participant was used. In the event that the participant couldn’t answer a question, he/she was asked to name an individual who should be able to supply the answer. This person was then contacted and asked for the data needed to complete the question. Goetz and LeCompte (1984) called this data-gathering strategy "network selection."

A second method of data collection employed was document analysis. Internal documents such as college catalogs, statistical summaries, student affair’s goals and objective statements, planning documents, and policy statements were collected from available sources during each site visit. Table 2 on the next page illustrates the types of documents collected and analyzed from each institution. Document analysis was used to give perspective to and enrich the interviewees’ remarks and perceptions.

Data Analysis

The qualitative technique of content analysis of data was used. According to Goetz and LeCompte (1984) qualitative researchers tend to analyze their data inductively. Goetz and LeCompte state, "inductive
Table 2

Type of Documents Collected from Each Institution

<table>
<thead>
<tr>
<th>Document</th>
<th>JMU</th>
<th>VPI</th>
<th>MWC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Affairs Division mission statements, goals and objectives, or annual reports</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Student Affairs Office goals, objectives, annual reports, or feasibility studies</td>
<td>3</td>
<td>6</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Computer Center policy statements</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Computer Center newsletters, workshop or course schedules, or general information</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>College/University budget documents</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>College/University statistical summary</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>College/University Student information</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Institutional Self-Study</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>17</td>
<td>7</td>
<td>38</td>
</tr>
</tbody>
</table>
research begins with a collection of data and builds theoretical categories and propositions from relationships discovered among the data" (1984, p. 4). One or more databases are used by sorting and classifying until constructs and categories emerge. Goetz and LeCompte (1984) elaborated on the process of theory building. They state that: "the raw data can then be reduced to quantifiable form by scanning, listing, coding, and scoring. Linkages then may be established by simple comparing and contrasting, by identifying underlying associations, by inference or by statistical manipulation" (p. 171).

Each of the case studies is described in narrative form. The setting, how the interviewer entered the site, and a chronology of the interview process is documented. The interview structure used at each of the three case institutions encompasses six broad areas of interest. Each area of interest was addressed on the interview guide as a major research question. Prompts and open-ended questions were also employed. The six areas of interest and the content covered during the interview process included:

1. What is the present status of CBISs at the selected public, four-year higher education institution in Virginia? The data needed to answer this question were: (a) demographic information about the interviewee and the institution, (b) summary of hardware and software used and when purchased, (c) information on the selection, implementation, and funding of CBISs and (d) influences on CBIS purchases and use.

2. How does the user's perception of technological innovation affect his or her use of CBISs? The data needed to answer
this question were: (a) information on CBIS usage, (b) user's perceptions of whether use of CBIS was successful in completing job tasks, (c) user's recall of how the job tasks were accomplished before use of CBIS, (d) user's opinion on preferred method of accomplishing job tasks and (d) user's perceptions of the effects that use of CBIS has had on organization, communication, policy and procedures, and responsibilities of self and others.

3. How do training and support affect the use of CBISs? The data needed to answer this question were: (a) type of service contract for support of CBIS, (b) user's perception of the effectiveness of the service contract, (c) user's perception of problems encountered with the CBIS, (d) type of training programs or opportunities offered, (e) user's perception of the usefulness of training programs, (f) user's perception of preferred way to meet the CBIS training and support needs in their office and in the college/university and (g) information on who was consulted and what procedure was followed when an unfamiliar CBIS task was presented.

4. How does an "integrator" or link person affect the use of CBISs? The data needed to answer this question were: (a) identification of a key person who linked the technical aspects and the academic aspects of a decision-making process or problem and the use of CBIS, (b) identification of the integrator's role, professional background, and personal characteristics, and (c) user's perception of the effects of
the integrator’s role and use of CBIS.

5. How does commitment by top institutional leadership affect the use of CBISs? The data needed to answer this question were: (a) user’s perception of whether or not the institution’s top leadership was supportive of CBISs, (b) user’s perception of whether or not the student affairs’ top leadership was supportive, and (c) user’s perception of the effects of top leadership support of CBIS.

6. How does a long-range plan for improving the utilization of technology affect the use of CBISs? The data needed to answer this question were: (a) information detailing the long-range plans for CBIS use within the user’s office and on an institution-wide basis and (b) user’s perception of whether or not a long-range plan affected use of CBISs.

For each case, the data gathered from the interviews were sorted, classified, and reported by research question. A discussion of the six broad areas of interest is presented based on the data gathered from the interview process and on documents collected from each site. Descriptive statistics were used as the data gathered are nominal and ordinal. Essentially, frequencies and percentages were used to consolidate and identify patterns in the data. Observations of the interview participants were quoted where appropriate to highlight and enrich the quantitative findings.

After presenting the findings for each of the three case studies, an additional chapter includes a comparison and contrast of the findings for each case. In addition, this chapter includes a discussion
of the critical factors or variables that seems to explain the differences in the findings among the three institutions. Relationships associated with these factors or variables were also identified. According to Yin (1985), "the logic underlying the use of multiple-case studies is to (a) predict similar results (a literal replication) or to (b) produce contrary results but for predictable reasons (a theoretical replication)" (pp. 48-89). The replication procedure was used to develop a theoretical framework which serves as a vehicle for generalizing to new cases. Results of the research yields information to build a theory identifying what factors facilitate and what factors inhibit the use of CBISs in student affairs.

Summary

The research question suggested the use of a semi-structured interview to gather data. Three institutional cases were studied. Student affairs' officials and related key personnel were invited to participate in the research. Six broad areas of interest were used to structure the interviews to be conducted at each of the three case institutions. Content analysis was used to sort and classify constructs and categories while document analysis was used to compare the interviewees remarks and perceptions with written, "official perspective." A pilot study was conducted in order to develop the interview and coding categories necessary for appropriate content analysis. Frequencies and percentages were used to consolidate and identify patterns in the data. Observations of the interview participants were quoted where appropriate to highlight and enrich the quantitative findings. Results from each case were compared and
contrasted. In addition, critical factors or variables that seemed to explain the differences in the findings were identified and relationships among these factors or variables were discussed. The objective of this research was the development of hypotheses concerning what factors facilitate and what factors inhibit the use of computer-based information systems in student affairs' planning and decision making.
Chapter Four:
James Madison University
Results

Purpose and Organization

The purpose of this chapter is to present results concerning the factors that facilitate computer use in student affairs at James Madison University (JMU). Background information describing the institution's history, mission, degree offerings, and administration and organizational structure introduces the case. Student affairs' background information also is provided including JMU's Student Affairs Division's mission statement and its administration and organizational structure. In addition, the chronology of the data gathering process conducted at JMU is documented. A discussion and summary of the six major research questions and relevant findings concludes the case study presentation.

JMU Background Data

History of James Madison University. According to the JMU's 1987-88 General Catalog, JMU was established by the Virginia General Assembly in 1908 as the State Normal and Industrial School for Women at Harrisonburg. The doors of the university opened to its first student body in 1909 with an enrollment of 150 students and a faculty of 15. In 1914 the University underwent the first of four name changes, becoming
The State Normal School for Women at Harrisonburg. In 1916 the University was authorized to award bachelor’s degrees.

Under the leadership of Samuel P. Duke, the institution became a college and its name was changed to The State Teachers College at Harrisonburg in 1924. The University continued under that name until 1938, when it was named Madison College in honor of the fourth president of the United States. During Duke’s administration, men were first enrolled as regular day students in 1946.

When President Duke retired in 1949, Dr. G. Tyler Miller became Madison’s third president. During Dr. Miller’s administration, from 1949 to 1971, the campus was enlarged by 240 acres and 19 buildings were constructed. Major curriculum changes were made and the institution was authorized to grant master’s degrees in 1954. In 1966 the college was authorized by the legislature to become a residential, co-educational institution.

With the retirement of President Miller, Dr. Ronald E. Carrier was selected as Madison’s new president. Under his leadership enrollment again doubled to well over 8000 by 1981, and the number of full-time faculty increased likewise to 400. In 1977, the General Assembly changed the institution’s name to James Madison University. Since that time, JMU’s enrollment has grown to more than 10,000 on-campus students, nearly 80% of whom are Virginians. In addition, full-time instructional faculty has grown to more than 450.

James Madison University is a liberal arts university with an additional commitment to professional and pre-professional programs. The University's major emphasis is at the undergraduate level; however, the graduate program is also strong. Graduate programs are proposed when the programs can provide an effective service to the community or when particularly excellent undergraduate programs can be extended into a position of regional and national recognition. As a regional university, James Madison attracts students from throughout the state, particularly the Shenandoah Valley, and the urban areas of Northern Virginia, Tidewater, Richmond, and Roanoke. (pp. 54-55)

Degrees offered. JMU is authorized to confer bachelors, masters, and educational specialist degrees. On the bachelors degree level specialty areas include arts, science, music education, business administration, fine arts, general studies, music, social work, and nursing. On the masters degree level specialty areas include arts, science, education, teaching, business administration, fine arts, music, and public administration.

Operational statistics. As of April, 1987, the student body is composed of 57 percent women and 43 percent men with a total enrollment of 10,126. The number of degrees conferred during the 86-87 academic year were 2,152 of which 1,932 were undergraduate and 220 were graduate. In 1987-88, full-time equivalent faculty totaled 451 with 67% tenured.

The campus and its location. JMU is located in Harrisonburg, a
city with a population of 25,000 in the center of the Shenandoah Valley of Virginia. The campus contains a total of 365 acres, including 31 acres at the University Farm. Within the 26 residence halls and 16 fraternity and sorority houses there are 5,100 residence hall spaces.

Administration and organization. The central administration of JMU includes Vice Presidents for Administration and Finance, Academic Affairs, Student Affairs, University Advancement, as well as the Director of University Relations and the Director of Athletics. All of these individuals answer directly to the President and administer a major area of responsibility. Figure 1 on the next page represents the formal organization of James Madison University as of 1987.

Student Affairs Background

Mission. The mission of the Division of Student Affairs at JMU is to:

...advance the educational purpose of the University by promoting a supportive yet challenging environment so that maximum development of the academic, interpersonal, identity, and value needs of the student is accomplished. This mission is accomplished by providing consultation, instruction, and a stimulating environment for students and by assisting faculty, staff, and members of the community at large in understanding the needs of students.

(Student Life Plan, 1985-1990, p. 1)

Administration and organization. The Division of Student Affairs is administered by the Vice President of Student Affairs. Professional support staff in this office includes the Associate Vice President,
Table 1: James Madison University Organization
Dean of Students, Director of Admissions, Director of Career Planning and Placement, Director of Counseling and Student Development, Director of Financial Aid, Director of Health Center, Director of Student Activities, and the Director of Residence Life. Within the student affair's organization, there are approximately 40 full-time professionals, 26 full-time support staff, 105 student workers, and 104 resident hall assistants. Part-time staff members include 4 professionals and 3 support staff.

Arrival at JMU

The researcher conducted all interviews at JMU during the week of April 18, 1988. Those individuals scheduled for an interview included the Director of Student Health, Vice President for Student Affairs, Dean of Students, Director of Career Planning and Placement, Director of Counseling and Student Development, Director of Residence Life, Director of Student Activities, Director of Financial Aid, and Director of Admissions. All scheduled interviews were conducted with the exception of the Director of Admissions. A follow-up phone interview was scheduled with the Admissions Director but the researcher was not contacted. Two further attempts were made to contact the Director of Admissions but neither were successful.

During the interviews, participants identified key individuals who support computer use in the student affairs' offices. During the JMU site visit, interviews were also scheduled with these individuals. These follow-up interviews included personnel from Administrative Computing, Microcomputer Services, and a private consultant hired by the Vice President for Student Affairs.

Status of Computer-Based Information Systems at JMU

JMU operates computer facilities to support instruction, research, and administration. Mainframe equipment includes two Hewlett Packard 3000 time-sharing systems dedicated to administrative services and a Digital Equipment VAX cluster dedicated to academic computing. Within the Division of Student Affairs there are 14 CRT terminals, 33 personal computers, and 24 printers. The earliest attempt to link terminals to the mainframe was initiated by the Office of Financial Aid in 1982. As of 1988, all student affairs' offices hold access to the mainframe. Sixty-seven percent of the personal computers are manufactured by IBM while 21% includes IBM compatibles [Zenith Laptops, Leading Edge, and
Panasonic computers] and 12% includes other computers [Kaypro, Apple II, and Apple MacIntosh]. Of the 24 printers, 9 are generic brands, 5 Hewlett Packard Lazer Jets, 5 Epsons, 2 Apples, 2 IBM, and 1 NEC. The majority of the personal computer systems were purchased in fiscal year 1986-87.

Mainframe computer software and hardware generally used by the Division of Student Affairs include:

1. Student information systems: This software package was designed by in-house programmers of JMU’s computer center. The tailor-made software package consists of a university student data base containing admission, demographic, course, financial, and housing data.

2. PROCOMM: A program designed to provide easy and convenient access to a broad variety of telecommunication tasks, such as electronic mail and electronic bulletin boards.

3. Electronic Mail: A program accessed through PROCOMM that allows users to send written memos, letters, and text to other users on campus.

4. Student Affairs Bulletin Board: A program accessed through PROCOMM that allows student affairs’ users to post information to a central location for all users to view simultaneously.

5. BITNET: This telecommunications hardware enables communication with regional, national, and international universities.

According to the student affairs’ respondents interviewed, all
eight offices access the mainframe and use student data base software in some capacity. Electronic mail and the student affairs' bulletin board are used by seven out of eight offices while BITNET is used by one office.

Personal computer software includes word processing, data base, spreadsheet, integrated, and office-specific types. The majority of interviewees use Multimate Advantage II for word processing and dBASE III Plus for file management. Spreadsheet use is limited as is the use of integrated software packages. The Office of Student Activities uses office-specific software such as the organizational tool software packages ORG Plus and Flowchart. Organizational tool packages are software designed to help a user graphically define and present the structure of their organization. In addition, reservation and scheduling software and sign design software also are used. The Counseling and Student Development office uses computer-assisted inventories such as the Minnesota Multiphasic Personality Inventory (MMPI) and career packages such as System of Interactive Guidance and Information (SIGI).

When the student affairs' individuals participating in the study were asked who was responsible for the selection and implementation of their present computer system, the majority of the interviewees responded, "The Microcomputer Services group is responsible". The role of the Office of Microcomputer Services (CMS) as stated by the student affairs' respondents was explained by remarks such as, "They advise and write up specifications"; "They help identify and anticipate our needs"; "They analyze and make recommendations"; and "We are not
required to follow their recommendations but then we don’t get support either." One interviewee responded, "We shopped ourselves and decided on IBM." A key participant from the OMS was also asked about OMS’s role in the microcomputer selection process. The respondent stated, "We make recommendations to offices not only to meet their needs but also to fit the university’s scheme of purchasing."

According to policy no: I:05:03, Computer Utilization and Acquisition, dated March 1985, "The Office of Microcomputer Services has been established to administer the acquisition, use, control, and training efforts related to these machines…. any request for microcomputer equipment for non-academic use should be accompanied by an analysis questionnaire and an equipment recommendation to be forwarded to a dean and/or vice president for approval. The requester should consult the OMS" (p.3).

Funding for computer hardware and software typically is budgeted through the State of Virginia’s operating budget procedure. Additional computer systems were funded by a private grant received for career development in the Office of Counseling and Student Development and an auxiliary fund account used by the Office of Student Activities.

Overall, the respondents indicated that individuals within the student affairs’ offices and other offices within the university, such as the OMS, influence their decisions to purchase a specific type of computer system. In addition, all respondents perceived that top leadership at JMU helps to facilitate computer use by committing financial resources for purchasing new technology. One interviewee stated, "The President is really supportive as is evidenced by adequate
budget allocations and a mandatory computer literacy fee for students." JMU includes a computer literacy component as part of student fees. According to the James Madison University General Catalog, 1987-88, "A common computer literacy component is therefore included in all programs to insure that students receive appropriate instruction" (p.36). Part of the computer literacy fee is allocated toward the purchasing of additional computer hardware and software.

Another interviewee stated, "Our campus was converting to personal computers, and we needed to get with it to keep in contact with the rest of the campus. In addition, the university committed its resources by establishing the CMS and installing a new telephone system. Most importantly, our Vice President for Student Affairs is very supportive."

In summary, JMU at present integrates mainframe and personal computing systems. The earliest attempt to link terminals to the mainframe began in 1982 with increased yearly purchasing of mainframe connectors. The majority of the personal computers were purchased during the 1986-87 fiscal year. All eight offices presently are connected to the mainframe and use student data base software. Electronic mail and the student affairs' bulletin board are used by seven out of eight offices while BTINET is used by one. In addition, all eight offices use their personal computers for word processing and office-specific applications, such as sign-design software by the Office of Student Activities and personality inventory software by the Counseling and Student Development Office. Seven out of eight offices use their personal computers for data base file management while two
offices use their personal computers for financial and budget applications.

According to the student affairs’ respondents, selection and implementation of their present computer systems is influenced by individuals within their offices and by individuals within the OMS. JMU’s policy states all offices wishing to use microcomputers must request all equipment and software through the OMS. Although student affairs’ offices are not bound to purchase equipment or software recommended by the OMS, no support or training is given for hardware or software deviating from OMS’s recommendations. Funding for CBISs is driven by the internal budget of JMU’s Student Affairs Division either through educational and general funds, private grants, or auxiliary funds. All eight respondents agree generous funding by the university facilitates hardware and software purchases within their division and improves the current status of computer use at JMU. The statements made by the interviewees that institutional commitment through budget allocations is extremely important in setting the tone for future university use of technology is consistent with the literature on factors promoting computer use in higher education institutions.

Thus, in response to the first research question, "What is the current status of CBISs at JMU?", JMU is moving toward state-of-art computing technology. For example, technology has advanced to the point of linking all eight student affairs’ offices to the mainframe thus allowing officials access to telecommunication and student data base software. In addition, personal computing software are used to access software for management, planning, and office-specific tasks. Results
of the study indicate at present that JMU's Student Affairs Division offers funding to advance the technology in their division which consequently helps to create an environment that facilitates computer use.

Users' Perceptions of CBISs and Their Use of the System

Officials within JMU's Student Affairs Division were asked why their present computer systems were purchased. The Director of Student Health stated that computer systems are purchased "to automate and to upgrade word processing," while the Vice President for Student Affairs stated that computer systems are purchased "to increase productivity and to facilitate the ability to communicate with each other." As mentioned, 88% of all computer systems in use employ IBM computers or IBM compatibles. Several reasons for purchasing the IBM systems or compatibles are given. The Dean of Students stated, "IBM systems and compatibles were chosen for future needs like [the development of] telecommunications on campus." In addition, the Vice President for Student Affairs stated, "We selected IBM systems because they are known to give effective service."

Tasks attempted by student affairs' officials using their computer systems include word processing, file management, electronic mail and budgeting. A student data base system and tailor-made applications are also used. Responses of the student affairs' officials were averaged according to their daily use of computer systems and by their personnel classification (e.g. clerical, students, professionals). Results indicate clerical personnel on average use the computer systems 50% of their time, student assistants' use the systems 40% of their time, and
student affairs' professionals use them 25% of their time. It seems the
level of use is consistent with the roles played by those interviewed.

Typical word processing applications are similar in each student
affairs' office and encompass tasks such as formatting and editing of
letters, memoranda, and policy manuals; merging of address lists and
form letters; and constructing mailing labels.

File management varies in each student affairs' office depending
on the specific needs of that office and on the sophistication of its
computer users. In its simple form, some offices use file management to
organize lists of people, addresses, and phone numbers. Other offices,
such as the Student Health Center, have developed more sophisticated
applications. For example, the Student Health Center uses file
management to record the day, time, category of complaint, and whether
it is a student's first or return visit to the center. Student
demographic data are also collected. With 23,000 visits to the health
center per year, a data base is regarded as a necessary tool for the
collection, organization, sorting, and displaying of pertinent data.

All but one office use electronic mail to communicate with other
offices within JMU's Student Affairs Division. The one office does not
use this function because linking lines between it and the electronic
mail system are not yet available. The major reason student affairs'
offices use electronic mail and the student affairs' bulletin board is
based on a requirement initiated by the Vice President of Student
Affairs. The requirement includes a statement that communication by
written letter or memorandum will no longer continue from his office,
thus, student affairs' officials are relayed information via the
student affairs' bulletin board and by electronic mail. For example, the Office of Student Health and the Office of Counseling and Student Development use the mainframe electronic mail to send documents back and forth to each others' offices.

According to the student affairs' officials interviewed, the computer is used to a limited extent for tasks such as budgeting and financial analysis. When the computer is used for financial analysis, electronic spreadsheet software is selected and used.

All offices link their terminals and/or personal computers with the mainframe computer to access the student information systems which houses students' records. The Dean of Students Office stated, "We use the student information system to access students' schedules, transcripts, grade point averages, and billing data, and to update emergency and local addresses of students. We have also developed a new screen to capture student scores on affective measures." The Financial Aid office stated, "Many offices work with us such as business, records, and admissions. The Business office needs to know who gets grants and aid. The Records office gives us pertinent data on students' class schedules and grades while the Admissions office gives us recruiting information."

Tailor-made software is developed primarily by an outside consultant hired by JMU's Student Affairs Division. The consultant's first task was to work with The Office of Residence Life to develop a computerized freshman roommate selection process and the second task was to develop a computerized room assignment application for all students. In addition, the consultant was assigned to work four hours
per week during the 1988-89 fiscal year with the Office of Career Planning and Placement. The consultant’s assignment was to tailor an application to fit JMU’s recruiting and placement plan. JMU’s interviewees feel the consultant’s role of developing tailor-made applications greatly has facilitated computer use in the Division of Student Affairs.

Office-specific software used by the Office of Student Activities includes scheduling applications for space and room reservations and graphics applications for student flyers.

In the early 80’s, the tasks previously described were accomplished by typewriter, calculator, stencil and copies, pen and pencil, phone, and hand-tallied reports. The Office of Counseling and Student Development stated, "Weekly reports were tallied by hand. We traced students and collected data. We even sent questionnaires to students to evaluate the center but they were never compiled. Filing was very difficult to maintain and records were impossible to update." Essentially, all offices interviewed perceive the use of computers to be more helpful in completing tasks than the old methods. One respondent remarked, "Now we are more efficient, more productive. We have expanded our ability to take on projects. Before we tried to figure out how we could get everything done." Another respondent remarked, "Before we would have needed three full-time clerical people, now we only need 1 3/4."

When the student affairs’ officials were asked their perceptions of the effects of CBISs on the communication process within their departments and/or divisions, the responses varied. For example, six
out of eight respondents perceive communication increases because of electronic mail while one respondent stated, "The use of electronic mail is depersonalizing as fewer phone calls and meetings result." The other respondent stated, "Communication is better but with the computer you can't read body-language."

The student affairs' officials were asked their perceptions of the effects of CBISs on their assigned tasks and responsibilities. One respondent remarked, "Computers have allowed us more time to be creative. Now we keep different types of statistics. Thus, I have better information to make decisions." An additional comment regarding how the computer affects the responsibility of others was, "Computers can handle mundane, repetitive tasks, thus, helping to make a clerical job more exciting."

Another effect of the use of CBISs perceived by all student affairs' respondents is that their offices presently run more efficiently. On the other hand, several of these same respondents also feel their offices have a long way to go to fully utilize their systems and they anticipate greater efficiency as increased computer use occurs.

All student affairs' officials interviewed believe significant changes have occurred in procedures within their offices and within their own job duties. These procedures relate more to individual job tasks, such as word processing, file management, and data storage, retrieval, and manipulation than to procedural changes involving JMU's Student Affairs Division. However, the change in procedure that affects the division as a whole is the use of electronic mail and student
affairs' bulletin board for communication. No policy changes are perceived by those interviewed to have occurred. As far as changes in the personnel which affect the organizational structure in JMU's Student Affairs Division, the Director of Financial Aid stated one full-time data entry person was hired as a result of computer use.

In summary, JMU's student affairs' officials purchased their present computer systems in order to increase productivity, to automate, to upgrade word processing, and to facilitate their ability to communicate with each other. Indeed, the literature review points out that data collected on all facets of higher education institutions help to improve the use of existing resources (Racippo & Foxley, 1980). Major tasks conducted by use of the computer include word processing, file management, electronic mail, budgeting, and student information management. According to the administrators interviewed, clerical personnel's average daily use of the computer systems is 50% of the time, while student assistants' average daily use comprises 40%, and student affairs' professionals, 25%. In addition, a consultant has designed tailor-made software for certain offices in the Division of Student Affairs. JMU's interviewees feel the consultant's role of developing tailor-made applications greatly facilitates computer use in the Division of Student Affairs. The use of tailor-made applications also is noted by Timm (1983) as the best way to advance the correct approach toward decision making in higher education.

Before the use of computers, student affairs' tasks were accomplished by typewriter, calculator, stencil and copies, pen and pencil, phone, and hand tallies, or they were not attempted. In
general, interviewees perceive the present use of CBISs makes their tasks simpler, increases communication, eases control of data, and increases efficiency. Many of the advantages of using CBISs stated by the interviewees compare favorably with the advantages identified in the literature review.

Respondents perceive that the more computer systems are used within an organization, the more changes are likely to occur in policy, procedures, organizational structure, and the communication process. For example, all student affairs' officials interviewed perceive that significant changes have occurred in conducting individual office job tasks, such as word processing, file management, and data management. Less evident are procedural changes involving JMU's Student Affairs Division. No changes in policy and limited changes in the student affairs' organizational structure are perceived to have occurred because of the use of computers. The impact of computers on the communication process is perceived to be helpful by six of eight respondents, however, two feel the use of electronic mail depersonalizes the communication process.

Thus, the second research question asked, "How does the user's perception of technological innovation affect his or her use of computer-based information systems"? One may conclude that student affairs' users at JMU perceive CBISs positively. And according to the review of literature, computer users who hold positive predispositions toward computer technology use the systems more often than those who hold negative predispositions. Respondents believe using CBISs on the job simplifies their tasks, helps to monitor data flow, increases
efficiency and, in general, increases communication. These perceptions by the student affairs' users at JMU led to greater computer use in their division.

The Role of Training and Support

Interviewees were asked which individuals or offices on campus helped JMU's Student Affairs Division with computer training and support. According to those interviewed and "Policy No: 1:05:03, Computer Utilization and Acquisition," 1985, service of computer hardware and software is handled internally within the Department of Administration and Finance. Study participants mentioned that several offices train and support the student affairs' CBIS users on campus. Three major service departments were mentioned most: Administrative Computer Support Services, Telecommunications/Maintenance/Repair Services, and Academic Computer Support Services. Approximately 26 staff members report directly to these departments. In brief, the three service departments and their major responsibilities are summarized below:

1. Administrative Computer Support Services
   a. Remote Centers: Any computer facility physically located outside the Administrative Computer Services building. Responsibilities of personnel include centralizing all administrative functions and specializing computing applications excluding word processing and office automation, microcomputer equipment, and microcomputer software.
   b. Information Center: A computer facility established
to support people who use computer products themselves as opposed to those who resell them. Responsibilities of personnel include controlling data administration, consulting, training, and technical assistance.

c. Microcomputer Services: A branch of Administrative Computer Support Services established to administer the acquisition, use, control, and training efforts related to microcomputers. Responsibilities of personnel include coordinating stand-alone administrative applications with the remote centers and the information center when shared access to data is required. Other services include supporting equipment on an approved list, maintaining a library of software, and operating a microcomputer laboratory for demonstration purposes.

2. Telecommunications/Maintenance/Repair Services

Responsibilities of this computer service group include installing, maintaining, and repairing all central computing hardware, either through service personnel or maintenance contracts. Microcomputer and micro equipment support also are provided.

3. Academic Computer Support Service

a. Instructional: Responsibilities of this computer service group include coordinating and scheduling of academic courses and microcomputer labs that utilize the central facilities.
b. Research: Responsibilities of this computer service group include coordinating requests from faculty members or students under faculty supervision for the use of computer facilities for research projects not externally funded. (JMU Policy No. I:05:03, pgs. 2-4)

Overall, the majority of users indicated they are pleased with the microcomputer support received. One interviewee remarked, "When we ask for assistance concerning microcomputer software, the Microcomputer Group gives us a day's response time." However, most of the interviewees feel response is slow and uneven when it comes to problems with the mainframe. In addition, one respondent remarked, "During registration, we can't get on the computer for a whole day. It [the mainframe] is just too slow as our institution has grown so fast."

Respondents were asked to describe the training opportunities offered that facilitate their use of computer systems. One example of training includes a required, ten-hour workshop for administrators. The workshop was first offered in 1987 and focuses on an introduction to computers. The workshop was and still is required for all new administrators since the institution initiated a computer literacy curriculum component for all students. Respondents typically remarked that the OMS either offers mini courses and workshops for university employees or works directly with offices to tailor a session for their staff.

More specifically, a document entitled, "Academic Computing Services, April/May/June Workshop Schedule," 1988, listed 36 different
one and two hour workshops offered once each month. Examples of workshops include 12 WordPerfect word processing classes of varying levels of complexity, 5 Multimate Advantage II word processing classes, 5 classes using the MacIntosh computer, one class in dBASE III Plus, one class in LOTUS 1-2-3, and several classes involving the mainframe communication functions. Only one respondent stated, "The courses offered by the Microcomputer Services group are not really good. Our clerical people have the same perception. They are too technical and contribute to computer phobia. We need practical applications. Most of us come away [from training] with a lack of transfer of knowledge." The majority interviewed, however, are satisfied with the courses offered by the CMS.

Other offices or people who are consulted when an unfamiliar computer task is encountered include the staff members within each student affairs' office or other offices within JMU's Student Affairs Division. Many respondents believe that, "We have a lot of knowledge within our institution." In fact, a Computer Users Group was established which provides an informal forum for exchange of computer-related information, assists in networking among staff and faculty users of similar hardware and software, and provides for professional development opportunities. One respondent remarked,

Our computer users group started with 20 people and now we have 70. Forty-five to 50 show up every meeting. We have a directory of people and the software and hardware used by each user. We also list their skills. Now we have members from the faculty, computer services, academic computing, publications, and office people.
Vendors give demonstrations and once a month we have a luncheon meeting.

All respondents offered their suggestions on how additional training and support programs can be developed at JMU. Two of the eight interviewed perceive the centralized training presently offered by the OMS is adequate and effective. These respondents believe a mixed class of persons with varying levels of computer knowledge and backgrounds gives employees a broader experience. The remaining six, however, stated they believe training tailored to the needs of specific offices and taught within their offices (in-house training) is more beneficial. One respondent remarked, "Structure very specific training sessions and offer them through our own offices. Then we can immediately apply the specific applications." Another respondent remarked, "We could offer secretarial workshops with one other office and that office could become our support group."

In summary, three offices were mentioned by respondents that train and support the student affairs' computer users on campus. The three offices include Administrative Computer Support Services, Telecommunications/Maintenance/Repair Services, and Academic Computer Support Services. The majority of the interviewees believe training and support services given within the University are adequate. Mini courses and workshops continuously are offered by the OMS and an information center has been established to support people who use computer products. Other offices within the Division of Student Affairs are consulted when an unfamiliar task is presented for completion. In fact, a computer users group was established which provides an informal forum.
for exchange of computer-related information, assists in networking among staff and faculty users of similar hardware and software, and provides professional development opportunities. Suggestions on how training and support programs can be developed at JMU were varied. Some of those interviewed are satisfied with the centralized training presently offered while other respondents believe in-house training would be more beneficial.

Findings from the literature review (Lukesh, 1986; Zastrocky, 1986; Epic, 1986; Martin, 1986; Coombes, 1986; Hanley, 1986; Ledbetter, Cox, and Snyder, 1986; Helfgott, 1986; and Henderson and Oscarson, 1986) suggest that training and support are one of the most important facilitators of use of computer-based information systems. Training and support indeed affect the use of CBISs at JMU. Service departments made available by the University facilitate computer use by offering support for maintenance of computer hardware and software. In addition, service departments help train users on equipment and software packages by offering workshops. The University offers work release to those interested in participating in these workshops.

At the divisional level, student affairs' individuals took a step past the University's offer of training and support by organizing a computer users group. The computer users group facilitates computer use by assisting in networking among staff and faculty users, provides professional development opportunities, and provides an informal forum for exchange of computer-related information. JMU's leadership offers a strong commitment to increasing computer use by supporting these training and support programs.
The response to the third research question, "How do training and support affect the use of computer-based information systems?", is clear. Training and support programs and services offered at the institutional and divisional levels facilitate computer use in the JMU's Student Affairs Division.

The Role of an Integrator or Link Person

Respondents were asked if there was a key person who links the technical and student personnel aspects of a decision-making process or problem in their office. All but one agree that a link person or integrator exists within their particular office. Of the seven who agree, six people stated the integrator is a person on the student affairs' staff. The seventh person indicated the integrator's role is played by an outside consultant hired by JMU's Student Affairs Division. Thus, the integrator's role is played by different individuals in different student affairs' offices.

When asked to describe the integrator's role, the Dean of Students remarked, "She is [more] knowledgeable [than other individuals working in the office], identifies needs, orders things first, and alleviates apprehension." In addition, the Director of Career Planning and Placement stated, "People go to him [the integrator] for information, he works with the consultant, analyzes programs, and trains others." Also, the Director of Residence Life described the role of integrator in his office as one who "can take information and apply it and has the ability to translate it into lay terms."

A description of the professional background and personal characteristics of integrators as perceived by the respondents include
the following remarks. The Dean of Students stated, "She has enthusiasm and speed. She is a good teacher. She has strong people skills, and she stays abreast of the state-of-the-art in computers." The Director of Counseling and Student Services stated, "He has computer knowledge, communication skills, intellectual skills, and analytical skills." The Director of Student Activities described the integrator's personal characteristics, saying, "He has patience and is supportive. He has expectations that others will and can develop computer skills." The private consultant hired by the student affairs stated, "An integrator needs political savvy, knowledge of computers, [and] knowledge on how to intervene to allow change to occur. [He] displays empathy, is a good trainer, and is a good listener." None of the integrators had formal degree training in computer science or information systems. In fact, two of the integrators hold bachelor degrees, one in mathematics and one in English. All computer skills were acquired either on-the-job or through continuing education classes. In sum, the respondents believe that the professional background needed by an integrator includes skills in the areas of computer technology, communication, and analysis. In addition, personal characteristics needed by an integrator include patience, empathy, listening skills, and the willingness to learn new computer-related information and to share that knowledge.

When asked how the integrator's role affected the use of computers within their offices, one respondent remarked, "We didn't use computers before." Another remarked, "Anytime we have a new project he [the integrator] slows things down at first and then things speed up." The Director of Residence Life stated, "Our unit has given us permission to
fail especially when change is involved. Our integrator helps us to take risks needed for change." Additionally, the Director of Financial Aid stated, "Everyone sees her [the integrator's] computer and that causes creative tension and a little healthy competition."

As described in the literature review, the role of the integrator in facilitating computer use is very important. According to the Harris Study (1983) decision makers without direct access to data (or those decision makers who chose to be supplied with data) need the skill and ability of an intermediary party. This person is described as someone who is intimately acquainted with the data, the way the system works, and how the data are to be reported. Skills of the integrator as stated in the literature review are consistent with the skills identified by the interviewees at JMU. For example, the Harris study (1983) revealed an integrator holds strong personal-relation skills, a healthy respect for the complexity of the decision-making process, and an appreciation for nonquantitative data. Similar skills were revealed among the integrators identified by those interviewed within the student affairs' offices at JMU.

In summary, seven of eight interviewees reported that a link person or integrator exists within their office. Of these seven, six people stated that the integrator is a person on staff where the seventh person stated the integrator's role is played by an outside consultant hired by the Division. The integrator is described as one who identifies computer needs, alleviates apprehension of computer use, informs others of the computer's potential, analyzes problems, and trains others. Some of the professional and personal characteristics of
an integrator mentioned most include strong communication; people, intellectual, and analytical skills; knowledge of technology; and displayed enthusiasm and speed.

The response to the fourth research question, "How does an integrator or link person affect the use of computer-based information systems?", also is clear. For those who acknowledge the presence of an integrator within their office agree the integrator's role positively affects use of computers both within their office and also within JMU's Student Affairs Division.

Commitment by Top Leadership

All respondents reported they believe JMU's top leadership supports the use of CBISs. A typical view held by the respondents is well illustrated by the following quote, "Our President is committed. For example, he has required that all administrators enroll in a computer literacy class, that all students pay a semester-based computer literacy fee, and that adequate budget allocations are available for computers." Similarly, all respondents believe student affairs' top leadership is committed to the support of computers. Ways in which this commitment is communicated include the acquisition of computer resources for all student affairs' offices, hiring of an outside consultant, and availability of workshops and training programs. The effects of top leadership commitment on the use of CBISs in the student affairs' office and on campus as a whole are perceived by the respondents as very positive. For example, the Director of Student Health stated, "It is very helpful to have information about students in the Student Information System. We have quick retrieval and
verification. Our computer system is more flexible and we have greater communication." Another interviewee reported, "The institution established Microcomputer Services and we [JMU's Student Affairs Division] established the computer users group." The Director of Residence Life stated, "We have more equipment, more software, and we are limited only by our imaginations."

According to the *James Madison University Operating Budget Proposal* submitted to Governor Baliles for the 1988-90 biennium, several initiatives committing resources for computer use are in process. Requests were initiated for (1) an administrative computer upgrade and (2) additional funding and FTE positions for the support of JMU's Computer Literacy objective. These requests illustrate top leadership commitment to CBISs at JMU. For example, a new administrative computer upgrade will support a state-of-the-art telecommunications system, an on-line degree audit system, an automated telephone registration system, and local area networks within the computer laboratories. Additional funding and full-time equivalent positions for the support of JMU's Computer Literacy objective will support curriculum development related to computer applications, as well as general wages and student assistant wages for training and laboratory management.

In summary, all respondents believe JMU's top leadership supports the use of CBISs. Ways in which this commitment is communicated include a required computer literacy class for administrators; computer literacy fee for students; adequate budget allocations for computer hardware, software, training and support; and networking of student
affairs' offices. Respondents perceive the effects of top leadership commitment to the use of computers in student affairs' offices and on campus as positive.

According to the literature (Epic, 1986; Er, 1987; Fleit, 1986; Lucas, 1986; Lukesh, 1986; Zastrocky, 1986) the most important facilitator of computer use in a university is the commitment of top leadership. Without such commitment adequate resources would not be present to fulfill a potential user's request for data needed to make informed decisions. Both the review of literature and the results gathered from the interviews stress the importance of top leadership commitment.

The fifth research question asked, "How does commitment by top institutional leadership affect the use of computer-based information systems?" It appears that commitment by top institutional leadership at at JMU facilitates the use of computers at both the university and student affairs divisional levels.

**Long-Range Plans for the Use of Computer-Based Information Systems**

All respondents but one agree that JMU does not have a long range plan for the improved use of computing technology. The one respondent stated, "Yes, we have a university cabinet which recently has defined goals and objectives of the university in relation to the use of computers." Likewise, all respondents agree JMU's Student Affairs Division does not have a long-range plan for the improved use of technology. One respondent remarked, "No, we don't know what we are talking about as we are expanding so fast and heading in so many directions it is hard to anticipate our plans."
Even though those interviewed stated that no long-range plans had been developed for the use of computer technology within the JMU's Student Affairs Division or on a college-wide basis, several student affairs' documents contain evidence of one-year and five-year plans for the improved use of computers. For example, "Chapter III, Student Life Plan," 1986, illustrates a five-year plan of goals and objectives for JMU's Student Affairs Division from 1985-1990. All offices within the Division mention at least one goal or objective related to computer use. Each office is concerned about automating its work. Examples include the following:

1. Office of Career Planning and Placement. "In 1985-86, hire a consultant to help in implementation process and computerize on-campus recruitment program and all budget information" (p. 11). "In 1987-88, access computerized career information systems and computerize cataloging of library information" (p. 12).

2. Counseling and Student Development Center. "In 1985-86, explore and implement ways of utilizing the computer for administrative needs and services to students" (p. 15). "By 1988-89, all demographic and evaluative information will be computerized. Budget, inventory, and word processing systems will be operational" (p. 16).

3. Office of the Dean of Students. "Buy a computer to carry locator information, ride-sharing data, and transfer to transfer information" (p. 18).

4. Office of Financial Aid. "To continue to work with
Computer Services in establishing a program which will allow summer session financial aid awards to be entered independently of the academic year" (p. 22).

5. Office of Residence Life. "To work in conjunction with the Computer Center on the refining of the CRT terminals and the further development of the housing assignment computer program package" (p. 27).

In addition, other documents such as the "Feasibility Study for the Office of Residence Life," 1987, conducted by Petter Boe and the Student Affairs Mission Statement, Goals, and Objectives, 1987-88, specifically address the improved use of computer technology within JMU's Student Affairs Division. Some confusion exists between what the interviewees believe are long-range plans for computer use and what the researcher found as evidence of existing plans. Evidently, there is a communication problem within the Division as to what constitutes a long-range plan.

In summary, all respondents but one agree that JMU does not have a long-range plan for the improved use of technology. Likewise, all respondents agree JMU's Student Affairs Division does not have a long-range plan for the improved use of technology. Some confusion exists between what the interviewees believe are long-range plans for computer use and what the researcher found as existing plans. For example, several student affairs' documents contain evidence relating to one-year and five-year plans for the improved use of computer technology. All offices within the Division mention at least one goal or objective relating to computer use. In addition, other documents were found
specifically addressing the improved use of computer technology within JMU’s Student Affairs Division.

According to the literature (Coombes, 1986; Evancoe, 1985; Fleit, 1986; LeDuc, 1986; Leim, 1986; Little & Tamares, 1983; Lucas, 1986; Lukesh, 1986; Naron & Estes, 1985; Partow-Navid, 1987; Zastrocky, 1986) a plan increases support for new technology and offers assistance to others in coordinating activities and identifying critical issues. In addition, the literature suggests certain criteria are present in a successful plan. These criteria include a visible commitment of top leadership, acceptance and support of the planning process by those with program responsibility, establishment of appropriate policies and procedures to support the plan, and creation of a management information system to supply data needs of the plan (Hipps, 1982; Hopkins & Massey, 1981; Mayhew, 1979). The student affairs’ documents met two of the criteria cited in the literature. First, JMU does have a management information system (CBIS) in place that supplies the data needs of the plan and second, the visible commitment of top leadership is evident. However, no known or understood long-range plans are recognized by the student affairs’ officials interviewed. Further, plans that are not known or understood are not especially effective in facilitating the use of CBISs.

The sixth research question asked, "How does a long-range plan for improving the utilization of technology affect the use of computer-based information systems?" One must conclude the absence of long-range plans have not been a significant deterrent to the use of computers in JMU’s Student Affairs Division.
Chapter Five:
Virginia Polytechnic Institute and State University
Results

Purpose and Organization

The purpose of this chapter is to present results concerning the factors that facilitate computer use in student affairs at Virginia Polytechnic Institute and State University (VPI). Background information describing the institution's history, mission, degree offerings, and its administration and organizational structure introduces the case. Student affairs' background information also is provided including VPI's Student Affairs Division's mission statement and its administration and organizational structure. In addition, the chronology of the data gathering process conducted at VPI is documented. A discussion and summary of the six major research questions and relevant findings conclude the case study presentation.

VPI&SU Background Data

History of Virginia Polytechnic Institute and State University. According to the Virginia Polytechnic Institute and State University General Catalog, 1988-89 and Virginia Polytechnic Institute and State University, The Self Study, 1986-88, VPI's official history began in 1872 when it was founded as a land grant college under the Morrill Act. The doors of Virginia Agriculture and Mechanical College opened to its
first student body in 1872 with 43 students, a president, two faculty members, a librarian, and one building.

Charles L.C. Minor was chosen as the college's first president and he implemented the curriculum designed by Virginia's first superintendent of public instruction, William H. Ruffner. According to the Virginia Polytechnic Institute and State University, The Self Study, 1986-88, the narrowly defined technical and agricultural curriculum was unpopular with both faculty and students. Furthermore, the role of military training in the college was unclear. In 1878, the Board of Visitors of the college produced an organizational plan to help direct the future of the college. The organizational plan provided for a Corps of Cadets, limited the role of state politics in the college's internal affairs, and expressed the belief and desire that the institution develop on a broad rather than a narrow interpretation of the Morrill Act.

With the leadership of President John M. McBryde, the college continued to stress the expanded role for an applied science or technical school. In recognition of the nature of this new direction for the college, the name was changed in 1896 to Virginia Agricultural and Mechanical College and Polytechnic Institute. A period of steady growth and development of the institution occurred during the years between the McBryde presidency and the Second World War. The Agricultural Extension Program was established at VPI in 1914, the Army Reserve Officer Training Corps (ROTC) program began in 1917, and the training of vocational agriculture teachers was initiated under the Smith-Hughes Act of 1918. In 1944 "Agricultural and Mechanical College"
was dropped and the legal name became the Virginia Polytechnical Institute.

In more recent years the college has undergone a transformation into a broad-based university with an increasing emphasis on the humanities and liberal arts. In 1970 the Virginia legislature changed the name of the university to Virginia Polytechnic Institute and State University, more accurately reflecting the scope of the instruction offered at Blacksburg.


Virginia Polytechnic Institute and State University, a publicly supported, comprehensive, land-grant university, serves the Commonwealth of Virginia, the nation, and the international community by generating the disseminating knowledge in the humanities, arts, social sciences, scientific/professional disciplines through instruction, research, and extension. The University instills within each member of the University community an appreciation of the values and obligations of productive citizenship and the responsibilities of leadership, while promoting personal and intellectual development. Its scholastic programs are accessible to all who demonstrate academic merit to gain entrance.

To achieve this mission as the University moves toward the year 2000, it will identify and build on strengths across the University, forge innovative and mutually productive relationships
with industry and government, manage resources efficiently, and establish a clear identity as a forward-thinking, high-quality institution that systematically guides and evaluates its future.

(p. 82)

**Degrees Offered.** On the undergraduate level, instruction is offered in 67 departments of seven academic colleges. The colleges include Agriculture and Life Sciences, Architecture and Life Sciences, Architecture and Urban Studies, Arts and Science, Business, Education, Engineering, and Human Resources. On the graduate level, the colleges have graduate programs coordinated through the Graduate School. Master’s degrees are offered through the Graduate School and the Virginia-Maryland Regional College of Veterinary Medicine in 81 different areas of concentration, while doctoral degrees are offered in 74 different areas of concentration.

**Operational Statistics.** As of Fall 1987, the student body was composed of 40 percent women and 60 percent men with a total enrollment of 22,702. The total number of degrees conferred during the 86-87 academic year was 4,878 of which 3,581 were undergraduate and 1,297 were graduate. In 1987-88, full-time instructional faculty totaled 1,507 with 65.9 percent tenured.

**The campus and its location.** VPI is located in Blacksburg, Montgomery County of Virginia. The University grounds at Blacksburg cover about 2,600 acres and include an airport, farm, experimental plots, and orchards. The University also has about 600 acres of adjoining agricultural research land under long-term lease and owns about 1,300 acres of nearby mountain land, and about 1,600 acres of
land on New River. It has mineral rights to about 1,300 other acres. VPI has more than 100 campus buildings and numerous other facilities.

Administration and organization. The central administration at VPI includes Vice Presidents for Administration and Operations, Finance, Information Systems, Student Affairs, and Development in addition to the Provost. All of these individuals answer directly to the President and administer a major area of responsibility. Figure 2 on the next page represents the organization of Virginia Polytechnic Institute and State University as of 1987.

Student Affairs Background

Mission. The mission of VPI's Division of Student Affairs is to:

... publish and enforce University policies necessary for a sage and orderly campus environment. It works with other units of the University to promote a community environment that enhances learning. To enhance personal growth, the Division promotes student involvement in a wide variety of activities and experiences during out-of-class hours.

(The University Self-Study, 1986-88, pp. 7-21)

Administration and organization. VPI's Division of Student Affairs is administered by the Vice President. Professional support staff in his office include the Assistant Vice President, Director of University Student Health Services, Director of University Counseling Services, Director of University Cooperative Education Program, Director of University Placement Services, Director of Housing and Residence Life, Director of Student Activities and Squires Student Center, and Director
of Military Affairs. Within the student affairs' organization, excluding the Offices of Cooperative Education and Military Affairs, there are approximately 92 full-time professionals, 138 full-time support staff, and 278 part-time staff members.

**Arrival at VPI**

The researcher conducted all interviews at VPI during the week of March 28, 1988. Those individuals scheduled for an interview included the Assistant Vice President, Interim Director of University Student Health Services, Director of University Counseling Services, Director of University Placement Services, Director of Housing and Residence Life, and Director of Student Activities. All scheduled interviews were conducted. As the Office of University Cooperative Education was to be reassigned in the 1988-89 academic year to the Office of the Provost, the Assistant Vice President for Student Affairs recommended against an interview. In addition, the Director of Military Affairs declined to participate in the study.

During the interviews, participants identified key individuals who support computer use in the student affairs' offices. During the VPI site visit, interviews were also scheduled with these individuals. These follow-up interviews included personnel from the Office University Placement Services, the Department of Systems Development, and the Office of Microcomputer Services.

Relevant documents were collected from available sources. Documents reviewed included: *Virginia Polytechnic Institute and State University, The University Self Study, 1986-88*; *Virginia Tech: Institutional Research and Planning Analysis, University Fact Book,*
Status of Computer-Based Information Systems at VPI

VPI operates computer facilities to support instruction, research, extension, and administration. Mainframe equipment includes two IBM systems dedicated to instructional, research, extension, and administrative activities. In addition, VPI's mainframe equipment includes four VAX 11/780 systems, two IBM 4341 systems, and a Floating Point FPS/164 MAX system. Two of the VAX 11/780 systems provide interactive computing, primarily servicing undergraduate instruction. The remaining VAX systems are dedicated to CAD/CAM (Computer Aided Design/Computer Aided Manufacturing) and research purposes. One IBM 4341 system is dedicated to a CAD/CAM system supporting an array of
Within the Division of Student Affairs there are 35 CRT terminals, 19 personal computers, and 20 printers. The earliest attempt to link the terminals to the mainframe was initiated in fiscal year 1976-77. By the early 1980s all student affairs' offices held access to the mainframe. Seventy-four percent of the personal computers are manufactured by IBM while 10% are IBM compatibles (Leading Edge) and 16% are other brands of computers (Sperry, Apple II). Of the 20 printers, 13 are IBM, 4 NEC, 1 Apple, 1 Epson, and 1 Star. The majority of the personal computers were purchased in fiscal year 1984-85.

According to computer policy statement, "Computing Systems at Virginia Tech" (1987), mainframe computer software and hardware generally used by the Division of Student Affairs includes:

1. CMS (Conversational Monitoring System) - This monitoring system runs under the operating system and provides interactive programming with software such as PROFS, SPIRES, SCRIPT/VSS.

2. PROFS (Professional Office System) - This office system is used to update and change calendars, send and receive notes from other PROFS users, add automatic reminders, and create and update documents. PROFS is used by executives, managers, secretaries, technical, and clerical personnel, and others that need to perform daily office jobs.

3. SPIRES (Stanford Public Information RETrieval System) - This
interactive data base management system is designed to handle all types of data from compact, numerical values found in administrative and scientific data to lengthy, textual values such as bibliographic data.

4. **SCRIPT/VS** - This IBM word processor supports GML (Generalized Markup Language) and DCF (Document Composition Facility). This is the major text processing package supported by the computer center.

5. **RSCS (Remote Spooling Communications Subsystem)** - This subsystem controls communications among input/output devices. RSCS also provides a link via BITNET with many other academic computing systems in North America and Europe.

6. **IMS (Information Management System)** - This control system is used in administrative applications. IMS is designed to manage medium to large data bases in a multi-application environment.

7. **BITNET** - This inter-university network enables the computers at the various member institutions to communicate directly. BITNET supports file transfer, mail, and message exchange.

8. **SURANET (Southeastern Universities Research Association - SURA)** - SURANET is a consortium of 35 universities in southeastern United States. This network allows direct and easy access to member institutions.
According to the student affairs' respondents interviewed, all six offices access the mainframe and use the mainframe student record system (SPIRES) in some capacity. Personal computing software includes word processing, data base, spreadsheet, integrated, and office-specific types. The majority of those interviewed use personal computer software for word processing. Brands of word processing software include WordPerfect, Word Star 2000, Microsoft Word, and Multimate. One respondent mentioned that the majority of their computer tasks including word processing and data base management are conducted by using mainframe software SCRIPT/VS, PROFS, and SPIRES. Data base management tasks are generally conducted by using the personal computer software dBASE III Plus. Spreadsheet software Lotus 1-2-3 and SuperCalc are in use by most offices while one office uses integrated software such as First Choice and Enable.

The University Counseling Services office uses office-specific software such as Virginia View, System of Interactive Guidance and Information (SIGI), and Harrington Osdhea Interest Inventory for career counseling and IASSI (Learning And Study Strategies Inventory) for skill improvement. The Department of Student Activities uses WEIBER for scheduling events in the Squires Student Center.

When the student affairs' individuals participating in the study were asked who was responsible for the selection and implementation of their present computer system, the respondents stated the student affairs' directors make recommendations to the Vice President of Student Affairs on selecting an appropriate system. The Director of University Placement stated, "We talked to people on our campus and
other campuses." The Director of University Counseling remarked, "Our staff decided what we needed and I made the recommendation [to the Vice President of Student Affairs]." According to the Director of Student Activities, "The Assistant Director of Student Activities spent a great deal of time talking to consultants in Communication Network Services (CNS), and other campus offices. Then he made a recommendation to me and I made a recommendation to the Vice President [of Student Affairs]."

Funding for computer hardware and software typically is budgeted through the State of Virginia operating budget procedure. Student affairs' offices in Student Activities, Housing and Residence Life, and University Student Health Services purchased their computers through auxiliary fund sources while University Placement Services received two of their computers as gifts. In addition, the University Counseling Services office mentioned that some of their computers were purchased by private grants.

Overall, the respondents indicated that individuals within their own and other University offices, such as the CNS, influence their decision to purchase specific types of computer systems. In addition, all respondents perceive that top leadership at VPI helps to facilitate computer use by committing financial resources for purchasing new technology and by setting the pace in developing new innovations. For example, the Director of University Health Services stated, "Some of the influence [to use computers] was internal to the university. For example, time cards are now required to be entered through a terminal. We had to do it". Another interviewee stated, "Our budget request
system is on the mainframe. We need to respond to University pressure [to automate]."

In summary, VPI presently integrates mainframe and personal computing systems. The earliest attempt to link terminals to the mainframe began in 1976, while the majority of the personal computers were purchased in the early 1980s. All offices within VPI's Student Affairs Division presently are connected to the mainframe. In addition, all offices use personal computers for word processing. The PROFS software is used by all offices to carry out file transfer among other PROFS users. Personal computing word processing software is used by 50% of those interviewed while mainframe word processing software is used by the remaining 50%. Four out of six offices use personal computers for data base management with dBASE III Plus mentioned most as their choice of software. All offices within VPI's Student Affairs Division are required to use the mainframe operated budget system for financial requests. In addition, several offices use personal computing software, primarily LOTUS 1-2-3, to enhance budget operations.

Additionally, office-specific applications are used by the Department of Student Activities for scheduling events at Squires Student Center and by the Office of University Counseling Services for career guidance and skill improvement.

According to the student affairs' respondents, selection and implementation of their computer systems is influenced by individuals within their offices and by individuals within the University. Seemingly, the University's push to remain state-of-the-art in regards to computer technology influences individual offices to do the same.
Funding for CBISs is driven by the University's internal budget process. Typical fund sources include education and general funds, private grants, and auxiliary accounts.

All respondents agree adequate funding by the University facilitates hardware and software purchases within VPI's Student Affairs Division and improves the current status of microcomputer use at VPI. However, the respondents stated that VPI has widely used computers since the mid 70s and the university's mission drives the administrators, faculty, and staff to continuously improve their use of computers. For instance, a component of VPI's mission statement is to "establish a clear identity as a forward-thinking, high-quality institution that systematically guides and evaluates its future" (The VA Plan for Higher Education 1987, p. 82). All respondents interviewed mentioned that an underlying assumption of VPI faculty and staff members includes their commitment to improve innovation.

Statements made by the interviewees that institutional commitment through budget allocations is an important factor influencing computer use is consistent with the literature cited (Epic, 1986; Er, 1987; Fleit, 1986; Lucas, 1986; Lukesh, 1986; Zastrocky, 1986). Moreover, the statements made by those interviewed that the university's mission plays an important role in facilitating computer use also is consistent with the literature (Lukesh, 1986).

The first research question asked: "What is the current status of CBISs at VPI?". This study makes clear that VPI uses state-of-art computing technology. This technology encompasses on-line budgeting, word processing, data base management, student information management,
and electronic file transfer. State-of-art computing technology and a strong institutional mission committed to advancing innovation creates an environment at VPI which facilitates computer use.

**Users' Perceptions of CBIS and Their Use of the System**

Officials within VPI's Student Affairs Division were asked why their present computer systems were purchased. The Assistant Vice President of Student Affairs stated, "[In our office] the computer systems were purchased primarily for word processing reports and other correspondence." Further, the Director of University Placement stated that computer systems were purchased "to save resources and to provide better services to our public," while the Director of University Counseling Services stated that computer systems were purchased "to automate and to stay on track with the way TECH was going." In addition, the Director of Housing and Residence Life stated that computer systems in his office were purchased because, "We were not satisfied with the University budget system. The [University's] system did not give us adequate detail. Therefore, we use LOTUS 1-2-3 to give us the historical picture we need." The Director of Housing and Residence Life remarked, "We had a local net problem with access and some problems with cables." He further stated, "We used the mainframe software package, GML, for word processing and printed items off by using NEC printers via electronic mail. However, the response time [of the mainframe] became sluggish, and it was hard to get on the network. In addition, increased costs of line changes convinced us to begin our own in-house system. As a result, we purchased personal computers to control the type of data we need in our office. Now we use software
tailored to meet our needs."

All respondents interviewed agree computers were purchased to enhance office automation in the areas of word processing, budgeting, managing student records, and controlling the data needs by their particular office.

Tasks attempted by student affairs' officials using their computer systems include word processing, file management, electronic mail, accounting, purchasing, personnel management, student information management, and budgeting. Office specific tasks include scheduling and reservations, banner making, a room assignment lottery system, tracking of student judicial problems, and a pre-selection system for interviews with employers.

Responses of student affairs' officials interviewed were averaged according to their daily use of computer systems and by their personnel classification (e.g. clerical, students, specialized professionals, administrators). Results indicate that clerical personnel, on average, use the computer system 50% of their time, student assistants vise the systems 90% of their time, specialized professionals such as payroll and accounting personnel use the systems 60% of their time, and student affairs' administrators use them 12% of their time. It seems the level of use is consistent with the roles played by those interviewed. Most of the technical work is completed by support staff, e.g. clerical and specialized professionals, while student affairs' administrators tend to use the computer systems for communication tasks such as word processing and electronic mail transfer.

Typical word processing applications are similar in each student
affairs' office and encompass tasks such as composing, typing, and editing of letters, reports, memoranda, and other correspondence. Most offices use personal computers for completing word processing tasks. For example, the Director of Student Activities mentioned, "Every secretary has a unit wired into the mainframe and an IBM Quietwriter printer. The word processing software we use includes Microsoft Word or Wordstar 2000." However, the University Placement Office indicated they use the mainframe software package, SCRIPT/VS. The Director stated, "The University Placement office uses the GML to generate a quarterly recruiting bulletin. We use word processing and the mainframe data base to generate employer profiles, too."

File management varies in each student affairs' office depending on the specific needs of that office. All of those interviewed stated that they use their computer systems to query the student record system housed on the mainframe. The Director of University Placement stated, "By using the computer, GPAs are checked and student addresses are updated." Similarly, the Assistant Vice President of Student Affairs and Director of Housing and Residence Life both mentioned that the computer is used to track a student's file for judicial purposes. In this case, the computer is used to check a student's record for prior behavioral problems and to review student's grades. According to the Director of Housing and Residence Life, "Related student data also is queried such as tracking parents' home addresses, looking up SAT scores, and determining if the student has ever withdrawn from the University."

Two of the more sophisticated uses of file management occur in the
University Placement Services office and the Housing and Residence Life office. The University Placement Services office utilizes the mainframe to develop an employer profile data base. According to the senior programmer of University Placement Services:

Employer profiles are generated by using the computer data base and word processing software. The employer profile presents the company, its previous years' positions and requirements, and new positions and requirements. These profiles are sent to employers for updating while the revised profiles are keyed directly into the data base. In addition, majors, degrees, and citizenship requirements are included.

By using the computer, the Office of University Placement Services publicizes information on campus in a quarterly recruiting bulletin. Weekly updates also are published. Student resumes and other data are packaged and sent to employers. The employers call in over the phone and make their selection of students. The identification numbers of students are keyed into the computer and a list of those to be interviewed is generated and posted on campus.

A week before the interview these priority students come to our office. The students fill out a form and give it to a clerk who is stationed at a computer. The clerk checks to see if the student is truly a priority select and matches times and dates available for an interview. Remaining interview slots are posted.

Open interviews are scheduled for other students not in
the preselect process. We use the computer system to make checks on students' qualifications and citizenship status. Finally, the system generates paper copies of schedules for each recruiter and each room needed for interviews.

Another example of using the computer for file management was given by the Director of Housing and Residence Life. Not only does this office use the computer to query student records, but it also uses the computer to access the personnel system and accounting data bases. According to the Director of Housing and Residence Life, "The personnel system is used to look up any of our 316 employee records. We look for addresses, salaries, and merit increase data. In addition, the accounting/purchasing system is used to call up accounts, make inquiries, and to determine if purchase invoices are encumbered."

All student affairs' offices use the electronic mail system, PROFS, to send and receive notes, update and change calendars, add automatic reminders, and to create and update documents. Additionally, all student affairs' offices use the mainframe computer system for budget purposes. According to the Assistant Vice President of Student Affairs, "The University's budget system was placed on the mainframe and we enter our budget requests and justifications via the terminal. Also employee time cards are electronically submitted; we had to do it [become automated]." Two offices expressed dissatisfaction with the University's attempt to automate the budget process. Both respondents within these offices believe the University’s automated budget system lacks the capability of capturing historical data. Therefore, these offices use Lotus 1-2-3 to design, coordinate, and maintain their
office budgets. Only one office mentioned they use the integrated software packages, Enable and First Choice, to accomplish their word processing, file management, and spreadsheet tasks.

Office-specific software is used by the Department of Student Activities for scheduling applications for space and room reservations, while the Office of Housing and Residence Life uses banner making software. Also, the Office of University Counseling Services uses software for career planning and skill improvement inventories.

Tailor-made software is developed primarily by staff members of the specific offices. For example, the senior programmer/analyst develops, tests, and implements all software needs of the University Placement Services office. In the Office of Housing and Residence Life, the Assistant to the Director handles all telecommunication tasks.

In the past, the tasks previously described were accomplished by punched cards, calculators, paper and pencil inventories, tracking of budget with paper and pencil, memory typewriters, self-correcting typewriters, and manual checking of files. For example, the Director of University Counseling Services stated, "We used paper and pencil inventories for student assessment as well as printed materials and individual counseling." Similarly, the Assistant Vice President of Student Affairs stated, "We used memory typewriters and budgeting was done with a manual ledger." Essentially, all offices interviewed perceive the use of computers to be more helpful in completing tasks than the old methods. One respondent remarked, "Yes, our computer system is successful in completing the assigned tasks. We are more efficient, the data is more timely, and our output looks more
professional." Another respondent remarked, "The [fact that a great] number [of people] use our system [would] indicate its success. The response and evaluation completed by our students gives us this positive feedback."

When the student affairs' officials were asked their perceptions of the effect of CBISs on their communications process within their department and/or division, they gave similar responses. All respondents agree the computer systems used increase the efficiency of communication.

The student affairs officials were asked their perceptions of the effects CBISs have on their assigned tasks and responsibilities. One respondent remarked, "I do a lot more of my own typing," while another respondent stated, "I'm not as far behind with my own work, my quality of work is better, and editing is a lot easier."

Another effect of the use of CBISs perceived by all student affairs' respondents is that their offices presently run more efficiently. For example, the Director of University Counseling Services stated, "We spend less time on organizational reporting and more time on analysis. We produce a lot more with greater accuracy." Another respondent remarked, "Technology has helped us make more educated decisions."

The major change in procedures indicated by those interviewed includes the impact of the University's policy to complete the budget on line. Every office stated they were required to use the mainframe computer system to complete their budget requests. Another example of a procedural change was indicated by the Director of Housing and
Residence Life. He stated, "We have more preventive procedures, for example, our preventive maintenance program." Evidently, the preventive maintenance program assists the Office of Housing and Residence Life to determine which residence halls need maintenance before major repairs are required.

In addition, the respondents were asked what were the affects of the use of CBSSs on the student affairs' organizational structure. In response, the Director of Housing and Residence Life stated, "Our Assistant to the Director position was created by consolidating all telecommunication tasks. She is a liaison for us with the Computing Center." Further, the Director of University Placement Services stated, "There seems not to be a clear line between clerical and professional tasks; it is more like a support staff environment. In fact, we converted our clerical positions to administrative positions, that is from grade 4 to grade 6. We also hired our own systems analyst/programmer." Along these same lines, the Director of University Counseling Services and Director of Student Activities both stated their clerical classified positions were upgraded by at least one grade and some by two grade levels. The upgrading of these positions was justified because of the computer related tasks their staff now are accomplishing.

In summary, VPI's student affairs' officials purchased their present computer systems to enhance office automation in the areas of word processing, budgeting, managing student records, and controlling data needs. Major tasks conducted by using the computer include word processing, file management, electronic mail, account, purchasing,
personnel management, student information management, and budgeting.

According to those interviewed, clerical personnels' average daily use of the computer system is 50% of their time, student assistants' average daily use is 90%, specialized professionals' average daily use is 60%, and student affairs' administrators average daily use comprises 12%. In addition, tailor-made software are developed by staff members in specific offices. For example, in the University Placement Services office the senior programmer analyst develops, tests, and implements all the office's software needs. The use of tailor-made applications is noted by Timm (1983) as the best way to advance the correct approach toward decision making in higher education.

Before the use of computers, student affairs' tasks were accomplished by punched cards, calculators, pencil and paper inventories, memory and self-correcting typewriters, and manual checking of files. In general, interviewees perceive the present use of CBISs makes their tasks simpler, data more timely and accurate, and output more professional. Further, CBISs improve productivity, help to control data, and increase the communication process. Many of the advantages of using CBISs stated by the interviewees compare favorably with the advantages identified in the literature review.

The major change in procedure indicated by those interviewed is the impact of the University's policy to complete budget operations on line. All offices are held responsible for requesting, developing, and monitoring their budgets with the use of mainframe computer software. In addition, two offices dissatisfied with the limits imposed by using the mainframe budget package now use personal computer software to
further their financial analysis ability.

Personnel changes occurred in four out of six offices because of the use of computers. Two of the offices created new positions while the remaining two offices upgraded positions.

The second question asked, "How does the user's perception of technological innovation affect his or her use of computer-based information systems"? One may conclude that student affairs' users at VPI perceive CBISs positively. Accordingly, the review of available literature states that computer users who hold positive predispositions toward computer technology use the systems more often than those who hold negative predispositions toward computer technology. Respondents believe using CBISs on the job simplifies their jobs, makes data more timely and accurate, makes output more professional, helps to monitor data flow, and increases communication. In addition, the actual use of computers changes the organizational structure of VPI's Student Affairs Division. These perceptions by the users at VPI have led to greater computer use.

The Role of Training and Support

Interviewees were asked which individuals or offices on campus help VPI's Student Affairs Division with computer training and support. According to those interviewed, service of computer hardware and software is handled by several departments of the Division of Information Systems. The Division of Information Systems is administered by the Vice President for Information Systems who reports directly to the Provost.

Study participants mentioned that several offices train and
support the student affairs' CBIS users on campus. The major
information systems departments mentioned most include the Computing
Center, Communication and Network Services, Systems Development, and
Data Administration. Approximately 300 professionals report directly to
the Information Systems Division. In brief, according to "GN01-
Introduction to Computing at Virginia Tech," 1987, computing resources
that directly support the Division of Student Affairs include:

1. **Computing Center**. The Computing Center develops,
maintains, and operates the central computing facilities.
Services provided by the Center include consultation,
documentation, and training seminars. Within the
Computing Center are support services departments including
User Services, Distributed Computing, and Advanced Scientific
Computing. In addition, system service departments include
Systems Programming and Operations. Briefly, the major
responsibilities of the departments reporting directly to the
Director of the Computing Center include:

a. **User Services**. This department serves as the link
between the Computing Center and the user community.
In addition to providing consulting for users with
programming problems, User Services installs and
maintains application software packages, teaches
short courses on a variety of topics, and publishes
User’s Guides as well as weekly and quarterly
newsletters for systematic dissemination of
information to users.
b. Distributed Computing. Distributed Computing maintains the Computer Center's network control and telecommunication software. This department also consults with users on the purchase and use of computer work stations.

c. Advanced Scientific Computing. Advanced Scientific Computing serves the needs of large-scale computing users. This department gives direct support for vector computing on Virginia Tech's 3090 computing facility, on the FPS 164/Max array processor and for remote supercomputing centers.

d. Systems Programming. Systems Programming maintains the operating system software for all major systems. This department also makes recommendations for the identification, evaluation, and selection of major computer hardware and software for the Computing Center.

e. Operations. Operations runs all computer systems and peripheral equipment including standard operation of hardware, Remote Job Entry Stations (RJE's), and the tape library. Operations is also responsible for maintaining the Center's remote facilities.

2. Communications Network Services. This department reports to the Director of Communication Network Services and is responsible for ensuring the continued availability of basic,
reliable communications services. In addition, CNS also manages the Personal Computer Auxiliary which handles the bulk purchase of microcomputers and related materials. The maintenance contract program for computer related equipment is administered by this office.

3. **Systems Development.** The Systems Development group reports to the Director of Information Resource Management. This department develops and enhances the administrative data base software systems that run under IMS.

4. **Data Administration.** This department temporarily is assigned to the Assistant Vice President for Information System. It supports the IMS data base system and manages access authorization for the IMS system.

Overall, the majority of the users indicate they are pleased with the microcomputer support received. However, most of the interviewees feel response is slow and uneven when it comes to mainframe support. One interviewee remarked, "We have few problems with the micros but, with the mainframe data, security is a problem because of hackers. Also access [to the mainframe] is up and down as it seems to be in a state of constant change." Another interviewee remarked, "The local area net is our achilles heel for the cost of the system is high. In the spring we have an added problem of plenty of thunderstorms which interfere with the [operation of the] local area network."

Respondents were asked to describe the training opportunities offered that facilitate their use of computer systems. All respondents mentioned that the User Services Department offers training through
short courses. More specifically the document entitled, "GN05-Computing Center Short Course Descriptions," (1987), lists 13 different short courses. The length of the course is determined by its nature. All short courses relate to the use of mainframe software. Examples of short courses include "Computer Center Orientation," "GML Introduction," "GML: Advanced Function Printing," "IBM PC Introduction," "PROFS Introduction Lab," and "SPIRES1-Searching and Updating." And still short courses are not the only way to learn about using computers at VPI. In fact, there are self-study alternatives such as on-line and written tutorials.

Along these same lines, the Director of University Student Health Services stated, "User services offer short courses of CMS, GML, and microcomputers. Classes are offered twice a week for two to four weeks. We [the Student Affairs Division] give release time." Similarly, the Director of Housing and Residence Life stated, "In-house training is provided by User Services. We receive announcements regularly on how to use software. In addition, our travel budget allows department members to attend training off-campus."

Other offices or people who are consulted when an unfamiliar computer task is encountered include the staff members within each student affairs' office, other offices within VPI's Student Affairs Division, and other offices within the Division of Information Systems. All respondents feel that, "We have expertise within each unit and a lot of people in the University." Another interviewee remarked, "We consult the manual. We have one [manual] for each computer system, accounting, personnel, and student records." The Director of University
Placement Services mentioned, "Either our own systems analyst is consulted or a member of the Systems Development Department is contacted."

All of those interviewed perceived the centralized training presently offered by User Services to be effective and adequate. The remark made by the Director of Student Activities best illustrates the opinion of those interviewed. He stated, "We learn from each other. If necessary, we call User Services and they will come over and teach to the unit. Our unique needs, therefore, are met. It is a matter of growing a little at a time."

In summary, four offices were mentioned that train and support the student affairs’ computer users on campus. The four departments include the Computing Center, Communications Network Services, Systems Development, and Data Administration. All of the interviewees believe that training and support services offered by the University are adequate. Mini courses and workshops continuously are offered by the Department of Users Services. Other offices within VPI’s Student Affairs Division are consulted when an unfamiliar task is presented for completion. All those interviewed mentioned that VPI has many highly specialized and technically trained personnel from which to draw as resources.

Findings from the literature review (Coombs, 1986; Epic, 1986; Hanley, 1986; Helfgott, 1986; Henderson & Oscarson, 1986; Ledbetter, Cox, & Snyder, 1986; Lukesh, 1986, Martin, 1986; Zastrocky, 1986) suggest that training and support services are among the most important facilitators of computer-based information systems use. Training and
support services indeed affect the use of CBISs at VPI. Service departments made available by the University facilitate computer use by offering support for maintenance of computer hardware and software. In addition, service departments help train users on equipment and software packages by offering workshops. The University offers work release to those interested in participating in these workshops. VPI's leadership offers a strong commitment to increased computer use by supporting these training and support services.

The response to the third question, "How does training and support affect the use of CBISs?", is clear. Training and support programs and services offered at the institutional and divisional levels facilitate computer use in VPI's Student Affairs Division.

The Role of an Integrator or Link Person

Respondents were asked if there is a key person who links the technical and student personnel aspects of decision-making processes or problems in their office. All respondents agree a link person or integrator exists within their particular offices. Three out of five respondents feel they played the role of the integrator either by themselves or with another individual on staff within their offices. The remaining two respondents feel the role of the integrator is played by another individual on their staffs. For example, in the Office of University Placement Services the integrator's role is a newly created position filled by a systems analyst who previously worked for the Placement office as a part-time graduate assistant. In this case, all integrators were found on the student affairs' staff.

When asked to describe the integrator's role, the Director of
University Placement Services remarked, "He acts as a liaison with the computer center and our office. He fills the planning and resource role by looking ahead to [anticipate] our hardware and software needs. He selects appropriate resources and responds to our ad hoc needs." In addition, the Director of Student Activities stated, "He is a researcher and keeps an eye open for the state-of-the-art [computer innovations] both internally [within the University] and externally [outside the University]." Further, the Interim Director of University Student Health Services remarked, "I play the role of a general trouble-shooter by answering questions such as why did it [computer system] do this or that or why did it [computer system] beep at me. I support others."

A description of the professional background and personal characteristics of integrators as perceived by the respondents is reflected in the following remarks. The Assistant Vice President for Student Affairs stated, "An integrator needs service user knowledge based on technological knowledge of equipment and practical knowledge of the unit. He also needs to be a good diplomat, mediator, and listener." The Director of Housing and Residence life stated, "He needs theory, philosophy, and sophisticated computer knowledge. He should have vision as to where we want to go and combine that vision with the resources to get us there." Finally, the Director of University Placement Services stated, "He has technical skills, interpersonal skills, and communication skills. He has the willingness to be part of this unit and to fit in with our office routine."

Two of the integrators hold Master of Business Administration
degrees with special training in computer science or information systems while the remaining three individuals acquired their computer skills either through on-the-job training or continuing education. In summary, the professional background displayed by integrators in student affairs’ offices at VPI includes skills in the areas of computer knowledge, communication, and practical experience. In addition, necessary personal characteristics perceived by the respondents include willingness to learn new computer-related information and to share that knowledge, good listening and mediator skills, diplomacy, vision, and resourcefulness.

When asked how the integrator’s role affects the use of computers within their offices, one respondent remarked, "The principle change has been a more positive attitude toward automation. When support dropped from Systems Development the attitude of our people changed. He [the integrator] can keep change going. He can program [the computer] which helps to get things done." The Assistant Vice President of Student Affairs stated, "An integrator makes transition smoother and easier. It [the integrator’s role] does not affect the inevitability of change but just makes it [change] easier." The Director of Housing and Resident Life stated, "[Our integrator] has been very helpful by paving the way to computer literacy." Additionally, the Interim Director of University Student Health Services stated, "The integrator’s role has facilitated more and more use. We had slow use up to 1983-84 and then Tech boomed with micros and it [the use of microcomputers] is increasingly getting faster."

As described in the literature review, the role of the integrator
in facilitating computer use is very important. According to the Harris Study (1983) decision makers without direct access to data (or those decision makers who chose to be supplied with data) need the skill and ability of an intermediary party. This person is described as someone who is intimately acquainted with the data, the way the system works, and how the data are to be reported. Skills of the integrator as stated in the literature review are consistent with the skills identified by the interviewees at VPI. For example, the Harris Study (1983) revealed that an integrator holds strong personal-relation skills, a healthy respect for the complexity of the decision-making process, and an appreciation for nonquantitative data. Similar skills were revealed among the integrators identified by those interviewed within the student affairs' offices at VPI.

In summary, all interviewees agree a link person or integrator exists within their office. Three of the five respondents feel they play the role of the integrator either by themselves or in conjunction with another individual on staff within their office. The remaining two respondents feel the role of the integrator is played by an individual on staff.

The integrator's role is described as one who acts as a liaison with student affairs' offices and the Computing Center, anticipates computer system needs, selects appropriate resources, researches state-of-art computer innovations, acts as a trouble shooter, and supports others. Some of the professional and personal characteristics of an integrator mentioned most include strong communication skills, diplomacy, vision, resourcefulness, knowledge of computer technology,
and the willingness to learn and share new computer-related information.

The response to the fourth research question, "How does an integrator or link person affect the use of CBISs?" also is clear. All respondents agree that the integrators role positively affects use of computers within their offices and within VPI’s Student Affairs Division.

Commitment by Top Leadership

All respondents reported that they believe VPI’s top leadership supports the use of CBISs. For example, one respondent stated, "We created a new position, the Vice President for Computer and Information Systems. Other evidences [of top leadership commitment] include our sophisticated computer network, satellite development, and our new integrated voice and data linkages." Similarly, the Assistant Vice President for Student Affairs stated, "We have been given new positions and the budget resources to procure hardware and software." Still another remarked, "Tech has a commitment toward computer technology as stated in our philosophical statement. If we are not computer sophisticated, we will be let go."

Contrary to the commitment displayed by VPI’s top leadership, all respondents feel the Vice President for Student Affairs is not strongly committed to the support of computers. There is a consensus by those interviewed that the Student Affairs Vice President neither hinders nor promotes CIBS support. The Assistant Vice President for Student Affairs, however, advocates computer use and represents the departments’ desires to increasingly become more technologically
literate. For example, one respondent remarked, "Our Assistant Vice President saw the need for computer use and sold it to our Vice President. He [the Assistant Vice President] controls our budget and has the expectation that technology must be used in its strength with the resources available."

The effects of top leadership commitment to the use of CBISs in the student affairs' offices and on campus as a whole are perceived by the respondents as very positive. For example, the Director of Housing and Residence Life remarked, "The use of CBISs has led to rapid dissemination of information, better communication, efficient use of time, easily available data, accurate and reliable information, and better decision-making ability."

According to the VPI & SU Operating Budget Proposal, Priority No 4 and No 15, submitted to Governor Baliles for the 1988-90 biennium, several initiatives committing resources for computer use are in process. Requests have been initiated for (1) Priority No. 4: Telecommunication-MBA program and (2) Priority No. 15: computer equipment and support for faculty and staff. These requests illustrate top leadership commitment to CBISs at VPI. For example, the concept of distance education was established in Virginia through VPI's televised Graduate Engineering Program. Therefore, priority No. 4 expands proposed televised offerings to include courses leading to a MBA degree.

In addition, as stated in Priority No. 15 a component of the Equipment Trust Fund is specifically targeted for the acquisition of student computer workstations. The integration of computer applications
into most of the disciplines has been accomplished or is in progress. VPI has not been able to provide equivalent levels of computer support, particularly personal computer support, to faculty and staff. According to this initiative, it is important for faculty to access computer workstations in order to prepare instructional materials for classroom activity. Priority No. 15 addresses this need by requesting 100 workstations for faculty and staff employed in academic departments.

In summary, all respondents believe VPI's top leadership supports the use of CBISs. Ways in which this commitment is communicated include the creation of the position of Vice President for Information Systems and the development of a sophisticated computer network including satellite and integrated voice/data linkages. Likewise, adequate budget allocations for computer hardware, software, training, support, and the upgrading of clerical positions in the Division of Student Affairs are additional examples of top leadership commitment to the improved use of technology. Respondents perceive the effects of VPI's top leadership commitment to the use of computers in student affairs' offices and on campus as positive.

According to the literature (Epic, 1986; Er, 1987; Fleit, 1986; Lucas, 1986; Lukesh, 1986; Zastrocky 1986) the most important facilitator of computer use in a university is the commitment of top leadership. Without such commitment adequate resources would not be present to fulfill potential users' requests for data needed to make informed decisions. The review of literature and results gathered from the interviewees both stress the importance of top leadership commitment and make clear that it is present at VPI.
The fifth research question asked, "How does commitment by top institutional leadership affect the use of computer-based information systems?" It appears commitment by top institutional leadership at VPI facilitates computer use by the university. And even though the top leader of the Student Affairs Division is not strongly committed to the use of computers, the Assistant Vice President for Student Affairs acts as an advocate for the improved use of computer systems. Hence, this commitment also facilitates computer use in student affairs.

Long-Range Plans for the Use of CBISs

All respondents interviewed agree the Division of Student Affairs does not have a long-range plan for the improved use of technology. However, representatives of two of the units within VPI's Student Affairs Division stated that their offices have developed long-range plans for improved use of technology. First, within the University Placement Services office, an Information Systems Steering Committee was formed to provide direction for the development of information systems which effectively support the organizational objectives of their unit. According to a draft written by the Information Systems Steering Committee, several functions of the committee are documented. Functions of the committee which specifically relate to the use of CBISs include:

1. A statement of University Placement Services' mission

2. A description of current operations - constituencies served, services offered, priorities among these, and the organization environment

3. A description of current information systems and the
technological environment

4. A description of anticipated operations - constituencies served, services offered, priorities among these, and the organizational environment

5. Information and new systems required to support these anticipated operations

6. A description of anticipated technological developments and their implications for the systems development strategy

7. Policies and procedures to support the systems development effort

8. A priority-ranked, descriptive list of new systems now under consideration

9. A priority-ranked, descriptive list of current system maintenance needs

10. A general description of resource requirements and organizational implications of the recommended development strategy and systems projects

Second, according to the University Counseling Services Annual Report, (1987), the only statement that refers to improved computer use includes the goal, "to continue developing a more programmatic approach to career counseling with more utilization of group and computer models in order to achieve more efficient use of staff time" (p. 3).

Respondents within the Office of Student Activities and the Office of Housing and Residence Life feel they need to develop long-range plans for improving the use of technology. Both offices feel they have sufficient equipment but need time to develop technological skills.
Both the Director of Student Activities and the Director of Housing and Residence Life call for a plan to address this need. For example, the Director of Student Activities stated, "Constant progress is being made. The last three years we have made great strides with our resources. We have our equipment but have not yet realized its potential. We need skill development." Additionally, the Director of Housing and Residence Life stated, "We do not have a coordinated long-range plan, however, we need it. I have appointed a long-range planning committee in response to recommendations of our recent self-study report."

The Assistant Vice President for Student Affairs stated that he recommends a long-range plan for the improved use of technology. He said, "We need a formalized integrated structure. Perhaps the integrators [in the Division] could get together and share information [that would allow us] to feed off other peoples' expertise."

All respondents agree the University developed an extensive long-range plan for the improved use of computer technology. Indications of this plan were documented in Virginia Polytechnic Institute and State University-The University Self-Study, (1986-88). Accordingly, the following excerpts from the self-study illustrate examples of VPI's technological plan.

1. Organizationally, the University created the position of Vice President for Information Systems. This person is responsible for developing and proposing strategic planning initiatives for the integration of information technology into the activities of the University, and to direct and monitor the
activities of the departments charged with the provision of information and technology-based services so as to provide effective planning, management, and evaluation of the resources required (p. 10-3).

2. Recommendation 10-1. That procedures be implemented that require the Vice President for Information Systems to document the enhanced benefits, reduced costs, or added efficiency for major procurement that appear to be needed to expand information and communication systems. Before a new initiative is put into place, the specific benefits to be achieved should be included in the developmental plan and that plan should be properly publicized and reviewed by faculty and others (p. 10-8).

3. Recommendation 10-9. That training laboratories to support both mainframe and PC computing be provided and staffed with professional trainers to teach students and faculty how to use hardware and software, manage their data, and use graphics and printing capabilities. Further user support services should be provided, including additional short courses, more annual presentations to colleges on recent innovations, and introduction to appropriate on-line expert systems (p. 10-24).

4. Recommendation 10-10. That development of educational programs, including short courses and industrial institutes, be greatly expanded to take advantage of the available expertise at VPI&SU and to generate much needed support for
further development of sophisticated computing and information systems (p. 10-25).

In summary, all respondents agree VPI has a long-range plan for the improved use of technology. Likewise, all respondents agree VPI's Student Affairs Division does not have a long-range plan for the improved use of technology. However, two offices within VPI's Student Affairs Division developed their own long-range plans to address the future use of technology. The remaining respondents agree a long-range plan is vital for the improved use of technology.

According to the literature (Coombes, 1986; Evancoe, 1985; Fleit, 1986; LeDuc, 1986; Leim, 1986; Lettle & Temares, 1983; Lukesh, 1986; Lucas, 1986; Naron & Estes, 1985; Partow-Navid, 1987; Zastrocky, 1986) a plan increases support for new technology and offers assistance to others in coordinating activities and identifying critical issues. In addition, the literature suggests certain criteria must be present in order for a plan to be successful. These criteria include a visible commitment of top organizational leadership, acceptance and support of the planning process by those with program responsibility, establishment of appropriate policies and procedures to support the plan, and creation of a management information system to supply data needs of the plan (Hipps, 1982; Hopkins & Massey, 1981; Mayhew, 1979). VPI's university long-range planning documents meet the criteria as indicated by the literature. However, the Division of Student Affairs only partially satisfies the criteria set forth by the literature. There exists in the Division of Student Affairs a commitment (or at least an acknowledgement) that planning documents need to be developed
within each student affairs' unit as well as on a divisional level. There also is a management information system (CBIS) in place which supplies the data needs of the plan. Other necessary criteria as cited in the literature are not present in the VPI's student affairs' long-range plans for the improved use of technology.

The final research question asked, "How does a long-range plan for improving the utilization of technology affect the use of computer-based information systems"? One must conclude the absence of long-range plans have not been a significant deterrent to the use of computers in VPI's Student Affairs Division.
Chapter Six:

Mary Washington College
Results

Purpose and Organization

The purpose of this chapter is to present results concerning the factors that facilitate computer use in student affairs at Mary Washington College (MWC). Background information describing the institution's history, mission, degree offerings, and administration and organizational structure introduces the case. Student affairs' background information also is provided including MWC's Student Affairs' Division mission statement and its administration and organizational structure. In addition, the chronology of the data gathering process conducted at MWC is documented. A discussion and summary of the six major research questions and the relevant findings conclude the case study presentation.

MWC Background Data

History of Mary Washington College. According to the Mary Washington College Institutional Self Study (1983), MWC was chartered by the Virginia General Assembly on March 14, 1908 as the State Normal and Industrial School for Women at Fredericksburg. Edward H. Russell was appointed president in 1908, and the College began its first academic session in 1911 with 110 students.

The College continued operation under its original name until
1914, when it was renamed the State Normal School for Women at Fredericksburg. There were 49 two-year diploma graduates in 1915 and enrollment increased to 249. As a result of legislation by the General assembly in 1924, the school was authorized to offer a four-year degree in education and the College became known as the State Teachers College at Fredericksburg. It was accredited by the American Association of Teachers Colleges in 1924.

In 1934, the General Assembly changed the name of the institution from State Teachers College to Mary Washington College and granted it approval to confer baccalaureate degrees in the liberal arts. By the 1939-40 academic session, enrollment had reached 1,300. The school became formally affiliated with the University of Virginia in 1944, when Mary Washington College became the Women’s College of Liberal Arts and Sciences of the University of Virginia.

The decade of the 70s brought coeducation, Phi Beta Kappa, an academic internship program, advanced academic credentials among the faculty, a Bachelor of Liberal Studies degree, and authority to confer master’s degrees in liberal studies, business administration, and public administration. In addition, MWC operated as a fully independent institution under its own Board of Visitors in 1972.

In the Fall of 1982, a new set of undergraduate degree requirements became effective, revising requirements that had been in place since the 1960s. The new requirements stressed exposure to different academic methodologies and emphasized the importance of writing skills. During the early 80s, enrollment grew to 2,900.

Today, the College is primarily a small residential undergraduate
institutions with a total enrollment of about 3,350. Its limited
graduate offerings are designed for part-time, commuting students.
Although the College enrolls a national and international student body,
over 75 percent of the resident undergraduates are Virginians.

Mission statement. According to "The Virginia Plan for Higher
Education 1987," published by the State Council for Higher Education in
Virginia:

Mary Washington has historically focused on the liberal
arts and sciences, with the pursuit of academic excellence as the
core of [the] value system emphasized throughout the College. This
commitment to excellence and liberal learning will continue in the
years ahead.

Believing that a broad liberal education based upon
freedom of inquiry, personal responsibility and intellectual
integrity is the best preparation for citizenship and career,
the College requires its undergraduates to pursue balanced and
coherent studies in the arts, the humanities, and the natural
and social sciences as a necessary companion to their
concentration in a particular field.

As a small, predominantly residential undergraduate
institution of the liberal arts and sciences, Mary Washington is
distinctive within the Virginia system of higher education by
providing a small college alternative to qualified students. (pp.
59-60)

Mary Washington is sensitive to the educational needs of the
citizens within its commuting region and has established undergraduate
and graduate degree programs designed especially for adult part-time students. The College will continue to assess its full-time and part-time offerings and, when needed, will propose curriculum changes to fulfill its continuing education commitment to the area's population.

Degrees offered. The College is organized into academic departments of one or more disciplines and offers 35 undergraduate programs in the liberal arts and sciences, and compatible professional fields leading to the bachelor degrees in arts, science, and liberal studies. On the master's degree level specialty areas include interdisciplinary studies, liberal studies, and business administration.

Operational statistics. As of Fall, 1987, the student body was composed of 72 percent women and 28 percent men with a total enrollment of 3,352. The number of degrees conferred during the 86-87 academic year was 620 of which 595 were undergraduate and 25 were graduate. In 1987-88, full-time equivalent faculty totaled 148 with 63 percent tenured.

The campus and its location. MWC is located in Fredericksburg, Virginia midway between Washington, D.C., and Richmond, Virginia. The College owns a total of 386 acres of land with 15 residence halls and 20 other campus buildings.

Administration and organization. The central administration of MWC includes Vice Presidents for Academic Affairs, Business and Finance, College Relations, and the Executive Vice President. All of these individuals answer directly to the President and administer a major area of responsibility. The Vice President for Admissions and
Financial Aid and the Dean of Students report to the Executive Vice President. Figure 3 on the next page represents the formal organization of Mary Washington College as of 1985-86.

Student Affairs Background

**Mission.** According to the "Mary Washington College Student Affairs, Goals and Objectives," 1988, the Student Affairs Division at MWC is

... committed to excellence in liberal learning. Student Affairs enhances, supports and complements the student's academic pursuits by providing support services and a variety of residential living-learning situations which assist students in maximizing their learning and personal development both within and outside the classroom. To that end, student affairs provides opportunities for the acquisition of interpersonal and leadership skills, encourages appreciation of cultural and individual differences and promotes interaction among the various elements of the College. By creating a supportive, yet challenging environment, student affairs facilitates the acquisition of skills and abilities necessary for life long learning and for living productive, creative lives.

**Administration and organization.** Student affairs is administered by the Dean of Students. Professional support staff in this office includes the Director of Counseling, Assistant Dean of Residence Life, Assistant Dean of Student Activities, and the Director of the Health Center. Within the student affairs' organization, there are approximately 20 full-time professionals, 5 full-time support staff, and 19 part-time professionals.
Table 3: Mary Washington College Organization

THE RECTOR and the BOARD OF VISITORS

President

Executive Assistant to President

Vice President for Finance and Administration

Vice President for Business and Finance

Vice President for Auxiliary Enterprises

Dean of Students

Assistant Vice President for Student Services

Executive Vice President

Vice President for Admissions and Financial Aid

Vice President for Academic Affairs and Dean

Librarian

Acquisitions

Cataloging

Circulation

Reference

Periodicals

Student Records

Mail Room

Institutional Planning and Research

Personnel

Police

Student Organization and Activities

Student Health

Residence Life

Student Life

Student Health

Career Services

Academic Advising

Academic Internship

Community and Public Services

Continuing Education

Audio Visual

Annual Giving

Physical Plant

Fiscal Affairs

Auxiliary Services

Educational Foundation

Table 3: Mary Washington College Organization
Arrival at MWC

The researcher conducted all interviews at MWC during the week of May 23, 1988. Those individuals scheduled for an interview included the Dean of Students, Assistant Dean of Residence Life, Assistant Dean of Student Activities, and the Director of the Counseling Center. All scheduled interviews were conducted. The Director of the Health Center declined to participate in the study. During the interviews, participants identified a key individual who supports computer use in the student affairs' offices. The key person identified was the Director of the Administrative Computer Center and a phone interview was scheduled and conducted.


Status of Computer-Based Information Systems at MWC

MWC operates computer facilities to support instruction, research, and administration. Centrally housed equipment includes a Hewlett-Packard 9000 Unix Series 850 dedicated to academic computing. This minicomputer supports various programming languages, statistical software, and simulation languages. In addition, four Hewlett-Packard minicomputers are dedicated to administrative computing. The
minicomputers include (1) Series 70 to support an electronic library system, (2) Series 950 to support registrar, alumni, and financial aid data bases, (3) HP6X to support an athletics data base, and (4) HP6X to support a dining hall validation system.

Within student affairs there are two CRT terminals, three printers, and two personal computers. The earliest attempt to link the terminals to the mainframe was initiated by the Office of Residence Life in 1985. As of 1988, two out of five student affairs' offices hold access to the mainframe. These two offices include the Dean of Student Affairs and the Assistant Dean of Residence Life. All of the CRT terminals and printers are manufactured by Hewlett-Packard while one personal computer is manufactured by Hewlett-Packard and the other personal computer is an IBM product. Student affairs' terminals and printers were purchased during the years 1985 through 1987 while the personal computers were purchased in 1988.

Minicomputer software generally used by student affairs' offices includes programs developed and tailored for their needs by the Office of the Administrative Computer Center. The minicomputer software used for management of the student data base is called the Course Information System (CIS). As described in the document, "Software Available for HP Mainframe Users," (1989), minicomputer software generally used by student affairs include:

1. **Hewlett-Packard Listkeeper.** This software enables a user to create lists and labels.

2. **Visicalc.** This software is an electronic spreadsheet similar in function to **Lotus 1-2-3**.
3. **Hewlett-Packard Access and Report.** This software enables a user to access a data base from the mainframe or personal computer and generate a report to the printer.

4. **Hewlett-Packard Query.** This software enables a user to formulate a query to access data from a data base.

5. **SPSS-X.** This software enables a user to generate statistics.

6. **Reflection.** This is a terminal emulator which allows a user to transfer files between the mainframe and microcomputers.

7. **Miscellaneous software.** There are various utilities available for the manipulation, modification, and creation of files and/or reports.

According to the student affairs' respondents interviewed, the Office of Residence Life is the primary user of the minicomputer data base. No electronic mail or other networking systems are used by student affairs' offices.

Personal computer software includes word processing and data base management applications. The offices of the Dean, Residence Life, and Student Activities use *WordPerfect 5.0* for word processing while the Office of Student Activities uses *RBASE* for data base management. Two of the offices access the software directly through the minicomputer while one office accesses the software through their personal computer. The Counseling Center and Health Center do not use computer-based information systems. The Director of the Counseling Center stated that
the Office of Career Planning and Placement which reports to the Vice President for Academic Affairs uses ZIGGY PLUS as an automated career planning inventory.

When the student affairs' individuals participating in the study were asked who was responsible for the selection and implementation of their present computer system, all interviewees responded, "The Administrative Computer Center is responsible." None of the respondents knew the exact procedure for selecting and purchasing computer equipment, however, the Director of Administrative Computer Center commented on the selection process. The Director stated, "We have no written policy statement on the selection or approval process for administrative or academic computer systems. The departments' requests are channeled through either academic or administrative computing. Student affairs' requests come through my office. We review and approve requests while making any changes to the purchase order. Approval is given from the Budget Office and the purchase order is returned to the requesting office for further processing. We have blanket authorization."

Funding for computer hardware and software is budgeted through the State of Virginia's operating budget procedure. All student affairs' computer-based information systems were purchased through the state procedure. Overall, the respondents perceive top leadership has just begun to commit resources for purchasing new technology. In fact, according to the Dean of Students, "Before the 1988-89 fiscal year, there was no equipment allocated in the student affairs' budget."

In summary, MWC at present integrates minicomputer and personal
computer systems. The earliest attempt to link terminals to the mainframe began in 1985. Three out of five student affairs' offices use computer systems. Two of the three offices link to a minicomputer while the third office uses a personal computer. Word processing and data base management are the primary software applications used. Neither electronic mail nor BITNET are used.

According to student affairs' respondents, selection and implementation of their present computer systems is monitored by the Office of the Administrative Computer Center. Funding for CBISs is driven by the internal budget of the Office of the Dean of Students through the State of Virginia's operating budget procedure.

Thus in response to the first question, "What is the current status of CBISs at MWC?," MWC is in the beginning stages of automation. In fact, MWC's administration has just recently (1988) made available adequate resources for computer technology.

Users' Perception of CBISs and their Use of the System

Officials within MWC's student affairs' offices were asked why their present computer systems were purchased. All users agree that automation is the primary reason for purchasing computer systems. The Assistant Dean of Student Activities stated the computer system was purchased "to become more productive and efficient," while the Dean of Students stated the computer systems were purchased, "to address the needs of students in a more timely fashion."

Tasks attempted by student affairs' offices using the computer include word processing and data base management. Responses of student affairs' officials interviewed were averaged according to their daily
use of computer systems and by their personnel classification (e.g. staff, professional). Results indicated clerical personnel, on average, use the computer system 50% of their time while student affairs' professionals use them 33% of their time.

Typical word processing applications, similar in each student affairs' office, encompass tasks such as formatting and editing letters, memoranda, and other correspondence as well as constructing mailing labels. Variations of word processing tasks do occur in each student affairs' office. For example, the Dean of Students uses word processing to develop surveys, assessment instruments, and budget documents while the Office of Residence Life merges word processing functions with the minicomputer data bases to create letters indicating students' room assignments. In this instance, a user may query the minicomputer data base to generate a list of all freshmen requesting housing. This list may then be merged with text to create student letters by using different word processing functions.

File management occurs in the Office of Student activities and Residence Life. Use of data bases exists in a novice form. For example, the Office of Residence Life uses the registrar's data base housed on the minicomputer both to formulate queries and produce files. According to the Assistant Dean of Residence Life, "Queries include generating lists of all 21 year olds so as not to place them with incoming freshman, tracking all room assignments, and sorting students by lottery number." All programming concerning data base activity is controlled by the Administrative Computer Center.

The Office of Student Activities uses personal computer software,
RBASE, for data base management. Several applications according the Assistant Dean of Student Activities include "scheduling events, producing co-curricular transcripts, and handling inventory." He added, "We need to do all the scheduling by keeping track of groups who want to use the building. If a student or group is on probation, we don’t give them access to space. [The use of the computer] helps us to enforce policy better."

In the early 80s, the tasks previously described were accomplished by typewriters, paper files, hand sorting, and calculators. The Office of Student Activities stated, "Scheduling each day was done with a book which had the facilities listed. Each week we had to type a summary sheet." Both the Counseling Center and the Health Center do not use computers and essentially handle tasks manually or with the aid of a typewriter, calculator, and by hand sorting and tallying. All respondents interviewed perceive the use of computers to be more helpful in completing tasks than the old methods. One respondent remarked, "I’m more efficient and more effective. I write more and produce less garbage." Another respondent remarked, "Yes, our computer systems are successful, in fact, now everybody wants a computer for each hand."

The student affairs’ officials were asked their perceptions of the effects CBISs have on their assigned tasks and responsibilities. The Dean of Students stated, "We produce more work because the computer requires less time [for processing]." In addition, the Assistant Dean of Student Activities stated, "It [the computer] has taken the chore out of paperwork, thus more projects are likely to be taken on."
The three offices that use CBISs agree changes have occurred in procedures within their offices. For example, the Dean of Students stated, "Word processing gives a more personal touch to our correspondence," while the Assistant Dean of Student Affairs stated, "We can now monitor which groups use our facilities." In addition, the Assistant Dean for Residence Life stated, "We are more accommodating to our students because it is not such a burden [with the use of the computer] to try and make changes."

None of the student affairs' officials interviewed perceive that the use of CBISs has significantly affected the communication process. One respondent, however, did perceive the use of CBISs has "opened up discussion and stimulated possibilities" regarding the use of technology. In addition, none of the respondents perceive the use of CBISs has significantly affected changes in student affairs' policy or the organizational structure.

In summary, MWC's student affairs' offices purchased their present computer systems to increase productivity through automation by using word processing and file management and to address the needs of students in a more timely fashion. According to the administrators interviewed, clerical personnel's average daily use of computer systems is 50% of the time while professionals' average daily use comprises 33%.

Before the use of computers, student affairs' tasks were accomplished by typewriter, calculator, hand sorting, and pen and paper. In general, interviewees perceive the present use of CBISs makes their tasks simpler, eases control of data, and increases efficiency.
The advantages of using CBISs stated by the interviewees are comparable to the advantages identified by the literature review.

All student affairs' officials who use computers perceive that significant changes have occurred in conducting procedures within their offices. These procedures relate more to individual job tasks, such as word processing and data base management, than to tasks involving the entire student affairs' offices. No significant impact of computers in the communication process is perceived. Further, no changes in policy or in the student affairs' personnel structure are believed to have occurred because of the use of computers. Therefore, in response to the second research question, "How does the user's perception of technological innovation affect his or her use of computer-based information systems?", one may conclude student affairs' users at MWC perceive the CBISs positively. And according to the review of literature, computer users who hold positive predispositions toward computer technology use the systems more often than those who hold negative predispositions. Respondents believe using CBISs on the job simplifies their tasks, helps to monitor data flow, and increases efficiency. These perceptions by student affairs' personnel at MWC have led to greater computer use in student affairs' offices.

The Role of Training and Support

Interviewees were asked what individuals or offices on campus help student affairs' offices with computer training and support. All respondents agree the Administrative Computer Center helps with formal training and support needs. Approximately seven staff members report directly to this department. On an informal basis, other offices
within student affairs and additional offices such as the Admissions Office help with computer training and support. For example, one respondent remarked, "If we have a problem or get into trouble [with the computer system], the Admissions Office is right across the hall." Evidently, the Admissions Office at MWC has been using the mainframe student information system for the longest period of time and, therefore, users share their expertise with individuals in the student affairs' offices. In addition, all respondents agree the training and support provided by the Administrative Computer Center is prompt, effective, and it maintains a five-day response time for computer-related problems or inquiries. Still one respondent stated that if his (or her) office needs data and can not wait five days for a response by the Administrative Computer Center, it relies on other campus offices. This respondent stated, "Sometimes I can't wait [five days] so I call the Admissions Office for such things as a list of incoming freshman or I call the Student Records Office for grade point averages."

Respondents were asked to describe the training and support opportunities offered that facilitate their use of computer systems. Support activities involve the Office of the Administrative Computer Center. This office either creates tailored programs for individual student affairs' offices to use in generating data or responds to data requests. For example, the Assistant Dean of Residence Life stated, "They [the Administrative Computer Center] help to create new programs and to train people on how to make a query. They also help us if we have an [operational] problem with the computer." Other offices such as the Dean of Students directly request data from the Administrative
Computer Center. For example, the Dean of Students stated, "I may ask
the Center to give me a list of all juniors with so many credit hours
with such-in-such grade point average."

In reference to training programs offered, the Director of the
Administrative Computer Center stated,

We send people to Richmond for training on personal computing
applications like WordPerfect. The training involves a two-
day workshop. They can get away from the phones, people, and
general interruptions.

The Director of the Administrative Computer Center continued,

We train in our office for our own applications. Generally, a need
is stated and a meeting is scheduled to discuss that need. We then
determine if a personal computer stand-alone system should be
used, the minicomputer should be used, or both. We take it [each
request] on a case-by-case basis. Usually the department doesn't
know what they want or what is available [to them].

All respondents offered their suggestions on how additional
training and support programs could be developed at MWC. The Assistant
Dean of Residence Life stated, "The Administrative Computer Center
personnel are the experts in training; thus we can go to the computer
center or they can come over here" [for training sessions]. The Dean of
Students stated, "We need to give staff release time to attend hands-on
workshops."

In summary, one office was mentioned that trains and supports the
student affairs' computer users on campus. All respondents agree the
training and support given by the Administrative Computer Center is
prompt, efficient, and adequate. Personal computing training is offered through 2 day workshops held in Richmond, while minicomputer applications are taught and supported on campus by the Administrative Computer Center. Other offices within student affairs and other offices on campus are consulted when an unfamiliar task or request for data is presented for completion. Similar suggestions on how training and support programs should be developed at MWC were made by the respondents. Most respondents agree release time should be given and hands-on workshops should be offered either in their own offices or at the Administrative Computer Center.

Findings from the literature review (Coombes, 1986; Epic, 1986; Hanley, 1986; Helfgott, 1986; Henderson & Oscarson, 1986; Ledbetter, Cox, & Snyder, 1986; Lukesh, 1986; Martin, 1986; Zastrocky, 1986) suggest that training and support are one of the most important facilitators of computer-based information systems use. Training and support indeed affect the use of CBISs at Mary Washington College. Without the aid of the Administrative Computer Center, the Office of Residence Life could not function nearly as efficiently. Moreover, without the support of other offices such as the Admissions Office, the Office of the Dean of Students would not receive immediate resolution to many computer problems. In addition, off campus workshops are made available to help train individuals on personal computing software. Mary Washington College offers work release to those interested in participating in these workshops.

The response to the third question, "How do training and support affect the use of CBISs?", is clear. Training and support programs and
services offered by the college facilitate computer use in MWC’s Student Affairs Division.

The Role of an Integrator or Link Person

Respondents were asked if there was a key person who links the technical and student personnel aspects of a decision-making process or problem in their office. All agree no link person or integrator exists for the purpose of improving and using computer systems either within their particular offices or in an office connected or assigned to student affairs. In response to the fourth research question, therefore, which asked, "How does an integrator or link person affect the use of CBISs"? one might assume that the lack of identified integrators may act as a factor in inhibiting MWC’s use of CBISs.

Commitment by Top Leadership

All respondents reported that they believe Mary Washington College's top leadership supports the use of CBISs. For example, the Dean of Students stated, "Yes, our top leadership supports the use of CBISs. In fact, a computer committee has been formed to look at computing needs on campus and to find out where we need to go to get in line with the 90s." Similarly, all respondents believe the Office of the Dean of Students' top leadership is committed to the support of computers. The Assistant Dean of Residence Life stated, "There has been an internal push [within the Dean of Student’s Office] and by creative people within our own offices to make the computer more useful."

Specifically, ways in which this commitment is illustrated include the acquisition of computer resources for all student affairs' offices and the availability of off-campus workshops and on-campus training
programs. In fact, according to the "Mary Washington College 1988-89 Amendment Request" submitted to Governor Baliles, funding for a new mainframe computer was requested. This request also illustrates top leadership commitment at MWC.

In summary, all respondents believe MWC's top leadership supports the use of CBISs. Ways in which this commitment is communicated include adequate budget allocations for computer hardware, software, training, and support. Respondents perceive the effects of top leadership commitment to the use of computers in student affairs' offices and on campus as positive.

According to the literature, (Epic, 1986; Er, 1987; Fleit, 1986; Lucas, 1986; Lukesh, 1986; Zastrocky, 1986) the most important facilitator of computer use in a university is the commitment of top leadership. Without such a commitment adequate resources would not be present to fulfill a potential user's request for data needed to make informed decisions. Both the review of literature and results gathered from the interviews at MWC stress the importance of top leadership commitment.

The fifth question asked, "How does commitment by top institutional leadership affect the use of CBISs?". It appears that once MWC's top institutional leadership and student affairs' leadership committed to the use of computers, the use of CBISs improved. Since commitment to improve the use of computer technology began in approximately 1987, time will be a factor in determining whether top leadership commitment truly has a long-term effect on improved computer use at MWC.
Long-Range Plans for the Use of Computer-Based Information Systems

All respondents agree that MWC does not have a long-range plan for the improved use of computing technology. Likewise, all respondents agree that the Office of the Dean of Students does not have a long-range plan for the improved use of technology. Only one objective found through document analysis relates to the improved use of technology. This one reference was found in "Mary Washington College Student Affairs Goals and Objectives, 1988" in the Office of Student Activities section under goal four. The goal was to, "Work for a well balanced and evenly scheduled program of activities ... computerize the scheduling process by 1 August 1988."

Two offices suggested plans for their units. The Assistant Dean of Student Activities stated, "We all are new at it [computing]. We may down the road communicate with other departments by electronic mail. My long-range goal is to figure out how our unit relates to other departments" [electronically]. Additionally, the Assistant Dean of Residence Life remarked, "Our long-range plans are vague. Our office, however, would like to tie in with the physical plant. Then we can streamline our maintenance requests, furnishings, and billings. We also would like to tie into the mainframe to access information on grades and academic schedules. Presently, the Administrative Computer Center accesses data; we can’t do it."

In summary, all but one respondent agree MWC does not have a long-range plan for the improved use of technology. Likewise, all respondents agree the student affairs' offices do not have long-range plans for the improved use of technology.
According to the literature (Coombes, 1986; Evancoe, 1985; Fleit, 1986; LeDuc, 1986; Leim, 1986; Little & Temares, 1983; Lucas, 1986; Lukesh, 1986; Naron & Estes, 1985; Partow-Navid, 1987; Zastrocky, 1986) a plan increases support for new technology and offers assistance to others in coordinating activities and identifying critical issues. In addition, the literature suggests certain criteria must be present in order for a plan to be successful. These criteria include a visible commitment of top organizational leadership, acceptance and support of the planning process by those with program accountability, establishment of appropriate policies and procedures to support the plan, and the creation of a management information system to supply the data needs of the plan (Hipps, 1982; Hopkins & Massy, 1981; Mayhew, 1979). The student affairs' documents analyzed failed to meet these criteria set forth by the literature.

Therefore, in response to the sixth research question, "How does a long-range plan for improving the utilization of technology affect the use of CBISs?" one must conclude the absence of long-range plans have not been a significant deterrent to the use of computers in MWC's Student Affairs Division.
Chapter Seven
Comparison and Contrast of Case Studies

Purpose and Organization

The purpose of this chapter is to compare and contrast the research results by summarizing the factors that facilitate and the factors that inhibit computer use in student affairs at James Madison University, Virginia Polytechnic Institute, and Mary Washington College. Second, this chapter includes a discussion of each issue in light of the findings. Critical factors or variables that seem to explain the differences in the findings among the three case studies are discussed and the relationships among these factors or variables are identified. The findings are examined for consistency with the literature on uses of computer-based information systems for academic, student affairs, and corporate planning purposes.

Case Comparison and Contrast

Status of Computer-Based Information Systems. The current status of CBISs at MWC varies significantly from those found at JMU and VPI. JMU’s and VPI’s student affairs’ offices have held on-line capability since 1982 and 1976, respectively. In addition, all JMU’s student affairs’ offices have been connected to the mainframe since 1988, and VPI’s student affairs’ offices have been connected to the mainframe since the early 80s. VPI’s technology has been in place for at least 6 years longer than JMU’s and at least 10 years longer than MWC’s.
On the other hand, MWC is in the beginning stages of automation. For example, one of three MWC interviewees received on-line computer access in 1986 while the remaining two student affairs' officials received computer systems in 1988. In fact, the 1988-89 fiscal year was the first time new equipment including computer systems were authorized through MWC's budget procedure.

Hardware and software use among the three institutions also varies. For centralized computing, MWC's and JMU's student affairs' respondents use Hewlett Packard mini and mainframe computers, respectively, while VPI uses an IBM system. All case institutions use IBM brand computers for personal computing.

MWC's student affairs' respondents primarily use CBISs to execute software such as WordPerfect for word processing and RBASE for data base management. A Hewlett Packard software product is used to create and store the college's data base. Most software is stored on the minicomputer and accessed by users via a programmed menu, thus simplifying use of the system. Any request for data from the student data base must be channelled through MWC's Administrative Computer Center. At present, no electronic mail or file transfer systems are used in MWC's student affairs' offices.

JMU's student affairs' users seem to be experienced in using personal computing software. Not only are word processing and data base management applications used, but spreadsheet, integrated, office-specific, and tailor-made software packages also are used. Individuals access the mainframe through personal computers or terminals. Seven out of eight JMU's student affairs' respondents use
electronic mail and one respondent uses BITNET.

VPI's student affairs' respondents heavily use terminals to access the mainframe for various uses such as word processing, electronic mail, and budgeting. Personal computing software varies among users for word processing while dBASE III Plus and LOTUS 1-2-3 are commonly used for data base management and spreadsheet applications respectively. Similarly to JMU, VPI's student affairs' individuals access the mainframe through personal computers or terminals. In addition, all VPI's student affairs' respondents use electronic mail and BITNET.

The selection and implementation processes of CBISs used at MWC and JMU are similar. Both institutions rely on an office reporting to the computer center for guidance in selection and implementation of all computer systems. In fact, at MWC computer users are required to channel requests for CBISs through the Administrative Computer Center. The Administrative Computer Center has blanket authority to select types of hardware and software purchased. Along these same lines, JMU's users are recommended to use computer center services when selecting computer systems and no support is given for CBISs which deviate from the computer center's approved list. On the other hand, VPI's student affairs' officers select their own computer systems while a computer center office assists in the implementation process. At each institution, funding for major computer systems is similar and is driven by the State of Virginia's operating budget procedure. Additional computer equipment and software at each institution also are funded by private gifts, state or federal grants, and auxiliary fund sources.
Student affairs' respondents from MWC and JMU mentioned that a major incentive to purchase CBISs was the need to automate existing office procedures. For MWC, the automation of office procedures includes word processing and data base management, while at JMU, automation also includes office specific and tailor-made applications. JMU's student affairs' respondents mentioned that another influence that impacted the purchase of CBISs was the need to integrate existing personal computers and mainframe systems. Since VPI's computer environment has been integrated for some time, VPI's major incentive to purchase computer systems includes the university's mission to remain with state-of-art technology.

The first research question asked, "What is the current status of CBISs at MWC, JMU, and VPI?" This study makes clear that MWC is in the beginning stages of automation while JMU is moving in the direction of state-of-art computing technology. VPI's current CBIS status is state-of-art. At JMU, technology has advanced to the point of linking all student affairs' offices to the mainframe, allowing officials access to telecommunication systems and student data base software. In addition, personal computing software packages are used to access data for management, planning, and office specific tasks. VPI's computer technology encompasses on-line budgeting, word processing, data base management, student information management, and electronic file transfer. This state-of-art computing technology and a strong institutional mission committed to advancing technology have created an environment at VPI which facilitates computer use.

User's Perceptions of CBISs and Their Use of the System. Student
affairs' users at MWC, JMU, and VPI perceive CBISs positively, and as a result, they use these systems to complete assigned tasks and responsibilities. Respondents perceive that the use of CBISs helps to meet the current production demands of their jobs. Respondents indicated this demand for productivity was the major reason for purchasing computer systems. For example, at MWC, automation of existing office procedures is necessary to meet in a timely fashion the current needs of the students. At JMU, integration of existing computer systems is seen as important to facilitate user communication. And at VPI, enhancements to existing computer systems are necessary to remain state-of-art.

As previously mentioned, MWC's student affairs' individuals primarily use word processing and data base management software. Most of MWC's applications exist in their novice form, such as generating lists of selected students, tracking room assignments, and sorting students by lottery numbers. Similarly, novice word processing applications are used. For example, word processing formatted text letters are merged with data stored in the minicomputer data bases to create letters. Student affairs' individuals at MWC do not create programs to generate these applications, but direct requests to the Administrative Computer Center to create programs that meet their data needs.

At JMU, computer tasks are more sophisticated than those found at MWC. For example, student demographic data are collected by student affairs' officials by using data base management software and the personal computer. These data are organized, sorted, displayed, and
analyzed in order to make decisions related to student health concerns. In addition, the majority of JMU’s student affairs’ officials use electronic mail to communicate with each other and with individuals in other campus offices. Office specific software programs also are used to schedule space and room reservations and to develop graphics for student flyers. Further, JMU’s Student Affairs Division employs a consultant to develop tailor-made software for student affairs’ offices. Many user-friendly applications are developed by the consultant that fit the needs of specific student affairs’ offices.

VPI’s computer tasks are even more sophisticated than those found at JMU. For example, the mainframe is used to develop a tailor-made employer profile data base which is programmed and maintained by a student affairs’ senior programmer. Essentially, employer profiles are generated by using the mainframe data base and word processing software, a quarterly recruiting bulletin is published, student resumes are packaged and sent to employers, and interviews are scheduled. In addition, all VPI’s student affairs’ offices use an electronic mail system to send and receive notes, update and change calendars, add automatic reminders, and create and update documents. Further, all VPI’s student affairs’ offices use the mainframe computer system for budget purposes. Office specific software similar to that used at JMU also is used at VPI; such software includes scheduling and room reservation applications, banner making software, and career planning and skill development inventories.

All interviewees at the three case institutions perceive the use of computers to be more helpful in completing tasks than the old manual
methods. Those interviewed believe computers provide a mechanism to provide more timely data which improves the effectiveness of the decision-making process. In addition, a consensus exists among those interviewed that significant procedural changes have occurred as a result of using CBISs within student affairs' offices. Further, these procedural changes relate more to individual office tasks, such as word processing and database management, than to tasks involving the entire Student Affairs Division. Student affairs' individuals at MWC and at JMU believe the use of computers has not affected changes in policy at their institutions. However, the procedural change of using the mainframe to complete budget operations has affected VPI's policy as all offices now are held responsible for requesting, developing, and monitoring budgets on line.

According to the respondents, no personnel changes have occurred in student affairs' offices at MWC as a result of using CBISs while at JMU one personnel change was noted. At VPI, however, personnel changes occurred in four out of six offices. Two student affairs' offices created new positions while the remaining two student affairs' offices upgraded existing positions.

In addition, as a result of using computers, no significant impact on MWC's communication process is perceived by those interviewed. However, at JMU six out of eight respondents feel that electronic mail enhances the communication process while two respondents feel it depersonalizes the process. All of VPI's student affairs' respondents perceive the use of computers has increased efficiency of the communication process.
The second research question asked, "How does the user’s perception of technological innovation affect his or her use of CBISs?" Student affairs’ users at MWC, JMU, and VPI perceive CBISs positively. And according to the review of literature, computer users who hold positive predispositions toward computer technology use the systems more often than those who hold negative predispositions toward computer technology. Respondents believe using CBISs on the job simplifies tasks, helps monitor data flow, increases efficiency, makes output more professional, makes data more timely and accurate, and generally improves the communication process.

In addition, at MWC and JMU, the use of CBISs has not appeared to either change policy significantly or affect student affairs’ organizational structures. At VPI, however, minor policy changes have occurred which require student affairs’ officials to use CBISs. Finally, it appears that VPI’s student affairs’ organizational structure is beginning to change as is demonstrated both by the upgrading of clerical positions and by establishing a new position of senior programmer.

The Role of Training and Support. All respondents interviewed from the Student Affairs Divisions at MWC, JMU, and VPI believe computer training and support programs at their institutions facilitate computer use. Each student affairs’ unit identified at least one computer center office which offers training programs and support functions.

In regards to training programs offered at MWC, the Administrative Computer Center was identified as an office that tailors computer programs and trains individuals to use those programs. Not only does
the Administrative Computer Center (with a staff of seven) help to train computer users, it also offers support if technical difficulties arise with users' hardware or software. For training on commercial software such as WordPerfect, MWC supports participation in outside workshops held in Richmond, Virginia. Release time and the cost of the 2-day workshop are provided for student affairs' individuals wishing to participate. Mainframe computer support, however, is perceived as being too slow to meet the users' needs. MWC's respondents stated the 5-day response time often delays the decision-making process. As a result, MWC relies on other college departments such as the Admissions Office for data.

At JMU, two computer service departments primarily are identified as meeting training and support needs of student affairs' officials. These two departments (of approximately 19 individuals) include the Administrative Computer Support Services department and the Telecommunication/Maintenance/Repair Services department. Within the Administrative Computer Support Services department, the Office of Microcomputer Services (OMS) is mentioned most for their role in training and support programs. This office typically offers 36 different one to two hour computer-oriented classes each month. In addition, the OMS works directly with student affairs' departments to tailor computer sessions for the student affairs' staff. Moreover, all administrative personnel are required to attend a computer literacy workshop at the beginning of their employment with the university. The Telecommunication/Maintenance/Repair Service department supports the Division of Student Affairs in installing, maintaining, and repairing
all central computing hardware.

JMU’s respondents also mentioned that personal computer support is adequate but mainframe support often is slow and uneven, especially during registration periods. As a result, JMU’s respondents chose a remedy similar to MWC’s. JMU also relies on and consults with individuals in student affairs’ offices and other offices on campus when an unfamiliar task is presented for completion. In fact, JMU’s Student Affairs Division created a computer user’s group which provides users an informal forum for exchange of computer-related information, assists in networking among college staff and faculty of similar hardware and software, and provides professional development opportunities.

Of the three institutions studied, VPI offers the largest computing support service with over 300 professionals reporting to one of four departments of the Division of Information Systems. Three of the four departments are mentioned most often by respondents as those which help meet student affairs’ training and support needs, and these three departments employ 233 staff members. One of these departments is the Computing Center. Within the Computing Center department, the Office of User Services offers approximately a dozen different computer-centered courses. The courses vary in length and complexity. For example, several courses are prerequisites for others. The computer courses consist of two, two-hour classes per week for four to six weeks. In addition, VPI offers on-line and written tutorials and manuals, in-house training, and release time with an ample travel budget to attend off-campus workshops.
At VPI, the department mentioned the second most frequently was the Computer Network Services department. This department is called on when maintenance or repair work to computer systems is required. The Systems Development department also is mentioned as a computer center department called on for assistance when modification to administrative data base software systems is required. VPI's respondents stated, like MWC's and JMU's, that response time for mainframe computer assistance is slow and uneven. They also mentioned that outside influences seem to impact the quality of service in this area. For example, the security threat caused by hackers as well as spring thunderstorms interfere with VPI's student affairs' access to the mainframe. Here again respondents mentioned a need to depend on other campus users for computer support.

The third research question asked, "How do training and support affect the use of computer-based information systems?" Based on the respondents' comments and the literature reviewed, it is clear that the provision of support services increases computer use. It also appears that the majority of all interviewees believe that paid release time and workshops or courses tailored to meet the specific needs of the users are effective means of providing training and support services. However, all users mentioned that mainframe computer service is slow and uneven and many outside influences seem to impact the quality of service in this area. To offset these interferences with computer access, and to respond to the demand for quick response time, each institution has created mechanisms to meet its data needs.

The Role of an Integrator. Two of the three institutions studied identified integrators in their student affairs' offices. At VPI, all
student affairs' offices identified a key person, or one who links technical and student personnel aspects of a decision-making process or problem. At JMU, integrators were identified in seven out of eight student affairs' offices interviewed. No integrators were identified at MWC. In addition, all but one of JMU's integrators and all of VPI's integrators were identified as student affairs' staff members. The integrator not on JMU's student affair's staff was identified as an outside consultant.

For those respondents who identified the existence of an integrator, all agree that an integrator's role positively affects the use of computers within their office and within the Division of Student Affairs. The integrator is one who acts as a liaison with the computer center, identifies user needs, selects computer resources, and alleviates the fear of using the computer by teaching, training, and consulting.

The professional background and personal characteristics of the integrator also were identified by the respondents. Attributes associated with an integrator include strengths in computer knowledge and communication, practical experience, political savvy, and analytical skills necessary to support decision making. Personal characteristics include the willingness to learn new computer-related information and to share that knowledge, as well as patience, empathy, listening skills, mediator skills, diplomacy, resourcefulness, and vision.

The fourth research question asked, "How does an integrator or link person affect the use of CBISs?" It is clear that at JMU and VPI
the integrator's role positively affects the use of computers by facilitating computer innovations. In addition, respondents believe a more positive attitude toward technology is due to the integrators presence and thus increases the likelihood of computer use. It also is likely the lack of identified integrators acts as a factor inhibiting MWC's use of CBISs.

Commitment by Top Leadership. All respondents interviewed at MWC, JMU, and VPI believe top leadership supports the use of CBISs. Specifically this commitment is evidenced at VPI by the creation of the position of Vice President for Information Systems and the development of a sophisticated computer network including both satellite and integrated voice and data linkages. JMU's top leadership illustrates its commitment to computer technology by requiring all administrators to enroll in a computer literacy class and by requiring all students to pay a computer literacy fee. MWC has just recently established computer literacy and office automation as two commitments of top leadership.

On the divisional level in student affairs, all respondents believe top leadership essentially supports the use of CBISs. JMU's student affairs' leadership now requires all offices to use electronic mail as a tool for communication and, consequently, makes computer resources available to meet this requirement. In addition, JMU's student affairs' leadership has committed resources to hire an outside consultant who works with individual student affairs' offices to create tailor-made software applications. This commitment illustrates that computer use is a priority for JMU's Student Affairs Division. At VPI, the Assistant Vice President for Student Affairs acts as a facilitator
for the division. VPI's student affairs' offices, as a result, receive necessary financial allocations to fund computer software and hardware, to upgrade clerical positions, and to hire new computer personnel.

And as noted above, MWC's administration has just recently (1988) made available adequate resources for computer technology. If this early momentum is to be sustained, then top leadership commitment in the form of adequate budget allocations for computer hardware, software, and training and support services must be forthcoming.

The fifth research question asked, "How does commitment by top leadership affect the use of CBISs"? It is clear that top leadership commitment at VPI, JMU, and MWC facilitates use of computers. Without the commitment of top leadership, financial and human resource allocations would not be available to advance the use of CBISs.

Long-Range Plans for the Use of CBISs. It appears the lack of long-range plans has not significantly affected the use of CBISs at MWC, JMU, or VPI. VPI is the only institution whose respondents indicated that a long-range plan is available and this plan is defined on the institutional level. Further, distinct goals exist for the improved use of computers as evidenced in VPI's 1986-88 self study. For example, the position of Vice President for Information Systems was created and was charged with both creating and maintaining new training laboratories, and developing new educational programs.

On the other hand, no formal long-range plans for the improved use of computers exist in any of the three institutions on the student affairs divisional level. What did exist were individual office goals addressing computer use in the Student Affairs Divisions at VPI and
JMU. In fact, by reviewing student affairs' internal documents, goals or objectives for improved computer use were identified. However, during the interview process, none of the respondents from each institution studied recognized these plans as long-range in nature. Some confusion existed among those interviewed concerning what comprises a long-range plan. Nonetheless, plans must be identified and understood in order to be effective in facilitating computer use.

The last research question asked, "How does a long-range plan for improving the utilization of technology affect the use of CBISs?" One must conclude the absence of long range plans has not been a significant deterrent to the use of computers in the Student Affairs Division at MWC, JMU, or VPI.

Discussion of Results

In the early 70s it was routine for mainframe computing to follow a centralized pattern. Most offices used terminals to access data files through the computer center. Software such as word processing and data base management programs were accessed in this way. VPI's efforts to automate its campus began during this period and this link to the past explains the institution's preference for mainframe computing. For example, 65% (35 out of 54) of VPI's student affairs' respondents use terminals to access data for computing, thus leading to strong, experienced mainframe users. JMU, however, began its push for automation during a time when the tendency was to use personal computers for computing. This is illustrated by the fact that 70% (33 out of 47) of JMU's student affairs' respondents use personal computers to access data for computing, thus leading to strong, experienced PC
users at JMU. Since MWC has just begun (1986) this process of automation, the college will most likely follow a process of automation similar to JMU’s.

Novice computer users such as those found at MWC access data by submitting data requests to the computer center. The computer center determines what data files are needed and writes a program to access data. These data are returned to the user in the form of a written report or electronically displayed by the use of a personal computer or terminal. The user accesses the data file by using programmed menus. Examples of this are found at all three institutions, however, MWC’s users solely rely on computer center designed reports and menu-driven programs. An advantage of this process is that data remain controlled by one office which increases data integrity and reliability. As the user’s confidence and use increase, more data requests usually are generated. This places a burden on the computer center to increase productivity with usually the same level of staffing. Many users at JMU and VPI mentioned that they have resorted to using personal computers to design reports, spreadsheets, and other data applications to reduce the time it takes to produce information through computer-center requests. Because of increased personal computer use and loss of a centralized, computer center concept at JMU and VPI, data integrity and reliability have become more questionable. Consequently, the issue of how best to integrate personal computer and mainframe use has surfaced. Likewise, as more MWC’s users develop sophistication in using computers, the integration of personal computer use and mainframe use will also become an issue.
The period of time in which automation occurred indeed has played a part in the present status of computer systems found at each institution. Another factor which seems to explain the status of CBISs and perception of their users involves the institutions' missions. The results suggest each institution's mission drives the direction the college or university has taken in regards to computer technology. A similar finding is illustrated in the literature. For example, Lukesh (1986) stated the CBIS must be in line with the norms, values, interests, and needs of the group (Lukesh, 1986). In the case of VPI, the institution's mission of "establishing a clear identity as a forward-thinking, high-quality institution" plays a large part in the push for individuals and departments to stay abreast of the latest innovations. In turn, the fact the VPI is noted for its strong pursuits in research, engineering, and science most likely attracts faculty and staff with similar interests. The faculty and staff at VPI bring to their jobs interest, awareness, and sensitivity toward innovation and in turn are expected to engage in innovative pursuits.

On the other hand, MWC's mission articulates the goals of a liberal education, therefore, the college most likely attracts faculty and staff members whose educational philosophies are in line with this mission. Further, it also is likely that many of the staff members will have liberal arts backgrounds. According to Farrell (1984) administrators with humanities and social sciences backgrounds ranked at the bottom of the scale for the successful use of CBISs while administrators with engineering, mathematics, and natural sciences backgrounds ranked at the top of the scale. Furthermore, there are no
advanced engineering or science degrees offered at MWC, therefore, individuals attracted to MWC for employment are not as likely to use the mainframe for advanced scientific or mathematical computing as personnel at colleges or universities with these kinds of advanced degrees. As a result, this limits MWC's human resource pool of skilled computer users and creates little demand for more advanced capabilities at the institution. Along these same lines, JMU's mission is similar to MWC's. However, the size of this institution is two and one half times larger than MWC. As a result, JMU's size gives additional human and financial resources not available to MWC, hence facilitating increased computer use.

Other factors that seem to impact users' perceptions of CBISs are tied to the visibility of the computer system and participation in its use. In regards to visibility, CBISs must be observed by members of the institution in order for the systems to be perceived as legitimate. Participation in the selection, development, and use of computers by top leaders who advocate computers fosters their use, as is seen at JMU and VPI and is evidenced in the literature (Epic, 1986; Er, 1986; Fleit, 1986; Lucas, 1986; Lukesh, 1986; Zastrocky, 1986). In fact, the Farrell (1984) study showed that as top leadership use of computers increased, decision makers were more likely to use CBISs. Commitment of financial resources, of course, also is required to purchase the computer equipment and hire the personnel needed to facilitate computer use.

Examples of visibility and participation are found at JMU and VPI. At JMU, the computer literacy requirement for administrators, the Vice
President for Student Affairs' requirement for electronic mail communication, and strong training programs are visible examples of top leadership's participation in computer use. VPI similarly exemplifies visible and participatory use of computers as is demonstrated by the creation of the position of Vice President for Information Technology or "computer czar." Fleit (1986) stated that 100 of the 3,700 higher education institutions in the U.S. have established the position of computer czar. Fleit further stated, "the creation of this singular position was a signal on how an institution is dealing with one of the most important forces to hit higher education in its history—the force of technology" (p. 30). Other examples found in VPI's Student Affairs Division include a newly created programmer/analyst position and numerous upgrades of classified positions. MWC, however, shows very few visible examples of administrative role modeling or participation in computer use.

Top leadership commitment that is visible and participatory in nature is a vital factor in facilitating computer use. For instance, signals concerning whether or not technology is deemed important are given to members of the college community. Based on these signals, certain behaviors are rewarded, and often reorganization of campus departments occurs. The new technology causes change in the institution, therefore, there is a need to redefine patterns of responsibility and performance of the group adopting the innovation. The findings of this study suggest and the literature (Coombes, 1986; Epic, 1986; Henderson & Oscarson, 1986; Martin, 1986; Zastrocky, 1986) cites evidence that a need for training and support services during the
adjustment period of using new technology is important.

An integrator often can ease the tension caused by rapid change. Since this individual understands both computer technology and the needs of the individual unit, he or she can act as a buffer to the unit by explaining, supporting, and teaching unit members about new technology. Needs of the members of the unit can be met as the integrator advocates the units' position to members of central administration and explains the units' needs to technologically oriented members of the computer staff. The integrator can help in reorganizing the unit to meet the changing needs demanded by the innovation.

According to Timm (1983), "comprehensive computer-based information systems are difficult, if not impossible, to implement in higher education because decision making in higher education is diffuse, decentralized, and political in nature. Hence, trying to systematize all decision making is the wrong approach" (p. 28). In other words, data and analysis are needed that are tailored to accommodate the units' information needs. An integrator's unique skills and personal qualities enable the creation of these tailor-made computer applications. More importantly, the integrator knows the level and type of staffing needed to implement the system effectively. Examples of integrators were found in all student affairs' offices at VPI, in seven out of eight offices at JMU, and in none of the offices at MWC. These findings as well as findings from the literature (Harris, 1983) suggest that MWC may increase use of computers if it identifies and develops the role of integrator.
Planning is another important facilitator of technological innovation cited by the literature. The factors for successful planning identified in the literature include visible commitment of top organizational leadership, acceptance and support of a planning process by those with program responsibility, establishment of appropriate policies and procedures to support the plan, and the creation of a management information system to supply the needs of the plan (Hippe, 1982; Hopkins & Massy, 1981; Mayhew, 1979 and others).

Of these four factors, results drawn from VPI's and JMU's source documents indicate that two of the four factors for successful planning in the Student Affairs Divisions are in place at those institutions. Both institutions illustrate the commitment of top organizational leadership through the creation of management information systems. However, there is little evidence to suggest either that appropriate policies and procedures are in place to support the management information system or that student affairs' users accept and support a planning process for the improved use of computers. For example, the interviewees knew of no long-range plans for the improved use of technology. Since documented planning processes are not evident to the student affairs staff at VPI and JMU, these processes are not taken into account in decision making.

Along these same lines, results drawn from MWC's source documents indicate that top level Student Affairs Division leadership commitment is just beginning to become visible. None of the four factors necessary for successful planning are evident at MWC. Although some factors cited from the literature are met by all of the institutions, none of the
respondents perceived that a long-range plan for improved use of
technology was in place at their institutions. Only one institution,
VPI, mentioned that an institutional level plan was visible and
understood. Again the results emphasize that the existence of long-
range written plans are not an important factor in the use of CBISs.

In summary, this study researched the status of CBISs at three
Virginia institutions: MWC, JMU, and VPI. Student affairs’ users
perceptions of computer-based information systems were also researched.
In addition, the role of the integrator, training and support programs,
top leadership commitment, and long-range planning were cited by the
literature to be important facilitators of computer use and served as a
theoretical framework for the study. The results of this study seem to
be consistent with those found in the literature.

However, critical factors or variables that seem to explain
further the findings of the three case studies also were identified.
These factors include the period of time that computer use was
initiated at the institution (and, accordingly, the type of technology
commonly used); the natural evolution of user sophistication; the
institution’s mission and size; the visibility of technology; top
leadership’s participation in the selection, development, and use of
computer systems; and the critical role of the integrator during times
of rapid technological change. These critical factors coupled with the
factors examined by the original research questions are the basis for
the theory that specific factors and conditions exist that facilitate
computer use. And, if institutions of higher education foster these
factors and conditions, improved computer use will occur.
Chapter Eight

Summary, Conclusions, Implications, and Recommendations

Purpose and Organization

In chapter eight a brief summary of the study is presented which restates the problem and research questions, describes the procedures, and draws conclusions based on the findings. An interpretation of these conclusions lays the groundwork for discussing implications for higher education policy and practice. Finally, recommendations are presented for ways the study can be improved and suggestions are made for further research.

Summary

Over the past two decades, systems of higher education have become increasingly complex and more technological. Thus, there has been a growing emphasis on formal planning and decision making and on how organizations might better adapt to the future. Higher education administrators, including student affairs’ administrators, have responded to these pressures by initiating formal planning processes and turning to new modes of creating and handling information. Among these new modes are the more versatile computer-based information systems.

The application of computer-based information systems holds a great promise for Student Affairs Divisions. Computer-based information
systems have assisted in labor-intensive work found in the offices of admissions, financial aid, registrar, and placement as well as with room assignments and enrollment management (Garland, 1985). Furthermore, data collected on students has improved the effectiveness of assessment and program evaluation (Garland, 1985), enhanced student services such as counseling, advisement, and career planning, and helped reduce attrition (Baldrige, Kemerer, & Green, 1982; Beal and Noel, 1980; Stadtman, 1980). Racicppo and Foxley (1980) added that data collected on all facets of the higher education institution has helped to improve the use of existing resources.

The underlying assumption of this research is that computer-based information systems increasingly are being used as a tool in the formal planning and decision making processes in institutions of higher education. An interesting research question, therefore, is why do some institutions use computer-based information systems more readily than others, particularly within student affairs' offices? With this question in mind, a research study was undertaken to determine what factors facilitate and what factors inhibit computer use in the Student Affairs Divisions of MWC, JMU, and VPI.

Six questions guided the research:

1. What is the present status of computer-based information systems at selected public, four-year higher education institutions in Virginia?

2. How does the user's perception of technological innovation affect his or her use of computer-based information systems?

3. How do training and support affect the use of computer-based
information systems?

4. How does an "integrator" or link person affect the use of computer-based information systems?

5. How does commitment by top institutional leadership affect the use of computer-based information systems?

6. How does a long-range institutional plan for improving the utilization of technology affect the use of computer-based information systems?

The study consisted of a descriptive survey that used a semi-structured interview technique to gather data, and various document reviews. Three institutions were deliberately selected for study based on the strength of their reputations for using CBISs in planning and decision making generally. All three institutions differed by institutional type, size, and mission. Student affairs' officials and related key personnel from these selected institutions were invited to participate in the research.

Content analysis was used to sort and classify constructs and categories of interviews while document analysis was used to compare the interviewees' remarks and perceptions with written, official documents. A chapter that addressed the factors examined by the six research questions was dedicated to each case institution. Essentially, frequencies and percentages were used to consolidate and identify patterns in the data. Observations of the interview participants were quoted where appropriate to highlight and enrich the quantitative findings. An additional chapter compared and contrasted results of each case and discussed critical factors or variables that seemed to explain
the differences in the findings among the three case studies. Relationships associated with these factors or variables were also identified. The objective of the study was to develop a hypothesis concerning what factors facilitate and what factors inhibit use of CBISs in student affairs’ planning and decision making.

Conclusions. The following conclusions have been drawn from the findings of this study.

Status of CBISs

(1) MWC is in the beginning stages of automation with most computer applications existing in their novice form such as generating lists of selected students, tracking room assignments, and sorting students by lottery numbers.

(2) JMU is moving in the direction of state-of-art computing technology. Technology has advanced to the point of linking all JMU student affairs’ offices to the mainframe thus allowing officials access to telecommunication systems and student data base software. In addition, personal computing software is used to access software for management, planning, and office specific tasks.

(3) VPI’s current status of CBISs has reached the level regarded as state-of-art. VPI’s computer technology encompasses on-line budgeting, word processing, data base management, student information management, and electronic file transfer.

(4) The status of CBISs at MWC, JMU, and VPI is affected by the time period in which automation occurred. Automation occurring in the 70s was mainframe oriented while today automation usually involves using personal computers. Along with the process of automation at each
institution, user confidence is likely to increase. In general, it seems that as an individual's use of computer technology increases, his or her confidence in operating the system increases, too. Along these same lines, increased user confidence encourages more data requests. And, more data requests from personal computer users to the traditional mainframe-oriented computer center compels institutions to determine how best to integrate personal computer and mainframe use.

Perception of CBISs

(1) Student affairs' users at MWC, JMU, and VPI perceive CBISs positively, thus, they use the systems often.

(2) Respondents believe using CBISs on the job simplifies tasks, helps monitor data flow, increases efficiency, makes output more professional, makes data more timely and accurate, improves the communication process in general, and does not significantly affect changes in policy.

(3) No significant organizational changes have occurred at MWC or JMU because of computer use. However, several organizational changes were identified at VPI. As the automation process continues at MWC and JMU, it is likely that changes in their student affairs' organizational structure will occur.

(4) The institution's mission and size influence the direction colleges or universities take in regards to computer technology. Moreover, if users perceive part of their job includes support of the institution's mission and that mission is predisposed to improving computer innovation, then the users more likely will stay abreast of new computer technology. This support from the users will also
facilitate computer use.

Training and Support

(1) The student affairs' respondents at all three institutions generally were satisfied with the computer support and training they have received, particularly when it came to microcomputers. The study shows that paid release time and workshops or courses tailored to meet the specific needs of the users are effective means of providing training and support.

(2) All users mentioned that mainframe computer support was slow and uneven and many outside influences seem to impact the quality of service in this area. To offset these interferences with computer access and to respond to the demand for quick response time, each institution has created mechanisms to meet its data needs. These mechanisms included relying on other campus offices and using personal computers.

Role of the Integrator

(1) It is clear that at JMU and VPI the integrator's role positively affects the use of computers by facilitating the smooth and easy transition of computer innovations. Respondents believe that a more positive attitude toward technology is due to the integrator's presence. Thus one may conclude that an integrator increases the likelihood of computer use. It also is likely that the lack of identified integrators at MWC acts as a factor that inhibits use of CBISs.

(2) The integrator, as described by the respondents, is one who acts as a liaison with the computer center and student affairs' office.
He or she identifies needs, selects resources, and alleviates the fear of using the computer by teaching, training, and consulting.

(3) The integrator's professional background and personal characteristics also include strengths in computer knowledge, communication, practical experience, political savvy, and analysis. Personal characteristics also include the willingness to learn new computer-related information and to share that knowledge, as well as patience, empathy, listening skills, mediator skills, diplomacy, resourcefulness, and vision.

(4) Institutions of higher education should identify integrators on their campuses and promote and support their role.

**Commitment of Top Leadership**

(1) Top leadership commitment is described by the respondents and the literature as a crucial factor facilitating computer use. Visible ways top leadership can show their commitment include budget allocations for new hardware, software, and training and support programs; human resource allocations for computer-related positions; new requirements for computer literacy; and leadership's participation in the selection, development, and use of computers.

**Long-range Planning**

(1) The absence of long-range plans for improved use of computers is not a significant deterrent to use of CBISs.

**Implications**

Several points concluded in this study will affect higher education policy and practice. First, as automation of computer systems occurs on higher education campuses, and as users develop
sophistication in computer use, administrators should shift their attention, including human and financial resources, from a mainframe oriented environment to a personal computer environment. Shifting human and financial resources toward personal computer use will distribute technology to campus offices and departments and will signal to the college community that utilizing computer technology is an important priority. This shift will affect the type and style of training and support programs needed. As the automation cycle evolves, further resource commitment will be needed as integration of the two computer environments becomes the focus. Here again, administrators need to plan and prepare for new training and support programs, resource commitments, and the development of computer-related policy and procedures to support this integrated computer environment.

Administrators, however, should rethink their planning efforts for the improved use of technology. As this research study illustrates, student affairs' and institutional long-range plans were scarcely identified. In addition, there is no evidence of long-range planning efforts in the literature on student affairs. Therefore, it is difficult to determine whether the absence of long-range planning for technology in student affairs is different from the absence of long-range planning in any other student affairs' area.

Perhaps short-range, two-year computer improvement plans are the key. Not only is it difficult to predict what technology to use in a rapidly changing market, it is also difficult to predict the effects technology will have on the organizational structure. There is a need for administrators to first determine the initial effects of automation
before planning the next computer-related event.

Since an integrator was identified as the ideal person to implement a plan for automation, higher education administrators should identify, develop, and promote the integrator's role. In addition, higher education officials should ensure that short-term computer improvement plans are in agreement with the missions of the institution, division, and office. There is little hope for successful automation or continued and improved computer use if mission statements are disregarded.

Finally, since visibility of leadership is deemed an important facilitator of computer use, higher education administrators should participate in the entire process of automation. Continued efforts to foster the acceptance of technology on the part of those who advocate the use of CBISs is important.

Recommendations

One limitation of this research includes the researcher's strong disposition toward using computers which could influence the interpretation of data. However, care was taken to adhere to the interview questions with each interviewee at each case institution. In addition, a self-designed survey instrument which had not been tested in previous research was used. Therefore, pretesting of interview questions was undertaken to make the instrument as reliable and valid as possible.

An item that would improve the research instrument concerns the effect of short-range planning on the improved use of CBISs. Inclusion of this item would enrich the study by adding valuable data
related to planning and decision-making processes in higher education.

In conclusion, many related research issues are worthy of study. For example, research that determines how institutional mission and size affect technological choice would add insight necessary for designing effective computer-related improvement plans. Further, a study that identifies the characteristics or behaviors of people who hold a positive predisposition concerning CBISs may suggest a list of criteria that, when fostered, help improve the use of CBISs in institutions of higher education. An additional research topic, gleaned from the literature review and supported by the results of this research, might focus on the differences between analytic and intuitive decision makers in their use, confidence, and attitudes concerning the use of computers. Perhaps understanding distinctive thought processes may lead to changes in training and support programs as well as to increased use of CBISs. Furthermore, this research indicates the natural cycle of automation impacts the use of computers. It follows that an interesting research topic might track the office automation process and its effects on computer use.

Finally, as the review of literature revealed, very little research has been conducted on the outcomes of Student Affairs Divisions' use of CBISs. For example, a study which focused on the collection and analysis of student demographic data may enhance student services such as counseling, advisement, and career planning. Perhaps analyzing data related to students with judicial problems may lead to a set of indicators. These indicators may signal to student affairs officials when necessary intervention and monitoring of students
academic processes were vital. Such research would demonstrate the relationship of more effective and efficient student affairs operations with the nature, quality, and extent of student services.
Appendix A

Examples of Institutions Using CBISs

- University of Alabama in Huntsville: Faculty release time, consulting support and faculty seminars are used extensively as incentives for the development of courseware and integration of the computer into the curriculum (Thompson & Wright, 1986).

- Loyola University of Chicago: Information Center Services (ICSs) are responsible for the support of administrative mainframe computing for database, ad-hoc reports, and decision support. ICS also implement office support systems on microcomputers for word processing and office automation, and provide support for faculty, staff, and students via 35 short classes covering data bases, word processing, and electronic spreadsheets for both the mainframe and microcomputer (Krumrey & Sanders, 1985).

- Dickinson College: A rolling, comprehensive 5-year projection of where the administration wanted to go with the computer is part of the overall plan of the university (Thomas, 1985).

- Miami-Dade Community College: A computer monitoring system is used to track students' grades, warn students of potential problems, provide feedback on students performances and match career goals and abilities (Garland, 1985; Thomas, 1985).

- Virginia Polytechnic Institute and State University: Top-level commitment, interest, and encouragement of leadership on computing with
adequate funding is a priority of the institution (Thomas, 1985).

-Tennessee Technical University: Personal microcomputers were provided to each faculty member. In addition, the University Computer Center offers each faculty member 20 hours of preparatory training and workshops (Costello, 1985).

-University of Pittsburgh: A plan for implementing CBISs that blended scholarship, leadership, and management skills is initiated at this university. The institution relies "on scholarship in the thorough documentation of the problem, needs and solution as a mechanism for promoting discussion, consensus building, and arriving at a final decision" (Linhart, Yeager, & Perkins, p. 90, 1985).

-Castleton State University: Administrators use an automated data reporting system which interactively use programs such as word processing, statistics, data bases, and data analysis. Decisions are based on up-to-date information without tying up research and secretarial staff (Costello, 1985).

-University of Miami: Micro-generated graphs, Program Evaluation and Review Technique/Critical Path Method (PERT/CPM), and computer models are used to project enrollment, credit hours, and indirect costs (Sapp & Temares, 1985).

-Drexel University: Seminars and workshops, demonstrations, a special lecture series, two internal publications, and release time are provided to those interested faculty. In addition to release time, travel expenses for attendance at conferences and seminars throughout the country, funds for graduate and undergraduate assistants, and assistance from technical staff are provided. (CAUSE, 1985, § 5)
- Stetson University and Furman University: These universities use comprehensive computer strategies for planning, setting goals, and evaluating programs in student affairs (Garland, 1985).

- San Francisco State: Workstations for graphics, laser printing, programming, sound generation, and word processing are provided to the departments of Art, Broadcast Communication, Design and Industry, Dance, Film, Interdisciplinary and Experimental Arts, Theatre and Music (CAUSE, 1985, g,6).
Appendix B

Letter of Introduction

412-13 Merrimac Trail
Williamsburg, VA 23185
September 9, 1987

Dr. Sandra Sullivan
Vice President for Student Affairs
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061

Dear Dr. Sullivan:

Please allow me to introduce myself. My name is Genene M. DeMaio and I am a doctoral candidate in the School of Education from The College of William and Mary in Virginia. Presently, I am enrolled full-time as a research graduate in the Higher Education Program.

My proposed research project, which will serve to fulfill dissertation requirements, will attempt to determine what factors contribute and inhibit the use of Computer Based Information Systems and to develop a model to aid in the use of Computer Based Information Systems in Student Affairs decision making. A literature review as well as an informal discussion with a member of the State Council for Higher Education in Virginia has indicated that Virginia Polytechnic Institute and State University is an exemplary model regarding computer use and accurate, reliable reporting.

In the near future and with your permission, I intend to interview several student affairs administrators at your institution. Before I undertake this process, I am in need of a recent structure chart of your organization specifically the Student Affairs Division. Identifying who and how many student affairs administrators is important in order to determine methodology related to data design, analysis, and implementation.
Thank you for your time and consideration concerning my request. If you have any questions or are in need of additional information, you may contact me at the above address or by phone at (804) 253-4291. I will be in touch with you or your office within the next week.

Sincerely,

Ms. Genene M. DeMaio
Appendix C

Letter of Follow-Up

FACTORS CONTRIBUTING TO THE USE OF COMPUTER BASED INFORMATION SYSTEMS AT SELECTED PUBLIC, FOUR-YEAR HIGHER EDUCATION INSTITUTIONS IN VIRGINIA

TO: Research Participants

FROM: Genene M. DeMaio; 412-13 Merrimac Trail; Williamsburg, VA 23185
(Doctoral Candidate; School of Education; College of William and Mary)

Computer based information systems are increasingly being used as a tool in the formal planning and decision making processes in institutions of higher education. However, a review of literature has revealed that some institutions use computer based information systems more often in the decision making process than do other institutions. Further the review of literature has revealed that very little research has been conducted in student affairs divisions regarding their use of computer based information systems, even though the use of computer based information systems is deemed as important in student affairs divisions to capture vital statistics relating to students, faculty, and the curriculum. Such statistics are indeed necessary in making quantitative and qualitative decisions for student affairs planning. The purpose of this research, therefore, is to determine why some institutions use computer based information systems more readily than others, particularly within the student affairs offices.

Your institution is one of three selected based on the strength of your excellent reputation for computer based information systems in planning and decision making in general. Now, I would like to interview you to discuss your perceptions of the factors that facilitate the use of computer based information systems at your institution. Since you are involved with student affairs administration, your insight could help me to add to the limited body of knowledge related to computer use in student affairs planning and decision making. This doctoral dissertation is being conducted under the supervision of Dr. Roger Baldwin; specialist in Higher Education at the College of William and Mary and the following individuals: Dr. John Thelin, specialist in Higher Education; Dr. Virginia Laycock, Associate Dean of Education; and Mr. W. Samuel Sadler, Vice President for Student Affairs.
I will contact you by telephone later this week to arrange a convenient time for an interview, should you agree to participate in this research. While the length of interviews will undoubtedly vary, I anticipate that approximately an hour of your time will be needed. All information given during the interview will be anonymous and protected; the research is designed to obtain generalized information rather than personal identification.

Thank you for your consideration. If you wish to have a copy of a summary of the findings, simply complete and mail the enclosed, self-addressed, stamped post card.
Appendix D

INTERVIEW GUIDE

Research Question #1: What is the present status of CBISs at selected public, four-year higher education institutions in Virginia? Status of Topic (Who, what, where, when, why, how and for what purpose)

Demographics and Background Information on Interviewee

Name____________________________ Title________________________

Institution______________________ Date________________________

Gender______ Age_____ Start Time_________ End Time________________

Degree Program Emphasis Institution

<table>
<thead>
<tr>
<th>Degree</th>
<th>Program Emphasis</th>
<th>Institution</th>
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Major job duties/tasks

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

How many months/years in this present position?____________________________

How many months/years at this institution?____________________________

What other titles and jobs tasks have you been assigned at this institution?____________________

________________________________________________________________________________________
**Background Information on CBIS:**

(a) What type of Computer Based Information Systems (CBISs) are you presently using? When were they purchased?

<table>
<thead>
<tr>
<th>Hardware/Date</th>
<th>Software/Date</th>
<th>Software/Date</th>
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<td>5.</td>
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</table>

(b) Where was the hardware and software purchased? Who decided on the selection of the system?

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<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
<th>Selection/Person(s)</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
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</table>

(c) What procedure was followed in the selection and implementation of your present computer-based information system?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(d) How was your CBIS funded?__________________________________________
<table>
<thead>
<tr>
<th>Research Question #2: Does the user's perception of the impact of technological innovation affect his or her use of the CBIS?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Presently, what type of tasks are attempted by using the CBIS?</td>
</tr>
<tr>
<td>(b) Who are the major users of the system? How often is it used?</td>
</tr>
<tr>
<td>(c) Were there individuals, groups or organizations from inside or outside your institution that emphasized a need for CBISs? If yes, were these people internally or externally linked to your institution and what were their reasons for emphasizing a need for CBISs?</td>
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</table>

<table>
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<tr>
<th>(e) Why was your present computer based information system purchased?</th>
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<tbody>
<tr>
<td>(To accomplish what—maintenance, reporting, planning, etc.)</td>
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</tbody>
</table>

| (f) Were there individuals, groups or organizations from inside or outside your institution that emphasized a need for CBISs? If yes, were these people internally or externally linked to your institution and what were their reasons for emphasizing a need for CBISs? |

<table>
<thead>
<tr>
<th>(b) Who are the major users of the system? How often is it used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c) Were there individuals, groups or organizations from inside or outside your institution that emphasized a need for CBISs? If yes, were these people internally or externally linked to your institution and what were their reasons for emphasizing a need for CBISs?</td>
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<tr>
<th>(e) Why was your present computer based information system purchased?</th>
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<tr>
<td>(To accomplish what—maintenance, reporting, planning, etc.)</td>
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</table>
(b) Do you believe the CBISs are used successfully in completing these tasks? Why or why not?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(c) How were these tasks accomplished before the use of CBISs? Which do you prefer? Why?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(d) What effects do you perceive that the use of the CBISs have had?
Prompts may include:
   -Responsibilities concerning self and/or others
   -Policy and procedures
   -Organizational Structure
   -Communication

________________________________________________________________________

________________________________________________________________________

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________________________________________________________________________
Research Question #3: Does training and support affect the use of the CBISs?

(a) Is your present equipment under service contract? _____ By whom?

(b) What is your opinion of the type of service you receive?

(c) Are there any major problems with your present system? If yes, what are they?

(d) Have you had training opportunities to facilitate the use of the CBIS? Describe its nature and usefulness.

(e) Whom do you consult or what procedure do you follow when an unfamiliar task is presented to you for completion?

(f) Are there any other offices on campus which help you to use CBISs? If yes, name the office(s).
(g) For every office stated in (f), the interviewee will answer letters (g-1) through (g-4) stated below:

(g-1) What are the names of the individuals and where are their offices located?

(g-2) What types of tasks, problems, or projects are routinely asked of this office?

(g-3) How long does it take to get results or the finished product?

(g-4) What is your perception of the operation of this office?

(h) What is your opinion of the "best" way to meet the training and support needs of your office? Of the college or university?
Research Question #4: Does an "integrator" or link person affect the use of CBISs?

(a) Is there a key person who links the technical aspects and the student personnel aspects of a decision-making process or problem and the use of CBIS? ______

(b) Who is this person? Describe their role, professional background and personal characteristics.

(c) What is your perception of the effects of the integrator’s role and the use of CBIS?

Research Question #5: Does commitment by top leadership affect the use of the CBISs?

(a) Does your institution’s top leadership support the use of CBISs? Through what explicit means has that commitment been communicated?

(b) What effects has top-leadership commitment had (within your office or department) on the use of the CBIS? In the institution?
Research Question #6: Does a long-range plan affect the use of the CBIS?

(a) Does your office or department have a long-range plan for the improved use of technology? If yes, describe it. If no, what would you recommend as a plan?

(b) Is there an institution wide plan for the improved use of technology? If yes, please describe the plan.

(c) What effects has a long-range plan had (within your office or department) on the use of CBIS? Within the institution?
Other: Do you have any other comments or observations that you wish to share about your perceptions of CBIS?
Appendix E

CONSENT FORM

I understand that the interview will deal with the factors that influence the use of computer-based information systems in student affairs planning and decision making. I am aware that the research is designed to obtain generalized information rather than personal identification. I am also aware that I can refuse to answer any questions or to terminate the interview at any time without retribution.

__________________________________________
Signature

__________________________________________
Name Printed

__________________________________________
Date

Researcher: Genene M. DeMaio, Doctoral Candidate

Title of Research: "Factors Contributing to the Use of Computer-Based Information Systems in Student Affairs at Selected Public, Four-Year Higher Education Institutions in Virginia"

School of Education; The College of William and Mary in Virginia

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VITA

Genene Marie DeMaio

Birthdate: January 9, 1954
Birthplace: Troy, New York

Education:

1985-1986 The College of William and Mary Williamsburg, Virginia Certificate of Advanced Graduate Study

1979-1983 Virginia State University Petersburg, Virginia Masters of Science

1972-1975 State University of New York at Albany Albany, New York Bachelors of Science

Experience:

1987- College of William and Mary Williamsburg, Virginia Office of Planning and Budget Senior Budget/Planning Analyst

1985-1987 College of William and Mary Williamsburg, Virginia School of Education Graduate Assistant

1979-1985 Henrico County Schools, Virginia Business Educator

1977-1979 King and Queen County Schools, Virginia Business Educator