CORPORATE-BASED HIGHER EDUCATION DEGREE

PROGRAMS: ORIGIN, EVOLUTION,

AND IMPLICATIONS

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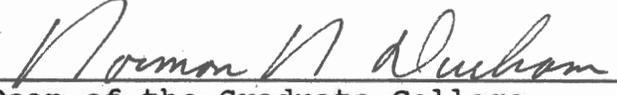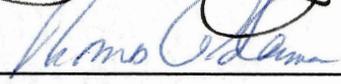DOCTOR OF EDUCATION
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ii

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TABLE OF CONTENTS

LIST OF TABLES

viii

CHAPTER I

INTRODUCTION

Background

Traditional education institutions are not alone on the education frontier of the twenty-first century (Cross, 1981). In the United States today, non-collegiate organizations such as corporations, professional associations, community groups, museums, trade unions, and the armed forces have actually taken the lead in providing services for those seeking post-secondary educational opportunities (Scott, 1987). It is natural to question why these non-instructional institutions have taken on instructional activities, and to speculate whether non-traditional approaches to education will become even more prevalent in the future. It is also valid to ask which agencies can provide the most appropriate education to meet the changing needs of modern society.

Because of the great variety in the nature and purpose of these alternative approaches to education, there cannot be a single answer to these questions. Education which is in preparation for the world of work is of particular interest since this area has undergone profound changes

1

since World War II. The rapid advance of technology and the advent of the information-processing society have led to a need for reclarifying the mission and purpose of higher education.

By tracing the historical evolution of higher education in America, it can be seen that the influence of the world of work has periodically reshaped the country's educational philosophy. The recurring need for corporate-related education and training has led to a variety of non-traditional approaches to education. The credit courses and degree programs offered by corporate-based institutions come closest to those of traditional higher education (Eurich, 1985). They may therefore provide valuable insights into why certain alternative approaches to education were instituted and how these non-traditional programs have responded to the ongoing changes in American society.

It is important to note that education for the world of work in America has, since the country's beginning, developed on a separate path from traditional university education (Eurich, 1985). Despite sporadic attempts to bridge the two domains, universities have undergone few serious reevaluations of their missions and goals in order to meet the needs of a changing society (Cranch, 1987). Although the sharp distinction between "training" as provided by industry for their personnel and "education" as provided by colleges and universities has been considerably

dulled in recent years, elements of the long history of separation still play a decisive part in how many universities and corporations envision their role in the educational community (Cranch, 1987).

The advent of the information-processing society has caused a new emphasis on the need for education and has resulted in a reevaluation of what it means to be an "educated" person. In the remaining decade of this century and beyond, knowledge will become the new power for individuals, organizations, and society as a whole (Cross, 1981). It is estimated that by the year 2000, two-thirds of all work in this country will be information work (Cleveland, 1985). An international emphasis will be required due to the global nature of the information-processing society. A lifelong-learning approach will be necessary to provide for constant upgrading of knowledge and skills. New methods of instruction and delivery will also be required in order to address the varied student population in numerous locations. The ability to meet change head-on will become essential to all involved in educational planning.

Human Resource Development and

Lifelong Learning

Drucker (1969) was one of the first to point out that modern industry was increasingly becoming knowledge-based

and that this change would have a profound effect on the world of work and how to prepare for it. He stressed that it was not education's role to teach people ever increasing amounts of information, but instead to teach them how to think so that they might "learn, unlearn, and relearn" as time went on.

Others have since emphasized that a corporation's greatest resource in the information society is its human capital, and that human resource development would become one of the key factor in achieving excellence (Aburdene, 1985; Lynton, 1984; Naisbitt, 1982; Peters and Waterman, 1982; Naisbitt, 1985). In Peter's recent book, Thriving on Chaos (1987), he stated that the corporate world is being confronted with such rapidly accelerating change that the only truly excellent companies will be those who are constantly adapting. He felt that the winning companies would be those which could not only respond quickly to shifting circumstances but could also pro-actively take advantage of them. To do so would require the development of an enormous flexibility, both on the part of management and the entire work-force.

Many in the business sector have recognized that rapid technological change requires a constant updating of skills if a corporation is to remain competitive. John Sculley, president and CEO of Apple Computer described Apple as "a twenty-first century company living in the twentieth

century" (Sculley, 1988, p.41). Recognizing that companies like Apple need to be constantly changing in the information age, he stressed that the people he hires must possess the aptitude for conceptual thinking, rather than just factual knowledge. As Sculley (1988) pointed out:

> The problem from an education standpoint is that we really aren't preparing people for a world in which they'd change careers four or five times in a lifetime. It will be a world in which the most successful people are those who can look at things from many perspectives (p.41).

David Kearns, chairman and CEO of the Xerox Corporation, emphasized that we are in a new era of lifelong learning that merges work and education (Kearns, 1988). He described the role of education as dealing mainly with the formation and refinement of ideas. He felt it was crucial for employees to not only be proficient in the basic skills, but also to be able to think and communicate what they're thinking, and be open to new ideas as they evolve.

In Reinventing the Corporation, Naisbitt and Aburdene (1985) cited human capital as the strategic resource replacing dollar capital in the information society. They pointed out that a constantly changing information environment required the corporation to function as an educator whose chief task was to train employees to learn, think, and create. The skills they envisioned as necessary for success in the information society were not those which were thought appropriate for early twentieth century

production workers such as promptness, neatness, accuracy and obedience. Instead they felt skills such as reading, writing, problem solving, and evaluating would be essential if people and profits were now to be inexorably linked.

In The Missing Connection Between Business and the Universities, Ernest Lynton (1984) also described the development, as well as the maintenance, of highly educated and skilled human resources as being of major significance to the country's economy. He observed that as such, education and training should represent a shared concern of educators and employers alike. He further observed that as training and education demands increased, these new needs were being met for the most part by sources outside the traditional education system.

Criticism of Traditional Education by
Business and Industry

Many leaders in business and industry have doubted the ability of traditional institutions to meet the present and future needs of the modern work force. A 1977 study revealed that only 12% of top business executives thought the schools and colleges were doing a good or excellent job of preparing people for work (Lusterman, 1977). Although the lack of technical training was a frequent complaint of those surveyed, their major criticism was in the area of general education. 54% indicated that language skill was

the major deficiency area, while another 24% pointed to deficiencies in math or computational skills. In addition, 80% of the respondents felt that some of the training methods used in industry could be advantageously adopted or put to wider use by educational institutions.

A second study suggested that new college graduates had problems making the transition from classroom theories to practical, on-the-job situations (Mandt, 1982). According to this report, new graduates also lacked a practical, disciplined understanding of themselves and their environment. It was noted that even within their own specializations, students were still not up to par. Although the students were assumed to possess at least a passable knowledge of their major subject area, they did not demonstrate that they were able to use that knowledge effectively. The report concluded "in short, they are not educated" (Mandt, 1982, p.48).

Lynton (1984) mentioned that the one nearly universal complaint of business and industry regarding new employees, even those with advanced degrees, was that they were unable to express themselves clearly and concisely. He claimed that graduates "write badly, spell badly, and even listen badly" (Lynton, 1984, p.94). Lynton personally felt, however, that the most serious complaint expressed by business and industry was that the typical graduate lacked problem-solving skills.

The Increase in Corporate Education

In 1985 the Carnegie Foundation released a report on corporate education which revealed that business and industry in this country were spending at least forty billion dollars annually on education, with nearly eight million students involved (Eurich, 1985). In addition to providing orientation programs and on-the-job training, corporations were found to offer educational opportunities ranging from remedial courses to the Ph.D. An increasing number of in-house courses were being evaluated for college equivalency credit, while other courses were gaining academic standing through cooperative programs with traditional higher education institutions. In addition, certain corporations were reported to be offering their own degrees, based on the authority granted them by the same state agencies and regional associations that accredit traditional institutions.

The American Society for Training and Development (1986) recently reported that the training and development provided by business and industry is comparable to higher education in complexity, and nearly comparable in expenditures and size. It was noted that employee training by employers is the largest delivery system in the country for adult education, and that training, rather than job education, provides most job skills. In addition, 70% of

executives, professionals, and technical workers who currently participate in some form of continuing education were said to receive employer-sponsored training rather than traditional education. The comprehensive nature and extent of today's corporate education has raised profound questions for the nation's traditional education system.

Economic Considerations for

Higher Education

The question of how traditional colleges and universities can best relate to alternative education providers, and what insights they might be able to gain from these nontraditional programs, is made even more significant when related to the declining position of America in the world's economy. Peters (1987) described this poor showing as a result of the inability of American business and industry to keep pace with the greatly accelerating changes brought about by constant innovations in computer and telecommunications technologies. In regard to the huge trade deficit, Peters (1987) noted:

> It is a powerful indication that ..... we are getting clobbered primarily because of the generally poor quality of what we produce and a failure, as the result of questionable service and slow responsiveness, to make use of our onshore, close-to-the- world's-biggest-market advantage...... In 1986, despite continuing bright spots such as computers and aircraft, even the trade balance in high-technology goods went into the red (p. 5).

To overcome the present dichotomy between the complex needs of a rapidly changing technological society and the slow responsiveness of the traditional higher education system in America, innovative approaches to education must be considered, tested, and evaluated. The areas of engineering, management, and technology, in particular, have undergone widely transforming changes and require special attention. The focus of this paper will be to address the current and future needs for education in preparation for work in these areas. The fact that corporate America has found it increasingly necessary to educate, train, and retrain its employees sends a strong message to the traditional institutions.

The corporate-based higher education programs chosen for this in-depth study have all originated in the corporate setting, and reflect a non-traditional approach to education in preparation for the world of work. Although the corporation and the college differ greatly, especially in terms of purpose and profits, it is likely that only a combination of features from these two institutions will serve to bridge the current knowledge gap and prepare American workers to compete in a world economy.

Purpose of the Study

This study was designed to determine what corporate-based, non-traditional approaches to higher education are

currently available. The principal aim has been to identify the key features which enable these innovative corporate-based programs to prepare students for the world of work in a rapidly changing environment. The study is limited to programs which are approved for college credit and lead to a degree. The major focus is on education for the areas of engineering, management, and technology since these subjects have been most significantly influenced by the onset of the information-processing society.

After thoroughly reviewing the literature pertaining to higher education which is in preparation for the world of work, four innovative corporate-based programs were selected to be studied in depth. These programs were chosen because they reflect the full spectrum of institutions currently offering corporate-based higher education degrees. This spectrum includes (1) corporate colleges; (2) institutions which began as corporate colleges but have since become independent; (3) corporations which provide their employees with the opportunity to earn degrees through a combination of their own in-house courses and traditional courses taken at a cooperating college or university; and (4) corporations which have joined in a cooperative arrangement with a consortium of universities to sponsor courses at the workplace via satellite or videotape.

The institutions chosen for this study are (1) Rand Graduate School, which is one of the few remaining corporate

colleges and the only one to award the Ph.D.; (2) Northrop University, which is one of the oldest of the original corporate colleges and the one which has been independent for the longest period; (3) General Electric Company, which is one of the earliest providers of corporate education and now offers degree programs in conjunction with cooperating universities; and (4) the National Technological University, which is a unique high technology approach to higher education in the workplace.

Statement of the Problem

Greater understanding is needed between the traditional higher education sector and the corporate sector if the changing educational needs of the modern American workforce are to be met. An increased knowledge of the credit courses and degree programs offered by corporate-based institutions may provide valuable insights into the reasons for the establishment of alternative education opportunities. It may also demonstrate how these innovative approaches to education enable business and industry to respond to the changes in American society.

The information obtained from the case studies of the four innovative corporate-based programs described above will be used to identify the important features which need to be considered by policymakers and planners, in both

higher education and corporations, when addressing how best to respond to changing education and training needs.

The following research questions will be answered as demonstrated through the case study approach:

1. How did these corporate-based programs originate and what developmental changes have they undergone?

2. How are these programs structured and what is their mode of operation? To what extent do they resemble traditional higher education operations?

3. What are the major characteristics of these programs in relation to the corporate, academic, and continuing education concerns of the changing world of work?

4. Which of the characteristics identified above are common to all four of the programs and which are unique?

5. To what extent can these characteristics be extrapolated to the traditional higher education setting, and can a model be derived which would address the higher education needs of the information-processing society?

Definition of Terms

1. <u>Accreditation</u>: the recognition conferred by a voluntary association which accepts into its membership an institution or academic program that meets its standards. Whereas the legal recognition of the right to operate as an educational institution, as conferred by a state, is not necessarily an indication of quality, recognition by a prestigious accrediting agency is thought to legitimatize academic offerings (Nash and Hawthorne, 1987).

2. <u>Adult learner</u>: a student beyond the traditional age of 18-22 years old who typically has major responsibilities outside of college course work.

3. <u>Business and industry</u>: used interchangeably and defined as a person, partnership or corporation engaged in

commerce, manufacturing, or service on a for-profit basis.

4. <u>Continuing education</u>: purposeful educational efforts toward self-development which do not carry college credit.

5. <u>Corporate-based higher education programs</u>: degree-granting educational programs which originated in the corporate sector, but which may or may not have continued to operate under corporate auspices. They maintain direct contact with the corporate sector through one or more of the following means: direct sponsorship, long term contractual arrangements, or cooperative agreements. These alternative approaches to earning degrees primarily address the following subject areas: business management and administration, engineering, and technology.

6. <u>Corporate college</u>: originally defined as "an institution offering postsecondary degrees which was initially established by an entity, profit or nonprofit, whose primary mission was something other than education" (Hawthorne, Libby and Nash, 1983, p.2). Institutions currently classified as "corporate colleges" range from all of the degree- granting institutions of non-collegiate origin, whether accredited or not, regardless of current status (Eurich, 1985; Hawthorne, Libby and Nash, 1983; Nash and Hawthorne, 1987) to only those institutions which have retained their original corporate sponsorship and do not currently exist as private educational institutions (Brazziel, 1988). Unless otherwise stated, this paper will restrict the use of "corporate college" to those institutions remaining integral to the corporation.

7. <u>Corporate education</u>: originally defined as education offered by a business or industry, or other non-collegiate agency, for its own members or employees (Nash and Hawthorne, 1987). In its broadest application, "corporate education" now refers to all educational and training activities sponsored by corporations, whether limited to corporate participants or not. This broader meaning will be used in this paper.

8. <u>Degree</u>: the rank awarded by an accredited institution to an individual following the completion of a required course of study. The degrees referred to in this paper range from the associate to the doctorate.

9. Education: as traditionally defined, the process of integrating material from an array of academic disciplines, and the analysis and synthesis of this material in order to achieve greater understanding. In this context, education focuses on "knowing why" rather than "knowing how" (Lynton and Elman, 1987, p.104). The ability to apply knowledge, however, has increasingly been accepted as an integral part of education and will be considered as such in this paper.

10. Higher education: education beyond high school, as typically provided by colleges, universities, graduate schools, and professional schools, in contrast to non-degree status post-secondary vocational instruction.

11. Higher education institutions: typically refers to traditional degree-granting postsecondary educational institutions such as colleges and universities unless otherwise stated.

12. Information-processing society: is a term used to describe the modern technological society which is becoming increasingly knowledge-based. The rapid technological advancements which have occurred since World War II, combined with the emergence of a new pluralism of institutions and the onset of a world economy, marked the end of the old "industrial society" (Drucker, 1969). In the new information-processing society, information replaces goods as the capital and central resource of the economy (Drucker, 1969). As noted by Herbert Simon (1968), although information of itself is worthless, the value is in the processing. In a similar vein, Drucker (1985) compared the information society to a biological organism. He stated that it is the processing of information which is fundamental to modern society, just as the biological processing of information within a living organism is fundamental to life.

13. Lifelong learning: the process by which adults continue to acquire formal or informal education throughout their life span, either to maintain and improve vocational viability or for personal development.

14. Non-traditional higher education: alternative approaches to higher education involving agencies or organizations which historically have not been involved in credit-bearing educational offerings. This term also refers to a departure from traditional patterns as manifested in mission and goals, content, participants, and methods and materials.

15. <u>Traditional higher education</u>: educational methods and goals which follow the long established practices and procedures of colleges and universities.

16. <u>Training</u>: originally, the process of teaching a specific skill or set of skills for narrow occupational application. The meaning has broadened, however, to include theory as well as practice and is now frequently considered to be the equivalent of "education". This broader meaning will be used in this paper unless otherwise noted.

Limitations of the Study

This study was limited to four in-depth case studies of institutions which offer corporate-based higher education degree programs. The selection of the institutions was based on the following limiting factors:

1. The institutions were to represent corporate-based approaches to higher education and thereby required by definition to demonstrate the following:
   (1) corporate origin
   (2) programs which lead to degrees
   (3) institutional and/or program accreditation
   (4) ongoing corporate affiliation as demonstrated by one or more of the following: sponsorship, contractual arrangements, cooperative agreements.

2. The institutions were to reflect the entire spectrum of agencies currently offering corporate-based higher education programs and therefore needed to include:
   (1) corporate colleges
   (2) institutions which began as corporate colleges but have since become independent
   (3) corporations which provide their employees with the opportunity to earn degrees through a combination of their own in-house courses and traditional courses taken at a cooperating college or university
   (4) corporations which have joined in a cooperative arrangement with a consortium of universities to sponsor courses at the workplace via satellite or on videotape which lead to a master's degree.

In addition to the above limitations regarding the selection of the institutions to be studied in depth, the case study method itself is also limited in the following ways:

1. Case studies may reflect individual circumstances rather than a generalizable condition.

2. Data collection is limited to those sources made available such as printed materials, formal and informal interviews, and personal observations.

3. The potential exists for excessive reliance on information from recognized authority figures.

4. Verifying the findings and validating conclusions may require follow-up studies over a period of several years.

Organization of the Study

This study is divided into five chapters. Chapter I introduces the problem and covers the significance of the study, the statement of the problem, the research questions to be answered, the definition of related terms, and the limitations of the study. Chapter II presents a comprehensive review of the literature related to education for the world of work. Chapter III describes the methodology of the study including the selection of the programs to be included, the nature of the case study approach, and the acquisition and treatment of qualitative data. Chapter IV presents the descriptive case studies of the four corporate-based higher education programs, an analysis of each program based on selected characteristics,

and a comparative analysis leading to the formation of a model. Chapter V contains the conclusions, implications, and recommendations for further research. Appropriate appendices are located after the references.

CHAPTER II

REVIEW OF SELECTED LITERATURE

This literature review is divided into seven sections
. .i includes (1) an overview of the history and philosophy
of traditional higher education in early America, (2) an
overview of the history and philosophy of employer-sponsored
higher education in early America, (3) the changing nature
of education for the world of work in twentieth century
America, (4) the current relationship between traditional
higher education and corporate education, (5) current
corporate approaches to education for the world of work, (6)
the principal characteristics of corporate-based programs,
and (7) a summary.

At the onset it should be noted that the purpose of
education has been a matter of debate since the time of
Plato. A tension has long existed between the desire to
develop the intellect for its own sake and the need to
prepare for earning a livelihood. In America, higher
education developed along two separate paths which
exemplified this dual nature of education. Traditional
education, as offered by the majority of the country's
colleges and universities, focused mainly on theory, while

non-traditional education, available through an increasing variety of institutions and agencies, addressed the need to apply knowledge. This literature review considers the age-old problem of integrating theory and practice, and after developing an historical perspective, looks at a number of current corporate-related attempts to make learning useful. The response of traditional and non-traditional higher education to the changing character of American society is the central theme of this review.

History and Philosophy of Traditional
Higher Education in Early America

Colonial Colleges

The first American colleges were established to meet the need for educated gentlemen to serve in the ministry and public service. Harvard College, founded in 1636 by the Puritan leaders of the Massachusetts Bay Colony, exemplified the country's conviction that educated citizens were needed for secular and religious service (Brubacher and Rudy, 1976). Access to a college education, however, was limited to male members of the elite class. In addition, the classical curriculum of the colonial colleges provided only one course of study to serve all students. This curriculum remained in place for nearly two centuries and continued to

be the principal means by which community leaders were educated.

Divergence from the Classical Curriculum

By the early nineteenth century, strict adherence to the classical curriculum and the belief that a college was the proper environment for only a small governing elite were beginning to give way. As the manufacturing class gained power and wealth, the concept of a more democratic kind of education began to take hold (Rudolph, 1977). New subjects such as science and mathematics were added to the curriculum and the usefulness of the classical curriculum was brought into question.

Some criticism of the existing educational order in favor of a more practical training had existed in America from the time of Benjamin Franklin. Early on there were those who urged that a new kind of higher education was necessary - one that would prepare American youth directly for a wide variety of employments. Before the Civil War, spokesmen for this point of view had generally been found outside the academic establishment rather than within it (Veysey, 1965). During the ten years after 1865, however, utilitarian-minded leaders began to achieve respectable academic positions in significant numbers. These included educators at prominent state universities and such privately endowed colleges as Harvard and Cornell.

Land-Grant Colleges

In 1862 the Morrill Land Grant Act had provided for the sale of public lands to finance the establishment of a college in each state which would specialize in agriculture and mechanic arts, but would not exclude other scientific or classical studies. As noted by Rudolph (1962), when Morrill first introduced his bill in 1857 he had stated that its purpose was to "promote the liberal and practical education of the industrial classes in the several pursuits and professions of life" (249). The land-grant colleges were thus founded on the democratic idea that higher education should be placed within the reach of larger numbers of persons, both male and female, and not limited to those from the elite upper class or the moneyed business or professional sector. The scope of course offerings was to be similarly broadened. As these concepts took hold among other American institutions of higher education as well, a new emphasis on the applicability of education to everyday life began.

Democratic Ideals and the Concept
of Usefulness

During the latter part of the nineteenth century the idea of democracy, as applied to higher education, came to have several distinct meanings. As Veysey pointed out, some

of these meanings appeared to be potentially contradictory (Veysey, 1965). "Democracy" was used by some to refer to the equality of all fields of learning, no matter how novel or technical. "Democracy" also implied accessibility, in terms of ease of admission or absence of fees. The acceptance of students of both sexes and all ethnic origins was also considered democratically desirable, as was the elimination of such requirements as the classical languages. The desire for a wide diffusion of knowledge throughout society was coupled with the assumption that all learning flowed downward from the university. At the same time, however, the most radical definition of "democracy" suggested that the tone for the university's actions should be set by the common man. By the turn of the century, usefulness in a vocational sense had become a prominent theme in the history of American higher education.

At the beginning of the twentieth century, however, the academic conception of a practical and useful education did still appear to have well defined limits. Calvin M. Woodward of Washington University, a leading advocate of technical training in the schools, modified Ezra Cornell's famous slogan about teaching any subject to anyone by stating that "the university was a place where everything useful in a high and broad sense may be taught" and that "we must not fail to preserve the dignity and the nobility of our educational standards" (Veysey, 1965, p. 71). According

to Veysey (1965), Andrew White and Charles Kendall Adams of Cornell agreed with Woodward's position, while Charles Elliot of Harvard wished simply that "the sharp line between an 'educated' and a 'practical' man might somehow disappear" (Veysey, 1965 p.71).

Although the education provided by the land-grant colleges and other higher education institutions which followed suit was designed to be practical, utilitarian, and vocational in orientation, the resources of these academic institutions were insufficient to supplant the apprenticeship system. In the past, apprenticeships had been the principal method by which people were prepared for work. Most apprentices had the opportunity for considerable "hands-on" learning and individualized instruction from a skilled practicioner. This approach was not considered practical in the university setting, and in addition, the majority of educators agreed that the teaching of crafts, industrial trades, and such occupations as blacksmithing and carpentry were best conducted outside the university. Advocates occasionally arose who supported the idea of including manual labor in the college curriculum but this notion survived only intermittently as a kind of fad (Veysey, 1965).

History and Philosophy of Employer-Sponsored
Education in Early America

The Apprenticeship System

The apprenticeship system, brought to America from
Europe, was the earliest form of formal corporate education.
From the Stone Age people had been learning methods of
production and skills from each other. Formalization of the
apprenticeship system was documented as early as 2100 B.C.
when regulations governing its operation were included in
the code of Hammurabi (DeCarlo and Robinson, 1966). The
Middle Ages saw the peak of the development of the
apprenticeship system as a structured training experience.
Because the craftsman or peasant classes were not educated
for literacy, their only means of learning a trade was to
receive instruction from a practitioner. This method of
learning was not restricted to manual labor or craft
occupations, however. Apprenticeship was also the principal
route by which those interested in pursuing the professions
of law, medicine, and education received their training.

The Industrial Revolution

Until the advent of the 20th century, a great deal of
the history of industrial education remained a variation and
improvement upon the institution of apprenticeship.
Technical and mechanical advances which began in the middle

of the 18th century, however, had a significant influence on the way work skills were taught. The establishment of Technical Schools in France in 1795 represented an early break from the old apprenticeship system (Tickner, 1966). With the dawn of the industrial revolution, the production of goods moved out of the home or individual shop, into the corporate factory. The growth of the assembly line method of manufacture meant that each individual needed to learn only a fraction of the total process of production. On-the-job training, learned while doing an actual job under supervision, increasingly replaced the earlier apprenticeship system in these fields which were becoming increasingly mechanized.

Corporation Schools

One-on-one training, however, could not produce the required trained personnel fast enough. The formation of corporation schools came about in response to the need for new methods of worker education. The first such school was established in 1872 by Hoe and Company in New York to train machinists to manufacture printing presses (Steinmetz, 1976). At least five corporation schools were established between 1872 and 1901, and by 1916 over 60,000 young men were enrolled in such schools (Steinmetz, 1976). Techniques of production were taught in all these schools, and were as different from each other as the specificity of the

application demanded. Also, in many instances, general education subjects were taught as well (DeCarlo and Robinson, 1966). By 1922, 150 of these factory based schools belonged to the National Association of Corporation Schools.

Baker (1963) pointed out a number of reasons why the establishment and development of the corporation schools had lasting significance. First, these schools and the subsequent formation of the National Association of Corporation Schools, had considerable impact on the public school curriculum. The Association assisted the public school system in the development of vocational curricula and very likely influenced the passage of the Smith-Hughes Act in 1917. This act authorized federal funds for the development of vocational education at both the secondary and two-year college level. In addition, the corporation school programs, which included alternating periods of classroom study with practice courses, led to the development of public and private continuation schools. Continuation schools were essentially cooperative programs which alternated classroom activities with periods of work experience under the direction of public-school authorities rather than corporate authorities.

Baker (1983) also credited the corporation schools with providing the foundation for collegiate cooperative education with business and industry. For example, the

work-study program instituted at the engineering school of
the University of Cincinnati in 1906 was based on programs
in the corporation schools. In turn, the University of
Cincinnati provided the idea for the nationally recognized
cooperative education plan established by Antioch College in
1921. In conclusion Baker (1983) stressed that the
corporation schools established a precedent for businesses
and industries to offer courses of study for their own
employees. She noted that many of the companies which
belonged to the National Association of Corporation Schools
in 1914 are now among the top industrial corporations and
are known to have developed high quality in-house education
programs.

Education in Preparation for the World of Work
in Twentieth Century America

The late 19th and early 20th century was a period of
intense public and private sector interest in education for
youth and workers (Eurich, 1985). Educational institutions
of every type were concerned with developing programs that
would meet industry's need for workers. Public and private
elementary and secondary schools, junior and senior
colleges, land grant schools, and vocational schools were
all involved with meeting the demands of the industrial
society. Eurich (1985) quoted historian Charles Beard's
1915 statement in regard to the education of the period:

More attention than ever is now being given to the
problem of how education may best fit the pupils for
their tasks as bread winners and as citizens. No
subject calculated to throw light upon the problems of
the world's work is being neglected. In university
laboratories experiments are being conducted along all
lines which may improve the quality and enlarge the
quantity of wealth produced..... American democracy
is trying the great experiment of combining learning
with what the Greeks regarded as the "vulgar" pursuit
of earning a living (p. 35).

Corporate Financial Support and Advisement

During this period, a new type of partnership between
business and industry and higher education emerged (Hurwitz,
1982). A railroad magnate gave Leland Stamford Jr.
University $24 million dollars, and the founder of Standard
Oil Company donated $34 million to the University of
Chicago. Several foundations were also formed. John
Rockefeller helped raise $46 million for the General
Education Board and $151 million was made available to the
Carnegie Corporation. In addition to financial support,
business leaders and other professionals also became more
involved in the governing boards of colleges nationwide. It
appeared that as universities became larger and more
business-like, they required more business expertise. This,
in turn, allowed business leaders to exert greater influence
over university policies.

The Shift in Work Education from Companies
to Colleges during WWI

The increasing complexity of business and industrial
organizations, combined with the demands of World War I for
maximizing output, led to a shift in responsibility for work
education from the companies to the colleges and
universities (Levenson, 1983). By the late 1920's,
references to corporation schools were no longer found in
the literature (Baker, 1983). The methods which had been
successfully put into place in the industrial setting for
training workers were not found to be effective in training
managers. Following World War I, a large number of colleges
and universities established departments and schools of
business which incorporated management training in an
attempt to respond to this need.

Management Education in the 1920's

Scientific management theories, developed before the
War, were supplanted in the 1920's by the human relations
theory of management which focused on the idea of the
employee as a whole human resource. Chester Barnard, of the
Bell Telephone System, was an early advocate of the well-
rounded executive as a wise corporate investment (Eurich,
1985). As vice-president of operations for the Bell
Telephone Co. of Pennsylvania from 1922 to 1927, he arranged

with the University of Pennsylvania for special courses in the humanities for his promising younger executives.

Rehabilitation of Workers during
the Depression

The Great Depression brought with it a new need for the training of workers, the need to rehabilitate them for new kinds of work. Nash and Hawthorne (1987) described the depression as not only a threat to the economic and social order of the time, but also a warning to the education community that there was a continuing need to train employees so that they would be able to adjust when change became necessary.

Increase in In-House Programs
During WWII

As the Depression ended and industry geared up to fight World War II, the work force was once more found insufficient to meet the demands placed upon it. Corporations were again faced with the choice of training their workers themselves or relying on public education to do so. In-house training programs were greatly expanded and, as in the days of the Industrial Revolution, business and industry again chose self-reliance as their preferred course.

Post WWII Expansion of Corporate Education

In order to meet greatly increased consumer demands after World War II ended, large-scale corporate education programs were initiated to utilize new technologies which had been refined during the war. Clark and Sloan (1958) referred to the post-World War II period as a second industrial revolution. Jacobs and Phillips (1979) observed that wartime research in science and technology had acted as a catalyst for an explosive growth in the space, computer, and management consulting industries in particular.

Growth of Corporate Education in the 1950's

During the 1950's corporate education continued to grow and training was provided for foremen and supervisors, factory operators, technical and professional personnel, junior and senior executives, and to a lesser extent, clerical staff. Eurich (1985) reported that many new alignments and contracts were made during this period between corporations and colleges or universities, especially with regard to supplying faculty for management training and technical engineering courses. Western Electric, IBM, AT&T, International Harvester and General Electric were among the leaders in educational efforts for their personnel. GE, for example, was offering 1,500 separate courses in 1956, with 37,000 employees enrolled at

an annual expenditure of $35 to $40 million dollars. IBM
took laboratory technicians with a two-year technical
diploma (or equivalent military or industrial experience)
and turned them into assistant engineers by giving them
regular 12-week courses of 40 hours a week, using standard
college texts as well as specially prepared materials.

Emergence of the Corporate Classroom

Two studies conducted in the late 1950's and early
1960's described the developing "corporate classroom".
Clark and Sloan (1958) and Oscar Serbein (1961) found that
some of the larger companies were spending more on education
than many large educational institutions. Clark and Sloan
(1958) claimed that corporate expenditures per student were
often two and one-half to three times the national average
for conventional classrooms in four-year colleges, and they
noted that a new sector was being added to the traditional
pattern of American public and private education. The
subjects areas which were being taught most frequently
included (1) orientation programs for the individual
company, (2) managerial development, (3) human relations,
and (4) general education courses. General education
courses were described as typical elementary and high school
subjects such as American history and government, as well as
avocational interests like ceramics, gardening, dancing, and
painting.

Effect of Accelerating Technological

Developments

During the 1960's and 1970's, greatly accelerating technological advancements created numerous new positions in fields related to and within business and industry. Although enrollments in college-level business programs rose dramatically during these years and the number and types of collaborative arrangements between business and industry and traditional higher education also increased, colleges and universities were again unable to keep pace with the rapid advancement in technology (Baker, 1983). Jacobs and Phillips (1979) noted that once more "the apparent inability of schooling to meet new training needs has led many employers to take on a larger share of the training function" (p.10).

Current Extent of Corporate Education

A substantial system of formal education and training now exists in the private sector. It's existence went largely unnoticed until the mid-seventies when it was described by IBM executives Branscomb and Gilmore (1975) in a special issue of Daedalus devoted to American higher education. The authors cited figures from their own company and from the Bell system to indicate the scope of education in private industry. They explained these developments as a

rising concern in American industrial circles over the intellectual vitality and flexibility of industrial personnel and pointed out that "an accelerating pace of social and technological change calls for some form of continuing education for which our colleges and universities are not yet organized" (Branscomb and Gilmore, 1975, p.222). John Dunlop, then Secretary of Labor, expressed similar concerns and coined the term "shadow system of education" to draw attention to the emergence of a major employer-sponsored complex of instruction which existed in virtual isolation and with little attention from the established academic institutions (Dunlop, 1975).

The first quantitative study of employer-sponsored education, published in 1977, was conducted by Lusterman for the Conference Board. The study was based on a survey of 610 corporations with 5000 or more employees and clearly indicated that business and industry increasingly viewed education and training to be vital to the continued presence of skilled and productive workers. Lusterman (1979) concluded that "industry is, in fact, no less a segment of the nation's educational system than our colleges and universities, technical institutes, and other schools" (p.3).

In 1985 the Carnegie Foundation released a report on corporate education that revealed that business and industry were spending at least forty billion dollars annually on

education, and that eight to ten million students were involved (Eurich, 1985). These figures approached the expenditure and enrollment of traditional higher education institutions. The type of education offered by corporations for their employees included compensatory education on both basic and advanced professional levels, and company-oriented education to assist in building a corporate structure. The courses included remedial work, basic skills and general education, technical/managerial training, and specific skill building or retraining. Classes ranged from short- to long-term, in-house to off-site, and credit to non-credit.

Although current corporate educational opportunities are varied and numerous, they have not been found to be equally distributed throughout the working population (Lynton, 1984). The majority of systematic training and development programs for employees occur only in the larger companies, and even these are quite limited in terms of the amount of instruction provided to any one individual and in terms of the percentage and categories of participating employees (Lynton. 1984).

The Current Relationship Between Traditional

Higher Education and Corporate Education

Three Potential Relationships

Cross (1981) described three basic ways by which traditional higher education could relate to non-traditional corporate education: as a parallel provider, as a competitor, or as a prospective partner. Examples of all three relationships exist at the present to a certain extent.

A Parallel Activity. Although the historical relationship between collegiate institutions and other providers of education has been essentially parallel, with each going along its own well-defined course, the changes that have occurred in the technological society and the changing needs of the modern worker have resulted in a great deal of overlapping. Cross (1981) described the earlier distinction between non-collegiate "training" and college "education" as fast becoming "blurred beyond usefulness - at least when applied to providers. Colleges are heavily involved in training as well as in education; and the programs of many corporations contain as much emphasis on theory, research, and personal development as any business school" (p.2).

In areas of training which address company issues only
(e.g.. orientation seminars), corporate education is
basically still a parallel education activity. Unless both
colleges and outside agencies severely limit their
educational focus, however, Cross (1981) thinks it is highly
unlikely that parallelism can be maintained on a wide scale.

A Competitive Activity. The possibility of competition
between traditional colleges and universities and the
corporate education sector is growing (Eurich, 1985). When
faced with declining enrollments, traditional institutions
view non-traditional education offerings which lead to
degrees, in particular, with considerable alarm. Because
the number of corporate programs leading to degrees in the
past was minimal, the fear of competition did not become
widespread (Branscomb and Gilmore, 1975). While the
majority of corporate training and education was restricted
to non-degree activities, it was not seen as threatening
(Cranch, 1987). As corporations expand their scope, broaden
their curriculums, offer courses for college credit, and
gain degree granting authority, however, the challenge they
pose to traditional higher education institutions will
increase (Cranch, 1987).

At the same time, the opportunity to serve the new
primarily adult student clientele can be viewed by colleges
and universities as a way to offset the current decreases in

traditional enrollments. The American Council on Education, in a study which addressed the potential of several strategies for offsetting the projected declines in college enrollment, included "increased enrollment of persons currently served by industry" as one of the most promising strategies for boosting enrollment figures (Frances, 1980).

Many have cautioned, however, that too much stress on applied scholarship would weaken the university's attention to more fundamental subjects and nondirected research (Lynton, 1984). Others have expressed the fear that too much adaptation to external needs would lead to the certain destruction of the autonomy of higher education (Lynton, 1984). Today's threats to the institutional integrity of colleges and universities are seen as more subtle and ambiguous than the external intrusions of the past (Davies, 1985). Lynton and Elman (1987) pointed out that it is particularly important for universities to make a careful determination of which instructional tasks are appropriate to their general mission and which are not. They stressed that it would be neither possible nor desirable for colleges and universities to provide most of the instruction required to maintain the competence of all public and private sector employees, members of the armed forces, and independent professionals. Because there are so many education demands in modern society, Lynton and Elman felt that there was ample opportunity for many categories of providers.

A Cooperative Activity. The third relationship which traditional institutions might seek with the non-traditional education sector is a cooperative one. In "The $40 Billion Question: Who will train for the Corporate Future?", Scott (1987) noted that colleges can provide businesses with educational programs at less fixed cost and with the potential for higher quality. He proposed three models of cooperative relationships which colleges and business could undertake: straight contracts, joint ventures, and quid pro quo. He also cited current examples of each type of relationship as follows.

Straight contracts allow business personnel access to college courses which suit their needs. In addition to typical semester-long credit courses, courses are frequently designed especially for the individual company and result in benefits for both the business and the college. In the example given by Scott (1987), the college provided courses on the use of personal computers to a major manufacturing company. The courses of varying lengths and intensities were made available to company personnel ranging from the secretaries to the chief executive officer. Some of the courses took place on the college campus while others occurred at the company's site. The business achieved its educational goals without the necessity of setting up its own program. The college brought in additional income and

increased its immediate enrollment, and some of the participants were even encouraged to enroll again as regular students.

Scott (1987) described joint ventures, which include combined planning and implementation factors as well as resource sharing, as particularly beneficial to educational institutions and industry alike. In the example given, a programming course for the IBM 38 was developed to train programmers for Laura Ashley, Inc., using the company's two IBM 38's. Because few colleges could afford to own the IBM 38, it had been difficult for the company to find programmers. The college, in turn, could then offer the course to others as well.

In one of the quid pro quo arrangements discussed by Scott (1987), the college provided training and consulting in market analysis and management information systems to a commuter bus company in exchange for donations to its scholarship program. In a second example, the college was asked to teach Japanese language, history, and culture to the American employees of Sony, and in exchange Sony would contribute to the college's equipment inventory.

Barriers to Competition

Although the numbers and types of cooperative programs between businesses and higher education institutions in America are increasing, several barriers still remain which

may hinder additional development in this direction. Basic distinctions are perceived between the goals and objectives of the two institutions. Industry is viewed as interested primarily in the cost effective operation of its enterprise, rather than in the development of individuals, whereas fostering individual development is considered central to the higher education mission (Lynton, 1981). Differences in mission between the two systems also result in a marked contrast in styles that hampers cooperation (Eurich, 1985). While higher education follows such traditional academic routines as 50-minute class hours three times a week over a period of three to four months, the corporate world follows a pattern of short-term, intensive efforts, by highly motivated employee-students.

In addition, the corporate impression that higher education institutions are too theoretical, excessively abstract, and too concerned with purely cognitive content, leads them to the conclusion that it would not be possible for traditional institutions to adequately prepare individuals for a transition from theory to practical application (Eurich, 1985; Lynton, 1982; Lynton and Elman, 1987). Also, as Zemke (1985) noted "corporate training professionals ... have complained for years that academia has shown little understanding of private industry's training needs" (p.24).

Other major impediments to industry-higher education cooperative efforts are the organization and decision-making processes of colleges and universities (Shedd, 1987). These sometimes cumbersome processes inhibit the ability of higher education to be flexible enough to respond rapidly to the changing needs of industry. Furthermore, the organizational structure of higher education was designed to some extent to protect the faculty's independent pursuit of knowledge and the institution's educational programs from the pressures of immediate social concerns.

Movement Toward Cooperation - the
Business-Higher Education Forum

The Business-Higher Education Forum was initiated by the American Council on Education as part of higher education's effort to reach out to other segments of society (American Council on Education, 1980). The Forum was designed to serve as a vehicle to promote understanding between chief executive officers (CEO's) of major American corporations and presidents of high ranking American colleges and universities. Forum members were expected to address problems held in common or separately, and to work together on projects and policy positions. Inaugurated in 1978, the current membership includes 40 CEO's of large United States based multinational corporations and 40 presidents of post-secondary institutions (Slaughter, 1990).

Of these institutions, approximately 50% are highly ranked research universities, 20% are highly selective liberal arts colleges, and the final 30% represent the variety of remaining post-secondary collegiate institutions.

The Forum's first report, <u>America's Competitive Challenge: The Need for a National Response</u> (1983), was prepared in response to President Reagan's 1982 request for recommendations which would strengthen America's ability to compete in the world marketplace (Business-Higher Education Forum, 1983). Only a small percentage of the report was devoted to university activities, research, education, and training, while the main thrust was to address the primacy of the private sector and the importance of economic competition (Slaughter, 1990).

Among the recommendations put forth by the first report, the following were of particular interest to this study: (1) business should emphasize career-long professional development for industrial, scientific, and engineering personnel; (2) business should support mathematics and science education, and develop areas of mutual interest, such as equipment, consultants, and research; (3) universities should train new professionals in a variety of fields to work for corporations in global factories and markets, and develop new criteria to meet these needs; (4) industry-university partnerships should encourage problem-oriented research which focuses on

accelerating commercialization; (5) programs should be developed to train the unemployed, assist displaced workers, and help the functionally illiterate to acquire skills for entry-level training; and (6) all students should be given a basic foundation in math, science, and technology.

The second report prepared by the Business-Higher Education Forum, Corporate and Campus Cooperation: An Action Agenda (1984), devoted considerably more attention to the problems faced by the university and to ways in which business and higher education are able to cooperate. It's primary purpose appeared to be the establishment of a basis for industry-university cooperation (Slaughter, 1990). The report stressed the independence of each sector and described their separate roles, while pointing out that the two sectors were complimentary and interdependent. The report's principal recommendation was that all business corporations and institutions of higher education examine and develop means to cooperate with and assist each other. Contract research was identified as particularly significant since it provided for high quality research at relatively low costs, helped bridge the gap between the corporation and the campus, increased the interaction of personnel, and enhanced the general understanding of shared interests. Little mention was made of actual joint research ventures, however, which have been seen as the key to excellence in research during the 1990's (Gardiner, 1990).

In general, the second Forum report portrayed corporations as providing resources ranging from careers to unrestricted endowments, while universities, in return, trained students, produced research, and redirected their enterprise to serve the corporation. Slaughter (1990) noted that the greatest benefit of cooperation between the two sectors as described in <u>Corporate and Campus Cooperation: An Action Agenda</u> might well be a political alliance in which each sector acted in the other's behalf to increase public support and subsidy.

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Current Corporate Approaches to Education

for the World of Work

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A wide variety of programs are currently available which fall into the category of employer-sponsored education. While some of these programs depend upon traditional colleges and universities for their very existence, others are inherently independent of traditional higher education in their planning, content, and delivery. As will be seen, however, even these independent programs tend to reproduce the standards and requirements of the traditional education sector when the question of accreditation arises.

Corporate Education Dependent upon Traditional
Higher Education

Courses Provided by Colleges and Universities. Colleges
and universities participate directly in employer-sponsored
instruction in two ways. They provide a portion of the
outside courses, and they also constitute a part of the in-
house activity through the delivery of specific programs
under contract with the employer. A large number of
contractual agreements between business and higher education
are currently in place. The American Council on Education's
Directory of Joint Ventures describes 290 jointly-sponsored
programs and activities between higher education and
business and industry, of which at least 70 refer to
college-level work, certificate preparation or renewal, or
degree preparation or continuation (Fenwick, 1983). The
greatest number of examples cited in the ACE directory
involve cooperative agreements with community colleges, but
four-year institutions as well as comprehensive universities
are also included. The programs listed range from brief
workshops to entire degree plans.

A Special Relationship with Community Colleges.   In
1982 the American Association of Community and Junior
Colleges (AACJC) published a booklet which provided
information on forty exemplary energy-related cooperative
agreements between two-year colleges and businesses (Jackman

and Mahoney, 1982). That same year AACJC also published a second manuscript describing 15 special offices, programs, centers, or institutes which had been established to coordinate and intensify the relationship of two-year colleges to business and industry (Mahoney, 1982). In 1985 AACJC published a directory of business/industry coordinators, individuals filling an administrative position created within 452 community, junior, and technical colleges across the country to serve as a link between various instructional departments on the campus and employers within the area (Day, 1985). As these publications demonstrated, two-year colleges were taking an increasingly important role in assisting local economic development efforts. Lynton (1984) described the two-year colleges as the most responsive element of the higher education system in terms of its commitment to local employment needs and to in-service education.

Use of University Faculty. In addition to the number of programs developed through direct contacts between employers and the education institutions, an indirect relationship has also existed for some years. A certain amount of employer-sponsored instruction has been provided by college and university faculty who are engaged as consultants on an individual basis, either directly or by a third-party vendor of training programs (Lynton, 1984).

Although the extent of this type of faculty involvement is not known, one study (Linnell, 1982) has indicated that 9% of faculty in doctoral institutions and 14% in comprehensive universities and liberal arts colleges designated "teaching" as their first or second largest source of outside income. The proportion of this outside teaching which constituted employer-sponsored programs could not be inferred, however.

Tuition Reimbursement. Another example of cooperation between business/industry and traditional higher education institutions is the tuition reimbursement plan, estimated to be offered by 80 to 90% of all corporations (Brody, 1987). The plans generally provide for tuition reimbursement to the employee after successful completion of courses at a local college or university. The reimbursement is typically dependent on the course being job-related or part of an overall degree plan which is ultimately job related. Studies of tuition aid plans conducted in the early 1980's indicated that, on a national basis only 3 to 5% of all eligible employees and no more than 1 to 2% of eligible blue-collar workers made use of these programs (Lynton, 1984).

Full- and Part-Time College Attendance. Some companies, responding to the accelerated rate of technological change, decided that the best means of preparing young workers for technical jobs was to send them

to college full-time. Texas Instruments (TI), for example, found it was no longer possible to hire technicians straight out of high school (Brody, 1987). Instead, they are now being sent to a local technical college full-time for one year on full pay, and then they will work part-time and go to school part time for a second year while they earn an Associate in Science degree. Other TI workers who are advancing on to higher positions are sent back to night school at company expense, and are given compensatory release time for their studies.

At IBM, it is possible to participate in a graduate level work-study plan (Eurich, 1985). Technical personnel work for the company part-time while earning credits for the M.S. degree at a local university, but when one-half the credits for the degree are completed, the person goes on to study full-time. All Ph.D. candidates from IBM who participate in this program study on a full-time basis.

Corporate Education Independent of
Traditional Higher Education

In-House Training. Job training, independent of any involvement with colleges or universities, has long been a part of the American workplace. As noted earlier in this chapter, the number and scope of corporate-based education programs has increased dramatically since World War II. Currently, corporations themselves are the largest single

provider of corporate education (Lusterman, 1985). In 1975, 80% of the money spent for education and training was spent on in-house company programs, 11% on tuition aid, and 9% for other outside courses (Lusterman, 1977). By 1985, Lusterman noted the gap had widened even further with the trend being toward even more internal training. Not surprisingly, larger companies were found to spend more money on in-house programs than smaller companies. Lusterman (1985) attributed this to a greater perceived need for training in the larger companies and the fact that they had sufficient resources to support such programs.

Corporate Learning Centers. Many large companies now have their own learning centers dedicated exclusively to the continuing education of their workers. Eurich (1985) reported that nearly 400 business sites presently include a building or a campus labeled "college", "university", "institute", or "education center." Examples include NCR's Management College and its Computer Science Institute; ARCO's campus at Santa Barbara for top executives; New England Telephone's Learning Center at Marlboro, Massachusetts; and IBM's new campus at Thornwood, New York. Possibly the largest and most elaborate corporate instruction center in the country was built in the early 1970's by the Xerox Corporation in Leesburg, Virginia (Levenson, 1983). This center maintains a staff of 500 full

time employees, and has health and recreational facilities
as well as advanced resource centers and learning
laboratories. Although the Xerox education center's
original focus was on service and sales personnel,
management courses have been recently added.

Corporate Courses Recognized by Specific Colleges or
Universities. Of particular interest to this study are the
corporate in-house courses which have evolved into college-
level courses in recent years. Several companies with
strong in-house programs have worked out transfer
arrangements with local higher education institutions,
thereby enabling their employees to receive academic credit
for work taken at the company. Eurich (1985) noted that
credit for some National Cash Register (NCR) courses is
given by a variety of colleges located near company
facilities; that General Electric's courses toward an
advanced degree in power systems engineering have been
credited for many years by Union College in Schenectady, New
York; and that among IBM's many collaborative plans, direct
ties exist between their Systems Research Institute and the
School of Advanced Technology at the State University of New
York's Binghamton graduate center.

Corporate Courses Recommended for General Academic
Credit. While similar alliances between corporations and
specific campuses operate on a one-to-one basis all across

the country, a number of corporations have desired a more universal acceptance of the college equivalency of their courses. In 1980 Hodgkinson reported that many of the over 500 business firms which operate their own education programs had already requested or were in the process of applying for an evaluation of their courses by the American Council on Education (ACE) to certify that they were indeed offering college-level courses. The American Council on Education's Program on Noncollegiate Sponsored Instruction (PONSI) is the principal agency which evaluates specific corporate courses and recommends academic credit at appropriate levels (Eurich, 1985). A similar PONSI managed by the New York State Regents also evaluates corporate programs (Cross and McCartan, 1984). Both accrediting agencies are nationwide in scope. The two groups combined have reviewed more than 3700 courses offered by approximately 350 noncollegiate organizations (Eurich, 1985).

A sampling of evaluated courses listed in The National Guide to Educational Credit for Training Programs (1986) includes such college-like courses as "Advanced Financial Accounting" and "Calculus I and II" offered by General Electric to its employees; "Modern Engineering Materials" and "Computer-Aided Electrical Engineering" offered by General Motors; "Accounting I and II", "Economics", and "Business Law" offered by The American Institute of Banking;

and "Marketing" and "Effective Management Skills" provided by Knight-Ridder Newspapers, Inc. In each case, the courses were considered the equivalent of from one to three units of college credits at a specified level from lower division to graduate. Mountain Bell Training and Education Center in Colorado found that in addition to receiving the assurance that their programs were of college quality, having their courses evaluated for credit also saved the company a considerable amount of money in tuition reimbursement (Eurich, 1985).

Corporate Colleges. The most comprehensive type of corporate education which exists independent of the traditional higher education sector is found within the small but significant group of institutions known as "corporate colleges" (Baker, 1983; Eurich, 1985; Hawthorne, Libby, and Nash, 1983; Nash and Hawthorne, 1987). Hawthorne, Libby and Nash (1983) were the first to describe the corporate college and defined it as "an institution offering postsecondary degrees which was initially established by an entity, profit or nonprofit, whose primary mission was something other than granting collegiate degrees" (p. 2). Included in this group were businesses, hospitals, service organizations, manufacturing corporations, and professional associations. The degrees

offered by these institutions ranged from the Associate to the Ph.D.

The degree-granting authority held by corporate colleges comes from at least one state and several either have, or have applied for, non-governmental accreditation from the same national and regional agencies which accredit traditional colleges and universities (Harris, 1987; Nash and Hawthorne, 1987). While degree-granting authority has historically been considered within the domain of traditional higher education institutions only, the ability of corporate colleges to offer degrees has been seen by some as the logical extension of their sophisticated training and education capacity (Craig and Evers, 1981; McQuigg, 1980). Many others, however, have viewed corporate degrees with alarm, seeing them as a threat to the quality of education and as unwelcome and unnecessary competition to higher education (Nash and Hawthorne, 1987; Eurich, 1985; Lynton, 1984).

By the early 1980's, 14 corporate colleges were identified which either had, or were in the process of petitioning for, the authority to grant college degrees (Hawthorne, Libby and Nash, 1983). In 1985, Eurich added four more institutions to the corporate college list, bringing the total to 18, and also updated their degree-granting status and non-governmental accreditation status. In addition, she indicated which of the corporate colleges

had remained an integral part of the sponsoring corporation and which had become independent. Nash and Hawthorne (1987) compiled the most recent list of corporate colleges, totaling 25 institutions, of which 19 had achieved degree-granting authority. An updated description of the corporate colleges is presented in Table I.

Corporate colleges developed from the following three general types of sponsors: (1) individual business corporations; (2) industry-wide affiliations; and (3) professional, research, and consulting organizations. Although the corporate colleges differed in their origin and sponsorship, they all were started by incorporated organizations whose main objective was not education. Another feature they all shared was that their establishment met a need which was not being addressed by the traditional higher education institutions at the time (Nash and Hawthorne, 1987). For example, the establishment of both the Institute of Textile Technology and Northrup University resulted from the need to educate specialists for a particular industrial technology. The development of the Arthur D. Little Institute was spurred on by the need to provide management education with an international perspective. The Wang Institute of Graduate Studies, established in 1979, and the much earlier General Motors Institute, established in 1919, were both founded because a

TABLE I

U.S. CORPORATE COLLEGES*

INSTITUTION	ORIGINAL SPONSOR	STATUS	DATE ESTABLISHED AND DATE DEGREE APPROVED BY STATE	NON-GOVERNMENT ACCREDITATION	DEGREES AWARDED
American College	National Association of Life Underwriters	Independent, Non-Profit	1927 1976	Middle States ACS	MS
American Institute of Banking	American Institute of Banking at Boston	Independent, Non-Profit	1909 1979	Conditional New England ACS	AAS
Arthur D. Little Management Education Institute	Arthur D. Little, Inc.	Integral, Proprietary	1964 1973	New England ACS	MS
Boston Architecture Center, School of Architecture	Boston Architecture Center	Independent, Non-Profit	1944 1979	National Architecture Accreditation Board	BA
The College of Insurance MBA	Insurance Society of NY	Independent, Non-Profit	1947 1962	Middle States ACS	AAS, BS BBA,
DeVry Institute of Technology	Bell and Howell (purchased in 1967)	Integral, Proprietary	1931 1957 (AAS) 1969 (BA)	North Central ACS NAITS, ABET	AAS BS

TABLE I (Continued)

INSTITUTION	ORIGINAL SPONSOR	STATUS	DATE ESTABLISHED AND DATE DEGREE APPROVED BY STATE	NON-GOVERNMENT ACCREDITATION	DEGREES AWARDED
GMI	General Motors Corporation	Independent, Non-Profit	1919 1945	North Central ACS NAITS, ABET	BS MS
Industrial Management Institute	Midwest Industrial Management Association	Integral, Non-Profit	1982 1984	Application North Central ACS	AAS
Institute of Textile Technology	Cooperative Program of Textile Industry of US and Canada	Independent, Non-Profit	1944 1947	Application Southern ACS	MS PhD
MGH Institute of Health Professionals	Massachusetts General Hospital	Independent, Non-Profit	1980 1977	New England ACS, Mass. Board of Registration in Nursing, National League for Nursing	MS
McDonald's Institute	McDonald's Corporation	Independent, Proprietary	1961 1985	Application Planned, North Central ACS	AAS

TABLE I (Continued)

INSTITUTION	ORIGINAL SPONSOR	STATUS	DATE ESTABLISHED AND DATE DEGREE APPROVED BY STATE	NON-GOVERNMENT ACCREDITATION	DEGREES AWARDED
National Techno- logical Institute	Major Business Corporations, US Government, and AMCEE (**)	Independent, Non-Profit	1984 1984	Application Pending, North Central ACS	MS
Northrop University	Northrop Corporation	Independent, Non-Profit	1942 1958	Western ACS ABET	AAS BS, MS
Rand Graduate School	The RAND Corporation	Integral, Non-Profit	1970 1975	Western ACS	PhD
Wang Institute of Graduate Studies	Dr. An Wang and Wang Laboratories, Inc.	Independent, Non-Profit	1979 1979 (Merged with Boston University in 1987)	New England ACS	MS

ACS   —   Association of Colleges and Schools

NAITS   —   National Association of Trade and Technical Schools

ABET   —   Accreditation Board for Engineering and Technology

(*)   —   Based on data from Cranch (1987), Eurich (1985), Nash and Hawthorne (1987) and Rector (1986)

(**)   —   Developed from courses offered by universities in the Association of Media-Based Continuing Education for Engineers

shortage existed of properly trained engineers in specific subject areas.

A number of trends are evident in the historical development of the corporate colleges. While the older corporate institutions gradually evolved toward broader based student bodies and in time added degree-granting status, the newer institutions started out with wider sources of clientele and most actually began with degree-granting authority (Eurich, 1985). After obtaining degree-granting authority, almost all of the corporate colleges immediately sought accreditation to fully legitimatize their academic status (Nash and Hawthorne, 1987). The degrees offered by the corporate colleges tended most often to be graduate degrees or first professional degrees.

For the majority of corporate colleges, the original corporate sponsorship gave way to independence and most then continued to operate as private, nonprofit alternatives to traditional higher education (Cranch, 1987; Eurich, 1985). The recent merger of the Wang Institute with Boston University has left RAND, Arthur D. Little, and the General Motors Institute as the only American corporations currently offering college degree programs (Brazziel, 1988).

Corporate-Based Degree Programs

The fact that it is possible to earn a college degree through participation in an education program of corporate

origin, or even just to receive college credit for corporate courses, is not yet universally recognized. Although the release in 1985 of the Carnegie Foundation's special report Corporate Classrooms, The Learning Business generated a considerable amount of interest among the higher education community, only those members of the general public who were associated with credit-bearing corporate education opportunities were fully aware of the alternative to traditional education which corporate education provided. As colleges and universities increasingly award college credit for non-collegiate educational experiences, and as more individuals choose to "test out" of traditional college subjects, the notion of college credit for corporate education and even the awarding of degrees by non-traditional institutions may become more commonplace (Eurich, 1985).

In addition to the corporate colleges described above, degrees can also be earned through hybrid corporate-university programs. Hybrid programs combine in-house courses approved for college credit with university courses. While the university, rather than the corporate institution, grants the degree, both institutions are jointly responsible for program planning and each participates in instruction and evaluation. It is anticipated that this hybrid approach, which draws on the resources of both sectors and

which requires a genuine partnership, will be of increasing importance (Cranch, 1987).

One of the leading examples of a hybrid program is that offered by General Electric in its Advanced Course in Engineering (Mills and D'Acosta, 1986). This curriculum features in-house courses which when combined with university courses result in high quality graduate degree programs at the master's level. Due to the multiple locations of the General Electric facilities, a high degree of coordination must be maintained with a number of universities (Cranch, 1987). Although General Electric contemplated the establishment of a corporate college, there were not enough employees at any one location to justify such an undertaking (Eurich, 1985).

Other hybrid degree programs represent a collaboration between university and government (Cranch, 1987). The Software Engineering Institute affiliated with Carnegie-Mellon University, for example, is a federally-funded research and development center sponsored by the Department of Defense. The goal of the Institute is to influence and improve educational programs for universities and industrial training departments, through the development of a model curriculum leading to a Master of Science in Software Engineering degree. The establishment of the Institute is based on the premise that software engineering is a very high national priority that will benefit greatly from

government sponsorship, although the strategy is to utilize the existing university and corporate networks.

Another approach to earning a corporate-based degree is offered by the National Technological University (NTU). Although considered a corporate college (Eurich, 1985; Cranch, 1987), NTU is perhaps better described as a unique high-technology approach to higher education. It was established in 1984 as a collaboration between 12 leading corporations and 15 universities which were members of the Association for Media-Based Continuing Education for Engineers (AMCEE). The Department of Defense also provided funding for the beginning year of operations as the first phase of a cost reimbursable contract. By 1986, 20 universities and 18 corporations were participating in bringing live courses, via satellite or on videotape, to over 600 employees at their own worksite (Solorzano, 1986).

This high technology approach to education for the world of work allows engineers to complete advanced professional work on-site which leads to NTU's master of science degree. Because NTU's telecommunications system is national in scope, the question of accreditation on a regional level becomes very complex (Cranch, 1987). Although the courses are all approved for credit by virtue of the accreditation of the individual universities which provide them, this university without a campus or a faculty greatly challenges traditional educational concepts and

practices. Issues of competition and quality control arise, and as well as legal issues associated with state authorization of degrees. NTU may thus prove to be one of the most provocative of the non-traditional, innovative, corporate-based degree programs.

Characteristics of Corporate Education

As demonstrated in this literature review, there are currently a number of different corporate approaches to higher education and it would not be possible to characterize all of them under a single heading. The corporate-based degree programs, in particular, are unique in that they must also meet the outside requirements necessary for eligibility for college credit. Some characteristics can be identified from the literature, however, which set the majority of corporate education programs apart from those of traditional institutions. These include features related to the following five areas: (1) educational goals and course content; (2) student population; (3) instructional setting; (4) instructional resources; and (5) program evaluation.

The corporate system's educational goals are pragmatic in that the education is used to achieve other goals such as business profit, growth, and viability. Program objectives are usually specific and explain what the student may expect to achieve in skills, competency, and behavior, as well as

knowledge (Eurich, 1985). Course content is related to the working world rather than being presented as abstracted theory. Course work is practical and application oriented, and interdisciplinary in nature. The length of classes is determined by the amount of time it takes to learn the subject (Lusterman, 1985). The majority of corporate education programs are professional and technical in nature, and the degrees offered are principally in the sciences, engineering, computer science, health-related areas, and business and management.

The organizational structure in the corporate sector allows changes to be made in educational programs when necessary. Eurich (1985) stated that the absence of academic departments and the prevalence of multidisciplinary studies in corporate colleges allows these institutions the flexibility and freedom to adjust curricula or requirements. She also viewed their lack of a tenure policy as a significant contributing factor to their ability to make changes.

Participants in corporate education programs are adult students, and learning takes place in circumstances in which the rewards of success and penalties of failure are perceived as high. These involve such considerations as present and future earnings, prestige, self-esteem, and career goals (Lusterman, 1985). Thus, the motivation level of corporate education participants is typically high.

In corporate education, the workplace is often the site for both the learning and the doing. Lusterman (1985) emphasized the benefits to be derived when experience is integrated with classroom instruction in planned, often individualized and serialized sequences of theory and practice, formal learning and problem-solving. Convenience and accessibility are also considerations when classes are offered on-site. In addition, corporate facilities may be used year-round and are available day and night. Ultimately, new, high-technology educational delivery systems may make "going to the campus" unnecessary for most areas of study (Brand, 1987).

Instructors for corporate courses are chosen from the best qualified people available, and are not necessarily those with the most academic credentials (Aslanian and Brickell, 1981). Eurich (1985) noted that corporate institutions made greater use of part-time faculty in order to draw on the expertise of those individuals currently active in the field relevant to their teaching. A professional, working atmosphere is typical of the corporate classroom and the instructor can easily introduce such concepts from the working world as the team approach to problem-solving. Internships are common among full-time corporate students, while many part-time students participate in work-study cooperative arrangements.

Instructional methods include a variety of teaching techniques ranging from the traditional lecture and discussion to highly innovative and individualized approaches. Because the corporate sector generally has access to new equipment and technology up to several years in advance of traditional colleges and universities, a hands-on approach using the latest equipment and materials is common in corporate education. Industry-wide affiliations have formed to share resources for training in areas of mutual interest. Resource sharing, both in terms of instructional expertise and technology, among the business sector, traditional higher education institutions, and the government, is seen as becoming increasingly important to the future of higher education in America (Boyer, 1986; Cross, 1981; Eurich, 1985; Loos, 1987; Lynton, 1984).

A characteristic which has been found particularly relevant to education in a time of rapidly changing needs is the corporate emphasis on the evaluation of instruction (Lusterman, 1985). In keeping with its origin, corporate education is basically results oriented. Because performance evaluation is an accepted part of the business world, it is not surprising to find less fear of criticism and more openness toward analysis for improvement on the part of corporate education as compared to traditional education (Eurich, 1985). In addition, many corporate

education programs maintain advisory boards of experts from other institutions and companies which meet periodically to review curricula and course outlines, as well as to assess current outcomes.

In summary, the principal characteristics of corporate education programs as presented in the literature appear to be (1) a pragmatic nature, (2) an interdisciplinary approach, (3) accessibility, (4) an innovative character, and (5) flexibility.

Summary

Education for the world of work in America has, since the country's beginning, developed on a separate path from traditional higher education. By tracing the historical evolution of higher education in America, however, it can be seen that the influence of the world of work has periodically reshaped the country's educational philosophy.

Traditional colleges and universities were founded to serve a limited population and closely followed the classical curriculum. By the early nineteenth century, however, strict adherence to the classical tradition and the belief that a college was the proper environment for only a small governing elite were beginning to give way. As the manufacturing class gained power and wealth, the concept of a more democratic kind of education began to take hold. The notion that education should be useful in a practical sense,

and the belief that it was necessary to prepare citizens for a wide variety of employments, became more acceptable. The Morrill Act of 1862 provided for the establishment of the land-grant colleges which were directed to "promote the liberal and practical pursuits and professions of life" (Rudolph, 1962, p.249).

The apprenticeship system was the earliest form of formal corporate education. Although a great deal of the history of industrial education in America to the twentieth century was simply a variation and improvement upon the institution of apprenticeship, the industrial revolution significantly influenced the way work skills were taught. One-on-one training in the corporate factory setting could not produce the required trained personnel fast enough. Corporation schools were formed in response to the need for new methods of worker education. The first corporation school was established in 1872 and by 1916 over 60,000 young men were enrolled in such schools.

The increasing complexity of industrial organizations, combined with the demands of World War I led to a major shift in responsibility for work education from the companies to the colleges and universities. When industry began to gear up for World War II, however, corporations were again faced with the need to train their own workers. The increased consumer demands which followed World War II, and the rapid technological developments which occurred in

subsequent years, further convinced the corporate world that it was necessary to expand corporate education opportunities.

There were many indications that business and industry were dissatisfied with traditional higher education and did not believe that the traditional education sector could provide the appropriate education and training which were necessary for work in the information-processing society. The current extent of corporate education approaches that of traditional higher education both in terms of expenditures and in numbers of students involved.

Traditional higher education can relate to corporate education in three basic ways: as a parallel provider, as a competitor, or as a prospective partner. Unless both colleges and corporations severely limit their educational focus, these two sectors face a future of competition or partnership.

Certain of the current corporate education activities are dependent upon the traditional higher education sector. These include courses provided by colleges and universities, either by contract or on a tuition reimbursement basis; courses taught by college faculty who are hired as consultants; and hybrid degree programs which require extensive collaboration between the corporation and the university.

Other corporate education programs are independent of the traditional sector in terms of planning and delivery. In-house training currently accounts for 80% of the money spent on corporate education. Large corporate learning centers have been established by several companies and resemble the traditional campus. Many corporations have alliances with local colleges allowing their employees to receive college credit for courses given by the company. Other corporations have requested an evaluation of their courses for transferable college credit, and a considerable number of these courses have been approved for credit by the American Council on Education's Program on Noncollegiate Sponsored Instruction.

The establishment of an accredited degree-granting college by a corporation represents the ultimate achievement of independence from traditional higher education. Although the corporate colleges differed in their origin and sponsorship, all were started by organizations whose main objective was not education. In each case their establishment met a perceived need which was not being addressed by traditional higher education institutions at the time. Although corporate sponsorship has now given way to independence for the majority of corporate colleges, they represent a significant non-traditional alternative to standard college and university degree programs.

Also of particular significance at the degree level are

the hybrid corporate-university programs. These programs combine in-house corporate courses with traditional university courses and result in a degree granted by the university. Both the corporation and the university participate in the program's planning, instruction and evaluation.

The high-technology approach to degree-level corporate education as offered by the National Technological University, represents an additional alternative approach to earning a college degree.

Certain characteristics can be identified which distinguish corporate higher education from traditional higher education. These include features related to the following five areas: (1) educational goals and course content; (2) student population; (3) instructional setting; (4) instructional methods and resources; and (5) program evaluation. Corporate-based higher education programs are basically technical and professional in nature. The principal characteristics which have previously been used to describe these programs include their pragmatic character, their interdisciplinary approach to learning, their accessibility, their innovative nature, and their flexibility.

CHAPTER III

METHODOLOGY

Overview

Review of Relevant Literature

The research strategy included a comprehensive review of the literature to determine the previous influence of the world of work on American higher education, the current societal pressures on higher education, the relationship of traditional higher education to current corporate education, the extent of current corporate education, and the nature of corporate-based education programs which lead to degrees. This information was required to determine the scope of current degree opportunities which originated in the corporate sector, as well as to formulate the framework for the case study design.

Framework for the Case Study

The case study research method is descriptive. It is used to assist the understanding of a subject by examining in depth the subject's background, characteristics, and responses in relation to the particular topic in question.

In order to design the case study, a common set of

propositions must be developed which are based on the

literature and any other relevant information available.

The propositions for this study include:

1. The educational philosophy of traditional higher education has periodically been redefined by changes in the world of work.

2. Corporate education has evolved to meet the educational needs of the workforce that are not being met by traditional institutions.

3. The advent of the information-processing society has resulted in an expansion of educational opportunities in the corporate sector, and has challenged traditional colleges and universities to again reexamine their missions and goals in light of the changing needs of society.

4. Corporate-based educational programs which lead to degrees are of particular interest as they represent the area of greatest overlapping between the traditional and non-traditional sectors, and thereby present the greatest opportunity for collaboration or competition.

5. Increased knowledge of the current scope and the principal characteristics of corporate-based education programs would assist policymakers and planners in both higher education and corporations to better respond to the changing needs of today's workforce.

6. Continuing education opportunities must also be considered as workers face an ever-increasing need to upgrade knowledge and skills.

Design of the Case Study

Case Study Reports

A comprehensive overview of each of the selected

corporate-based programs was derived from site visits, semi-

structured interviews, formal and informal observation, and document analysis. In each instance the goal was to prepare a descriptive case study report containing the following elements: origin, mission, and evolution of the program; curriculum and degree requirements; student demographics; tuition and financial support; faculty and administration; facilities and support services; and, current status and future plans.

Case Study Analysis

A three-dimensional analysis was then made of each program based on the elements which ordinarily characterize the separate worlds of academe, continuing education, and the corporation. Because the programs studied were significantly different in nature and scope, the analyses differed somewhat in emphasis. The response to change generated by the world of work was the overall integrating concept. Using grounded theory, the following features were chosen for in-depth consideration:

1. corporate characteristics
   - innovation
   - responsiveness
   - level of support
   - evaluation and outcome

2. academic characteristics
   - curriculum and degree requirements
   - instruction and instructional support
   - student qualifications
   - administrative structure

3. continuing-education characteristics
   - accessibility
   - flexibility
   - environment
   - focus

Comparative Analysis of Major Characteristics
and Development of a Model

An assessment was made to determine which of the corporate, academic, and continuing-education characteristics best described the education process at each institution in question. A comparative analysis then demonstrated which characteristics were unique to a particular program and which appeared to be universal. Those characteristics which appeared most closely associated with education for the world of work in the information-processing society were highlighted. A model for meeting the higher education needs of the future was generated from this data.

Research Strategy

The research strategy followed was based on procedures suggested by Lincoln and Guba (1985), Lofland and Lofland (1984), and Miles and Huberman (1984). The case study approach incorporated qualitative research methodology and elements of grounded theory.

Data Sources

Sample Selection

The institutions offering corporate-based degree programs chosen for the in-depth case studies reflected the full spectrum of such programs currently available. This spectrum includes:

1. corporate colleges

2. institutions which began as corporate colleges but have since become independent

3. corporations which provide their own employees with the opportunity to earn degrees through a combination of their own in-house courses and traditional courses taken at a cooperating college or university

4. corporations which have joined in a cooperative arrangement with a consortium of universities to sponsor courses at the workplace via satellite or videotape.

The institutions which were selected to represent the above include:

1. The Rand Institute, one of the few remaining corporate colleges which continue to operate under corporate sponsorship and the only such institution to award the Ph.D.

2. Northrop University, one of the oldest of the original corporate colleges and the one which has been independent for the longest period. As such, its evolution and response to change is of particular interest.

3. General Electric Company, one of the earliest corporate education providers whose current degree programs in conjunction with cooperating universities developed from long-standing training programs.

4. National Technological University, a recently established high-technology approach to higher education which makes it possible for engineers to

pursue master's degrees without leaving the corporate setting.

Population

The potential population to be sampled at each of the above institutions included corporate officials, administrators, faculty, staff, students, and contractors involved with the degree-granting programs. Individuals with several years involvement with the program or a comparable background in traditional higher education were sought out in particular. The number and geographic dispersion of individuals desirable for inclusion prohibited interviewing all of them. Selection of interview subjects was based on concern for representation, significance of position or role, recommendation, and availability. Initial contact with the prospective person to be interviewed was typically by phone, at which time an appointment was made to meet.

Factors considered in the one-on-one visits were background, current role, attitude toward the corporate-based learning experience, familiarity with mission and goals, personal involvement, comparison with other educational programs, and future expectations. Appendix A lists the sample population interviewed at each institution. Formal and informal observations of the environment,

including facilities and activities, were also made at each site visited.

Documentation

The documentation to be reviewed regarding each of the above institutions included newspaper and other historical accounts; corporate or university annual reports; proposals and planning documents; and catalogs, brochures, and bulletins describing available programs and their requirements. The sample documents reviewed for each institution are listed in Appendix B.

Data Collection

The guidelines followed in the semi-structured interviews are listed in Appendix C. The principal emphasis in each interview was dependent upon the nature of the individual's involvement with the program. Interviews were typically a minimum of one hour in duration. When necessary, telephone interviews were also conducted. In several instances, follow-up interviews also took place. A sample personalized follow-up letter is presented in Appendix D. Notes were taken during each interview and a transcript was written from the notes as soon as feasible thereafter. Each document was read and summarized as suggested by Miles and Huberman (1984).

In addition to notes taken directly from interviews, conversations, observations, and documents, memos were also written to record methodological decisions and concepts derived from the data collection, as well as questions and analyses formulated through the data collection process.

Data Synthesis and Analysis

The first effort was to organize and synthesize the data collected as above in order to write a descriptive case study report. The descriptive report outline included an overview, historical background, evolutionary changes, present status, and future direction. Interview transcripts, notes, summaries, and memos were all reviewed and passages relevant to the case study report were coded as they related to the respective elements of the report outline. Once the relevant passages were coded and categorized, the case study report was written. For each section of the report outline, the respective data was reviewed using Miles' and Huberman's (1984) tactics for generating meaning.

After completion of the case study reports, the data was re-analyzed based on the three-dimensional perspective described above (corporate, academic, and continuing education considerations). Also incorporated in this re-analysis was the concept of change in response to stimuli from the world of work. The re-analytic process again

incorporated Miles' and Huberman's (1984) tactics for generating meaning, i.e., noting patterns, clustering, factoring, noting relationships between constructs, and building logical chains of evidence.

The processes and characteristics of the corporate-based higher educations programs were described based on the above analyses. The validity of the findings was confirmed through the application of Miles' and Huberman's (1984) tactics for testing findings wherever applicable, i.e., checks for representativeness, avoidance of bias, triangulation, use of outliers, and feedback from informants.

A comparative analysis was then performed in an effort to identify which of the characteristics noted above were common to all four of the programs studied and which were unique. From this data a model was developed which incorporated those characteristics thought essential for meeting the higher education needs of the information-processing society.

CHAPTER IV

RESULTS

In Part One of the Results, a descriptive case study report, designed to be comprehensive in scope, will be presented for each of the corporate-based programs studied in depth. This report will provide detailed answers to Research Questions 1 and 2 and will include a description of the origin, evolution, organizational structure, and mode of operation of each program.

Following each case study report will be an analysis of the study data, based on corporate, academic, and continuing education characteristics related to education in preparation for the world of work. The answer to Research Question #3, concerning the distinguishing characteristics of each program, will be found in this section.

In Part Two of the Results, a comparative analysis will be made of the principal academic, corporate, and continuing education characteristics identified above. In answer to Research Question #4, characteristics which appear unique to a single program or common to all of the programs will be highlighted. From this information an attempt will be made to derive a model which would address the higher education

needs of the information-processing society. The features
which comprise this model correspond to Research Question
#5.

A brief summary at the end of this chapter will provide
an overview of all of the research question responses.

Part One - Case Study Reports and Analyses

Rand Graduate School: Case Study Report

Introduction. The RAND Graduate School, which offers a
doctoral degree in policy analysis, is an academic
institution integral to The RAND Corporation. The RAND
Corporation is an independent, nonprofit corporation engaged
in research and analysis of matters affecting national
security and the public welfare. Located in Santa Monica,
California, The RAND Corporation began as Project RAND in
1946, when the Air Force contracted with the Douglas
Aircraft Company to research the future of airpower and the
nation's security. Two years later, with funding provided
by The Ford Foundation, The Rand Corporation was formed as a
private nonprofit corporation in order "... to further and
promote scientific, educational, and charitable purposes,
all for the public welfare and security of the United States
of America" (Facts About Rand, 1989, p.8).

Today RAND employes over 1100 individuals, of whom
approximately 600 serve on the research staff. 43% of the

research staff hold Ph.D.'s, while another 33% have master's degrees. In addition, some 400 professional consultants provide the equivalent of an additional 80 full-time professionals each year.

RAND's current research encompasses many dimensions of national security and domestic policy issues. The programs undertaken by the Corporation include long-term efforts on new aspects of major national problems as well as individual projects, separately sponsored, which investigate issues of policy, technology, program assessment and operations analysis. Approximately 300 projects are currently under way for 65 sponsors in the federal government, state and local governments, and various foundations. In addition, several hundred private sector companies have also contributed support for nonproprietary research.

Origin, Mission, and Evolution. The RAND Graduate School of Policy Studies (RGS) was founded in 1970. It has been accredited by the Western Association of Schools and Colleges since 1975. Originally known as the RAND Graduate Institute, RGS was established primarily to provide graduate training which would lead to a doctoral degree in public policy analysis. In addition to producing Ph.D. graduates in policy analysis, RGS also sought to advance the methods and tools of policy research and the academic disciplines which it requires.

Although it is an integral part of The RAND Corporation, RGS is autonomous in setting its standards and curricular program. The graduate program features a distinctive curriculum that combines formal academic instruction with on-the-job training through work on RAND research projects. This innovative program of study is set up on a trimester schedule and requires the successful completion of the following 20 courses, workshops, or tutorials; participation in ongoing policy research at RAND; written and oral qualifying exams; and a dissertation. Besides the general degree of doctor of philosophy in public policy analysis, the program also offers specializations in four areas: national security studies, health policy, Soviet studies, and population studies. The programs in health policy and Soviet studies are offered through joint RAND/UCLA centers for policy studies in these fields.

Curriculum and Degree Requirements. The RGS curriculum was designed to thoroughly integrate the theory of policy analysis with its practice. During the course of the program, students spend 60% of their time overall on Rand research projects, first in an apprenticeship role as graduate assistants and later in a role of increasing responsibility as members of project research teams. This aspect of the RGS curriculum, known as OJT for on-the-job training, is its most distinctive feature. During the nine

months of the academic year students are required to put in halftime OJT, while fulltime OJT takes place during the summer months.

The 20 course requirement is comprised of 11 analytic core courses, two policy research workshops, and at least seven electives. The core courses provide a fundamental understanding of the concepts and tools relevant to policy analysis and fall into four categories: economics, quantitative methods, social sciences, and technology. Policy research workshops examine the practical application of the theory, tools, and techniques learned in the analytic courses. The workshops are led by analysts who have been actively engaged in the fields of policy research that are under review. The electives allow RGS students an opportunity to participate in a number of specialized curricular areas.

When RGS students have completed at least 17 quarter-length courses, workshops, or tutorials with satisfactory grades, they are then eligible to take the written and oral qualifying examinations. Most RGS students reach this point at the end of their second year in the program. Once the qualifying examinations are passed, the students focus on their dissertation work which is expected to evolve from the students' on-the-job training experiences. It is expected that the students will complete a publishable dissertation which is policy-relevant and contributes to knowledge in the

field sometime during the third or fourth year of their RGS work.

Student Demographics. Current students in the RGS program come from all over America and from several foreign countries. The admissions process is highly competitive with from 80 to 100 applicants vying for the 10 to 15 positions available each year. In accordance with RGS policy, almost all admissions are from applicants outside RAND. A master's degree, or training and experience equivalent to a postbachelor's degree and relevant to advanced work at RGS, is required. Approximately 40% of current students received their previous graduate training in the physical and natural sciences, engineering, or math. The other 60% of the students came from an advanced background in social science and the humanities.

The Assistant Dean described the current students as ranging in age from 23 to the late 50's with an average age ≈30. Approximately one-half of the students came to RGS directly after the completion of their master's degrees, while the other half came after working for several years in a variety of different areas. The ratio of male students to female students changes with each new admissions group. The administration's policy is to select the best possible candidates without regard to sex. The representation of minority students is very low, however. The Assistant Dean

noted that this was of concern to the reaccrediting committee which recently renewed RGS's accreditation for the next 10 years. Since minority students with a master's degree are highly sought in the job market, RGS does not expect a significant increase in applications from minorities in the near future.

Because of the interdisciplinary nature of the curriculum and the combination of course work and on-the-job training, admission is limited to students who can participate full time in the combined research and study program. The few students who are admitted to RGS while serving as full-time RAND staff members are expected to reduce their RAND workloads to half-time while taking a full course load. It is said that the key to success in both the admissions process and the completion of the program lies in personal motivation and commitment.

Tuition and Financial Support. The RGS tuition is currently $10,500. per year and will increase to $11,000. in the 1991-92 academic year. Students who have reached dissertation status will have their tuition reduced by one half for no more than four years. All RGS students receive renewable annual fellowships and are designated as Graduate Fellows. The annual stipend amount for each category is established by the Dean and is dependent upon academic and research experience and performance. The starting

fellowships are typically in the $25,000. range. In addition, a limited number of specially funded fellowships are available to those students participating in one of the RGS/UCLA combined areas of study including Health Policy Study and Soviet Studies. Postdoctoral fellowships are also available in Population Studies. RGS students who plan to seek academic appointments upon graduation may also apply for a limited number of teaching assistantships.

Faculty. The RGS faculty is composed of part-time instructors who are drawn principally from the doctoral staff of RAND's professional departments. A few distinguished scholars from outside RAND also serve as members of the faculty. All RGS faculty possess considerable experience both in conducting research for public agencies and in graduate teaching. Many of RAND's research staff came to the Corporation from the academic world, and a considerable number continue to teach part-time in colleges and university graduate schools.

RGS faculty hold advanced degrees in a wide range of academic disciplines with the majority coming from a background in one of the following areas: economics (29%), political science and government (21%), engineering and operations research (12%), and mathematics and statistics (9%). Other areas represented by the faculty (totalling 29%) include health, chemical physics, psychology,

philosophy, law, education, history, policy analysis, public administration, medicine, organized behavior, and sociology. The resulting mix of expertise at RGS reflects the multidisciplinary nature of policy analysis and provides students with the wide range of learning experiences necessary for this field.

Administration. The formal governing body for RGS is The RAND Corporation's Board of Trustees. This Board includes representatives from science, the academic community, industry, and the public. The Board of Trustees sets basic RAND policy and is kept continuously informed of the development of technical programming, the results of RAND research, and the status and progress of the Rand Graduate School. A committee within the Board exercises special oversight responsibilities for the graduate school.

In addition to being an integral part of the larger RAND organization, RGS is also a separate entity. Educational policies involving standards and curricula are formulated by two boards working in conjunction with RGS's Dean and RAND's president: the RAND Advisory Board, consisting of faculty members of the graduate school, three or four graduate fellows, and several senior members of the RAND professional staff; and the Academic Advisory Board, made up of a group of distinguished scholars outside RAND. The Rand Advisory Board assists in formulating educational

policies and practices, while the Academic Advisory Board advises RGS, the Dean, and the president of Rand on curriculum, faculty , admissions, funding, and other matters.

The administration of RGS is conducted with the participation and assistance of several committees, both standing and ad hoc. The Faculty Committee on Curriculum and Appointments meets monthly to review the curriculum and to approve new faculty appointments. Program and project managers at RAND play an important role on the RGS Admissions Committee because they oversee the on-the-job training which is an essential part of the RGS program. Other Admissions Committee members, appointed by the Dean, include several RGS faculty members. The First Year Review Committee reviews the records of each new RGS Fellow at the end of each academic year. Review Committee members are drawn from both the RGS faculty and RAND research management. Recommendations and decisions regarding each student's academic strengths, weaknesses, and prospects in RGS are made by the committee collectively and are discussed with each student by at least one member of the committee.

RAND Graduate School: Case Study Analysis

Corporate Characteristics

Innovation and Responsiveness. The RAND Corporation's entry into the education business came about as a consequence of its ability to address the increasing demand, due to the growing complexity of public problems, for the interdisciplinary skills of policy analysis. This need had been stressed by the National Science Foundation which claimed that interdisciplinary studies, including scientific fields, were essential to the solution of national problems. "More was needed than the usual interdisciplinary work in social sciences" which had been the previous hallmark of problem solving (Eurich, 1985. p.109). Although the primary goal of RAND research had been to help policymakers improve their decisions, the Dean of RGS asserted that education and training had been important byproducts at RAND from the start. He noted that both had arisen naturally from Rand's research on policy problems and the creation of new analytic methods in an interdisciplinary environment.

Recognizing the value of this informal educational activity which had become part of its function, The RAND Corporation institutionalized it by founding the RAND Graduate Institute in 1970. A charter amendment changed its name to the RAND Graduate School in 1980. The Dean explained the change was made to distinguish the Graduate

School from the other RAND institutes and to emphasize its academic character.

As noted in the Case Study Report, the principal goals of RGS are to provide graduate training leading to the doctoral degree in policy analysis and to advance the methods and tools of policy research including the academic disciplines required. Keeping in mind the stated objectives of The RAND Corporation "to further and promote scientific, educational, and charitable purposes, all for the public welfare and security of the United States of America" (Facts About RAND, 1989, p.8), it appears a near perfect fit occurred between the mission of this corporation and the establishment of an educational activity integral to it.

In addition, there were other more specific reasons for establishing RGS at RAND. It was deemed in the corporate interest to enlarge and expand RAND's image. It was also viewed as an aid to the recruitment and retention of staff. Many of the Corporation's senior staff members had expressed a strong interest in teaching in this complex field, and others welcomed the intellectual stimulus of having a small, select group of advanced graduate students working at RAND. Members of the research staff who are currently on the RGS faculty noted that although they have been invited to teach at a local university, it is more convenient for them to teach right at RAND. They also indicated that they enjoyed the opportunity to further interact with many of the same

students, since the students often wind up participating in research projects that they are involved with as well.

The presence of RGS also strengthened RAND's close ties with the academic community. The Dean noted that RAND anticipated that the standards and practice of policy analysis would be enhanced as the RGS graduates moved on to other institutions and agencies. In effect, Rand saw an opportunity to help define the field of policy analysis and to influence its future development. Additionally, the establishment of a new institute and the design of an advanced graduate program was a challenge which RAND could not ignore. With the level of expertise at hand in both the teaching and research areas, and the interdisciplinary capability required for policy analysis, entering the education field seemed both natural and an exciting adventure.

According to the Dean, the RGS program in policy development will continue to evolve as it seeks to exploit the comparative advantage that derives from RAND's policy research environment. Whereas advanced graduate training is usually grounded in a single discipline, the Dean emphasized that the policy problems of society are by nature multidisciplinary. Since the research at RAND allows RGS fellows many opportunities to participate in research on a wide range of policy issues, they can approach the real world of public policy more closely than at most traditional

graduate schools. The combination of formal learning with application that the RGS experience provides enables the students to develop the interdisciplinary skills necessary to keep up with the ever increasing complexity of public problems.

The only major program changes that have occurred since the establishment of RGS involved the development in the early 1980's of two joint programs with UCLA, the Health Policy program and the Soviet Studies program. These changes are of special interest as they represent direct collaboration between the "corporate college" and the "traditional" higher education institution. The Dean explained that in both instances RAND approached UCLA because it was evident that using the best resources of both institutions would allow a stronger research program proposal to be prepared for the prospective sponsor, and would facilitate the establishment of a top quality graduate program which would have access to all necessary coursework, instructors, facilities, and research materials. This was described by the RAND Employment Manager as "capitalizing on the best assets of both institutions."

No significant expansion is planned for RGS at this time. The Assistant Dean explained that the current number of students admitted per year (typically 10 to 12) is ideal in terms of (a) the number of research positions available, (b) the number of students instructors prefer to have in the

classroom, and (c) the number of evaluations that can comfortably be conducted at the end of the year. A total of 15 students entering the program per year is thought to be maximum. Since little attrition occurs, the number of students overall is expected to remain fairly constant.

Level of Support. A high level of corporate support exists both in financial terms and in terms of moral support. RGS is not financially self-supporting and relies on assistance from The RAND Corporation as well as various foundation grants to supplement the income derived from tuitions. Tuitions, grants from foundations like Sloan and Ford, and support by RAND contribute in roughly equal amounts to the cost of the program. A long-term goal of being self-supporting exists, however, primarily in response to the recommendation of the Western Association for Schools and Colleges. In addition, if RGS was self-supporting, not all student dissertation topics would necessarily have to be tied in to RAND research projects. To meet this goal will require an increase in the number and extent of grants to RGS itself, since tuition alone is insufficient to support this costly program.

The active participation of the RAND Board of Trustees Committee for the RAND Graduate School, the President and CEO of The RAND Corporation, and several senior members of the RAND research staff is indicative of the considerable

interest and administrative support given to RGS by high-ranking members of the corporation. In addition, the willing and eager participation by numerous RAND researchers as part-time faculty for RGS (there is a list of those waiting to be called on for faculty duty) demonstrates the close tie-ins between the graduate school and the corporation at all levels.

A final example of high level moral support can be gleaned from a listing of commencement speakers who have accepted RGS's invitation to speak. Although the graduates have never numbered more than 12 at a sitting, the commencement speakers have included such notables as the President of the University of California and former Assistant Secretary of Defense; the past president of the Ford Foundation and Assistant for National Security Affairs; the Chairman of the Foreign Policy Institute of the Johns Hopkins School of Advanced International Studies and former Secretary of Defense; and a past director of the Congressional Budget Office. Commencement exercises are held approximately every other year.

Evaluation and Outcome. The benefits to The RAND Corporation from the presence of RGS are numerous. The number of policy analysts with advanced degrees has been increased which is a boon to the nation and supports RAND's overall mission. RAND has had a hand in determining the

policies and practices associated with this field of study, and has therefore been able to advance the methods and tools of policy research. The academic disciplines which are required for policy studies have been enhanced through the interdisciplinary research approach, and at the same time the research environment has benefited from the stimulation of advanced students with inquiring minds and new input.

The low student attrition is testimony to the value the students place on this unique educational opportunity. The few who do leave before completion of the dissertation have typically been heavily recruited and, as the Asst. Dean noted, feel that they cannot pass up this job offer because it might be "the opportunity of a lifetime." Because of the numerous opportunities to make contact with a variety of potential employers through their RAND research activities, RGS graduates typically have an "in" with the system and frequently have access to highly desirable positions. The Assistant Director of Personnel mentioned that such opportunities may be the principal reason why some students chose to attend RGS.

As of October, 1990, 75 students have graduated from the program with doctorates in policy analysis and have gone on to work in a variety of positions ranging from the continuation of an area of research pursued at RGS to new project areas or to academic appointments. By design, few have continued on at The Rand Corporation. Graduates of

recent classes have found work at the Pentagon, in the U.S. Congressional Budget Office, at the Brookings Institution, in the U.S. Office of Management and Budget, at the World Bank, in the Defense Department, at the National Space Council, and have received academic appointments at such institutions as Harvard, Duke, Columbia, Cornell, UCLA, and the Naval Postgraduate School.

As previously mentioned, the presence of RGS has also been found to be a valuable recruitment and retention tool for The RAND Corporation staff. Many researchers have found stimulation and satisfaction in teaching, and appreciated the close relationship with the academic community that RGS provided. Without RGS, several researchers would likely have relocated.

The First Year Review Committee, composed of both RGS faculty and RAND research management, contributes significantly to the overall successful outcome for RGS, the student, and The RAND Corporation alike, by assessing the student's strengths and weaknesses at an early point in the program. The student's prospects in RGS are analyzed at the end of the first year and recommendations and decisions are made regarding future course work, on-the-job training and RAND research, and progress toward a dissertation. In some cases, it is found advisable that the student be terminated from the program.

Academic Characteristics

Curriculum and Degree Requirements. The combination of a rigorous curriculum and on-the-job training has made the RGS Ph.D. widely respected in the field of policy analysis. Although there are numerous master's degree opportunities in policy analysis, RGS is currently one of only four Ph.D. granting institutions in this area of study. It's approach is unquestionably the most "hands-on" and likely provides the best advanced preparation for addressing real-world policy problems. In the words of a 1988 RGS graduate:

> The combination of RGS coursework and OJT provide a unique environment for acquiring both the analytic tools used in policy analysis and the substantive expertise needed for policy research. Easy access to RAND researchers and their willingness to consider and critique new ideas ensures that dissertation research is rigorous and that it addresses current concerns. Undertaking such research as part of a larger RAND study yields opportunities to interact with sponsors who desire the results. Learning what material is useful to these people and how to present it have proven vital to the work I perform in my present position (The RAND Graduate School of Policy Studies Bulletin, 1989-1990, p. 42).

Instruction. As previously noted, the majority of the RGS faculty come from the doctoral staff of RAND's professional departments and as such, are very experienced in the application of their subject areas. In addition, those chosen as RGS faculty frequently have had considerable experience in instruction as well. A few faculty members

come from Southern California research universities. RGS is
headed by a dean and assistant dean, and the faculty who
teach part-time are approved by the Faculty Committee on
Curriculum and Appointments. Faculty members generally
teach one trimester or ten-week course per year. They are
paid extra by RGS to teach and their work loads are
appropriately adjusted, although they retain full salary.
Because teaching is thought of as a positive activity by
those on the faculty list, they approach it with marked
enthusiasm and a desire to share their expertise. To remain
on the faculty, the staff member must teach at least once in
a three-year period.

The wide range of academic disciplines the RGS faculty
represent result in a mix of expertise that exemplifies the
multidisciplinary nature of policy analysis. RGS students
may seek OJT within any RAND research unit in accordance
with their experience and interests. RAND researchers are
housed in six departments according to the following
academic disciplines: Economics and Statistics; Engineering
and Applied Sciences; Information Services; Behavioral
Sciences; Political Science; and System Science. Because
each research project can draw on professionals from any
department as needed, the RGS students are constantly
exposed to a broad spectrum of professional experience and
expertise.

As the new field of policy analysis continues to evolve, the RGS curriculum can be easily changed to meet the new needs. Because of the close association with RAND researchers, new faculty members and subject areas can be introduced as needed.

Instructional Support. RAND maintains one of the largest special libraries on the West Coast with upwards of 48,000 books, 204,000 reports, 3000 periodicals, 3000 maps, and numerous special files and microfilm. Comprehensive information and reference services are provided by experienced librarians with access to 40 major printed, abstracted, and indexing services and 24 computerized on-line information systems. RGS students are also able to use the libraries at UCLA and the University of Southern California, and messenger service is provided between RAND and the two universities. In addition, books and periodicals are available on interlibrary loan from other libraries throughout the world.

The Department of Computer Information Systems at RAND provides both researchers and students with large-scale computer resources and a wide array of computing services. A large staff of programmers, systems analysts, engineers, operators and technicians are available to help in preparing programs, data file acquisition and processing, and system

requirements. Several microcomputers are available to RGS students for coursework and dissertation preparation.

Because foreign scholars and analysts frequently spend brief periods in professional residence at RAND, RGS students have the opportunity to attend seminars on world-wide policy-relevant issues on site. The RAND research staff also offer seminars that considerable broaden the RGS students learning experience.

The RAND facilities are well suited for instructional support. In addition to the library and computer service facilities available to RGS, there are also smaller conference rooms suitable for small classes, a 100 seat main conference room, and a common room which hosts a variety of activities from small informal gatherings to large meetings and classes.

The availability of the above on site services and facilities to RGS students appears to confirm that RGS is truly considered an important part of a larger whole.

Student Qualifications. Admission to RGS is very competitive and only top applicants are accepted. The Admissions Committee reviews all applications which include: a letter to the Dean stating educational aims and reasons for graduate study in policy analysis; a personal resume; three academic or professional letters of recommendation; undergraduate and graduate transcripts; scores on the GRE

exams or their equivalent; and a recent research paper or report that the applicant reflects his or her best work.

As mentioned above, all students accepted by RGS are reviewed toward the end of their first academic year by the First Year Review Committee, and those whose future prospects in RGS are judged questionable may be advised to leave the program. Because of the stringent entrance requirements, this is a very infrequent occurrence.

Administrative Structure. As described in the Case Study Report, although RGS is autonomous with regard to setting standards and determining the curriculum, it remains an integral part of The RAND Corporation. The active participation of representatives from science, business and industry, and the academic community on the RGS Board of Trustees, the RAND Advisory Board, and the Academic Advisory Board has helped to insure that the mission and goals of RGS are appropriate to current needs, and that the program of study provides the greatest exposure to both the theory and practice of policy analysis.

Continuing-Education Characteristics

Accessibility. Students who wish to take part in the RGS program must be able to devote full-time to their graduate studies. As described previously, the combination of advanced coursework with on-the-job training results in a

rigorous program demanding full-time attention. Students must also be able to relocate to the Los Angeles area.

The high cost of the tuition is offset by the salary stipend, but would be a deterrent to a prospective student with a family to support. The high cost of living in Southern California must also be taken into consideration.

Accessibility is also restricted by the small number of students accepted per year and the stiff entrance requirements.

Also, because the program is structured in specific sequences, it is not possible to begin at other than the designated time. It is likewise difficult to drop out for an unspecified period and return when personal conditions are more favorable. Only advanced students who have completed the majority of their dissertation work have successfully returned to complete the program.

Flexibility. 11 RGS core courses from four categories including economics, quantitative methods, social sciences, and technology are required. The only core area in which students are given a choice of courses is technology. If students have had closely comparable work elsewhere, they are given the opportunity to have these courses waived through examination or other means. No transfer credit is accepted. All students must still complete the 20 course requirement, however.

A great deal of choice is available in terms of OJT and it is anticipated that all students will have experienced several areas of research by the time they choose the topic of their dissertation.

Environment. Located within The RAND Corporation's main complex overlooking the Pacific Ocean, RGS very much reflects the rest of the RAND corporate environment. The ease of access to RAND researchers on a informal basis is a real advantage of the corporate location. Although this is a restricted access facility due to the national security research which takes place, the atmosphere is relaxed and almost casual. Most interchange takes place on a first name basis and the organizational structure appears more horizontal than vertical. It is difficult to distinguish the RGS students from the RAND research staff, especially when the advanced students are provided with their own offices. Students also have access to technical, library, and computer services. Hierarchy is given less import than teamwork, both within the corporation and the graduate school. The overall ambience is that of a stimulating intellectual environment.

Although there are few specific activities for graduate students, RGS students tend to relate well to each other, and to the RAND staff, since they operate so often as part of a team. They are invited to participate in RAND's

program of recreational activities, including a number of
special interest clubs. RGS students and their families can
also use the RAND locker room facilities, beach, and running
path.

Focus. The RGS program is highly focused on preparing
the students to apply the theories, tools, and techniques of
policy analysis in real-world problem solving.   One student
described the RGS curriculum as "sharpening my analytic
skills while teaching me how to conceptualize, plan, and
carry out research projects dealing with major policy
issues." Another student, now graduated and working with
the Aerospace Corporation, said that RGS provided him with
the "intellectual framework and practical tools" that he
currently applies on a daily basis to both the management
and technical aspects of his work.

As previously discussed under corporate outcomes,
graduation from the RGS program yields great benefits. In
addition to obtaining an important and prestigious
credential, and the opportunity to make numerous valuable
contacts, students greatly benefit from exposure to a
thorough program of study which successfully combines theory
and practice and provides them with the multidisciplinary
framework necessary for the increasingly complex area of
policy studies.

Northrop University: Case Study Report

Introduction. Northrop University was established in
1942 as the Northrop Aeronautical Institute, a division of
Northrop Aircraft, Inc. of Hawthorne, California. The
founders, John K. Northrop, an early aeronautical pioneer
and the president of Northrop Aircraft, and James L.
McKinley, a distinguished technical educator and
industrialist, recognized the growing need for skilled
engineers and technicians in the aeronautics industry.
McKinley took charge of company planning for the new
training and education division, and in the next few years
developed one of the largest and most extensive programs for
training airplane mechanics and technicians to come out of
World War II.

As the war was drawing to an end, McKinley presented a
plan to Northrop and other members of the company's
executive staff which called for incorporating the
technical training division courses into a well-balanced
technical institute program which would be offered to the
public. When Northrop Aircraft accepted the plan, McKinley
began adding the services of many experienced educators and
administrators to his already experienced staff and began to
build a new campus to accommodate the expansion. The new
location was to be adjacent to the runway at Hawthorne
Field, and was to include an administration building,

engineering building, new shops and laboratories, and an airplane hanger which had been used for training Air Force specialists.

The Institute opened its doors to the public in 1946, and offered an intensive, practically oriented, two-year program through its aeronautical engineering school and a shorter technical program through its aviation school. In 1953, however, the Air Force pressured Northrop Aircraft to move the school off its property because of security reasons. Northrop Aeronautical Institute was divested from Northrop Aircraft, Inc. at this time and was purchased by McKinley. He arranged a merger with a technical school, California Flyers School of Aeronautics, which had extensive facilities in Inglewood, near the growing Los Angeles Airport, but was in need of students.

Northrop Aeronautical Institute operated in this new location from 1953 to 1957 as a private proprietary school of engineering and technology. In 1957 it changed its name to Northrop Institute of Technology and its status to a private, non-profit institution. In 1958 Northrop received approval to expand its educational offerings to include Bachelor of Science degrees. The Western College Association accredited Northrop Institute of Technology as a "specialized institution" in 1960. In 1962, Northrop attained the status of a "senior institution".

In 1965, a master expansion plan was prepared which included the design and building of a residence hall, a new engineering building, library building, and various other buildings. The James L. McKinley Residence Hall was completed in 1966 and the other buildings in subsequent years, all at the Inglewood location near LA Airport.

Master's degree programs were incorporated in 1969, following the addition of programs in mathematics and engineering technology. The Master of Business Administration degree program and the first undergraduate business curriculum leading to a Bachelor's degree in Management were added in 1970. The School of Law, offering the Juris Doctor degree in a four-year, evening program, was established in 1972 and was accredited by the Committee of Bar Examiners of the State Bar of California. In subsequent years, the School of Law added masters degrees in Taxation and in Procurement and Acquisition Management.

In 1974, the name Northrop Institute of Technology was changed to Northrop University to reflect the school's achievement of full university status.

Origin, Mission, and Evolution. As noted above, Northrop University was established in 1942 as the Northrop Aeronautical Institute, a division of Northrop Aircraft, Inc. It came into existence to prepare students for employment as aeronautical engineers and aircraft

technicians for the parent company, and to meet the projected professional manpower demands of expected growth in air transportation after World War II. Its philosophy of education, based on McKinley's beliefs, was to plan each program of study so that "each student not only understands his work in theory, but can perform in practice when actually on the job. That is why the Northrop Institute of Technology graduate meets the needs of industry - he knows how the job should be done and he knows how to do it" (Your Future in Technology, NIT Catalog, 1961).

From the start, the Institute made the most of the industrial resources available to it. Northrop Aircraft Company aerospace experts wrote and prepared the textbooks used in the classroom. They served as faculty members, providing 50 of the original Aeronautical Institute faculty. Advisory committees included a large proportion of industrial representatives in an effort to ensure that the instruction remained current as well as to provide for quality control of graduates. Use of industrial facilities and close contact with ongoing industrial projects provided the necessary hands-on experience required by students in this relatively new and growing field.

The concept of contract education also evolved from Northrop's early roots. In its first decade, the school educated mechanical engineers for Lockheed, trained 500 United States Air Force airframe technicians, and provided

on-site programs for the United States Navy. It even set up

a complete training center for the United States Army at the

Redstone Arsenal in Huntsville, Alabama. Foreign students,

many sponsored by their home country or a home industry,

began enrolling at Northrop as early as 1947. Today,

contract training of foreign students at the request of

large foreign employers, primarily airlines and air forces

of friendly nations, accounts for the majority of

international students.

Northrop's change in status from a proprietary to a

non-profit institution was linked to the recognition of the

importance of degree programs and accreditation. As

Northrop's academic offerings expanded, official validation

of its collegiate status became necessary in order to

attract a broader based student population. Also, the GI

Bill required that veterans receiving financial aid for

higher education purposes attend accredited colleges. In

addition, the Dean of Student Affairs pointed out that

because government contracts with aviation industries had

increasingly been funded based on the number of individuals

with bachelor's degrees who would be working on the project,

Northrop needed to emphasize to past and present students

the advantages of continuing on for a degree.

Whereas the 1952 Northrop catalog stressed the

advantages of a program of only two years, stating that

higher education in aeronautical engineering normally

required four years and thus meant two less years of employment pay and experience, the 1961 catalog urged students to consider continuing their formal education to at least the level of the Bachelor of Science degree. The 1961 catalog also noted that engineering was a rapidly developing professional area, and that those who would be the most successful in this area were the ones who were willing to continuously improve themselves through formal and informal study throughout their lifetime.

To enable previous graduates to obtain the further education necessary to earn their degrees, Northrop Institute of Technology provided a special program of evening classes. Between 1962 and 1968 when this program was completed, more than 1,000 people availed themselves of this opportunity to return and earn their degrees.

Between 1970 and 1974, Northrop experienced a decline in enrollment. The Northrop University Self-Study for Western Association of Schools & Colleges (1984) indicated that this drop was due to government cutbacks in space projects, anti-technology attitudes in the United States, and the discontinuance of the Boeing SST program. The financial crisis that was precipitated by this decline was met by a change in leadership. A new president was brought in who became responsible for special contracts, broadening the school's educational base, reestablishing close ties with industry, and increasing student services. The

enrollment decline was halted by the late 1970's and enrollment was brought to an all-time high in 1983.

During the late 1980's another serious decline in enrollment at Northrop University became evident. A new president took over in the fall of 1989 and called for a reevaluation of long held assumptions regarding Northrop's strengths and weaknesses. Members of the faculty and staff at all levels began looking at these assumptions and concluded that much had changed in terms of students' needs, the needs of business and industry, the affiliation of Northrop with local industries, the demands being placed on the curriculum due to increased accreditation requirements, competition with neighboring colleges and universities, and the avenues open to Northrop to attract additional students.

A significant turnover of administrative personnel has now occurred, and a new position of outreach coordinator has been created. The new president's intention is to greatly expand services to older, adult students who can only attend on a part-time basis and need the convenience of evening and weekend scheduling. The outreach coordinator he selected brings with her a very impressive record of success in adult and continuing education at a state university.

Northrop's current mission statement, as contained in the 1988-1990 catalog, indicates that the university seeks to provide comprehensive and innovative educational programs which contribute to the progress of industry and commerce

with an emphasis in engineering, engineering technology,
computer science, business administration and law. As the
search for an improved "niche" continues, it is likely that
this mission statement will be amended to include
continuing-education. It should also be noted that the
mention of law is no longer appropriate as the Juris Doctor
and the Master of Science in Taxation programs are being
phased out. Applications for admission to these programs
have not been accepted since the fall quarter of 1989.

Curriculum and Degree Requirements. A variety of
programs and degrees are currently available through
Northrop University. As most of them relate directly to
education in preparation for (or the return to) the world of
work, a brief description will be made of several of them.
Further consideration of programs of special interest will
be provided in the analysis of Northrop which directly
follows this case study report.

(1). The Institute of Technology is composed of two
departments, The Department of Aviation Technology and the
Department of Engineering Technology. Although the
Department of Aviation Technology primarily offers
certificate programs which are approved by the Federal
Aviation Administration (FAA), the Airframe and Powerplant
Program and the Airframe and Avionics Technician Program are
given academic credit towards associate of arts/associate of

science (AA/AS) or bachelor of science (BS) degrees in Aircraft Maintenance Engineering Technology and Technology Management.

The certificate programs are highly regulated by the FAA, and students completing these programs at Northrop University typically average a high 94% on the FAA licensing exams. Those students who wish to continue on to earn an associate degree are awarded 64 quarter hours of credit for the satisfactory completion of either certificate, and then have to complete an additional 62 quarter hours of credit in specified general education areas such as English composition, history, math, and communications.

The Department of Engineering Technology consists of BS degree programs in Aircraft Maintenance Engineering Technology, Electronics Engineering Technology, and Manufacturing Engineering Technology. The credit hours applied toward the associate degree for the satisfactory completion of the certificates as above are subsequently creditable to the bachelor of science degree. A total of 198 quarter hours of credit are required for the bachelor's. The program of study includes a base of applied science, graphics, mathematics, computer science, technology, and socio-humanistic studies.

(2). The Division of Humanities, Social and Computer Science offers a certificate program in English as a Second Language. This program, which does not lead toward a

degree, was instituted primarily to address the needs of many of the international students who must first become proficient in English before they are allowed to begin their technical training or academic work.

This Division also offers BS degrees in Computer Science and Information Systems, as well as an MS degree in Computer Science. A minimum of 195 quarter units of credit are required for the completion of the bachelor's degrees, with a heavy emphasis on math and computer classes, but including such basics as three English composition classes, an oral communication class, and a class in writing for business and industry. These English classes must be completed no later than the sixth quarter after initial registration. Students who find they have difficulty with English classes are required to take remedial English.

(3). The College of Business and Professional Studies offers AS degree programs in Technology Management and BS degree programs in Business Administration. The curriculum includes business core courses, specialization requirements, business electives, and general education requirements in science, humanities, and social science. The business core provides a basic foundation in accounting, finance, communications, management, mathematics, data processing, and marketing.

At the graduate level, both master of business administration (MBA) and master of science (MS) programs are

available. Applicants must demonstrate adequacy in the areas of English language, mathematics, accounting and finance, and economics before being admitted to one of the programs. Those applicants who did not major in Business Administration during their undergraduate studies are required to complete 27 prerequisite undergraduate units. Prospective students who do not yet hold a bachelor's degree but have completed 137 transferable quarter units at an accredited institution and possess a cumulative 2.75 grade point average with a 3.0 grade point in math, science, and business courses may be admitted to a special program. Students in this program must complete a minimum of 102 quarter units at Northrop University, of which at least 51 must be graduate courses approved by a graduate advisor. The successful candidate will earn both a BS and MS.

The MBA program is designed to enable business people and managers to develop and improve their effectiveness in highly competitive organizational environments. MBA students can also combine aspects of their backgrounds and previous education with their current studies to focus on ways to achieve their career goals and objectives. Five MBA specialization areas are available, including accounting, finance, international business, management and organizational behavior, and marketing.

The MS programs are designed to serve working adults whose maturity is reflected in their educational and

employment histories. The MS degrees provide an opportunity for people in technical and specialized fields to acquire and integrate management skills into their work environment as they advance in management in high-tech industry and commerce. Five MS specializations are available including management for education, international business and taxation, procurement and acquisition management, technology management, and systems and logistics.

A unique course of study at the master's level is scheduled to begin this year. The MS in Engineering Management (MSEM) represents a cooperative effort between the Department of Business and Management and the engineering departments. This degree was designed to bridge the gap between the technical and management sides in the modern workplace. Applicants should be engineering graduates currently engaged in industrial practice, who possess considerable professional experience. The 51 quarter unit program combines legal and technical studies with a core of management courses. The ultimate aim is to provide the education and expertise necessary to develop competent technical managers.

(4). The College of Engineering and Science offers two undergraduate degrees, a BS in Aerospace Engineering and a BS in Mechanical Engineering, through the Department of Aerospace, Mechanical and Civil Engineering. The undergraduate programs provide a broad background in the

humanities and social sciences, English, mathematics, basic sciences, engineering sciences, and system analysis and design. Because a number of the advanced engineering courses are taught by faculty from industry who are currently working in the forefront of their field, basic studies are reinforced by current industrial practice. A minimum of 197 quarter units of credit are required for completion of the undergraduate programs. Three graduate degrees, a MS in Aerospace Engineering, a MS in Civil Engineering, and a MS in Mechanical Engineering, are also offered through the Department of Aerospace, Mechanical and Civil Engineering. An additional 45 quarter units of credit are required for the completion of the MS degrees. Graduate students are able to select their program hours from approximately 70 quarter unit classes offered for each degree area.

The Department of Electrical/Electronic Engineering, also part of the College of Engineering and Science, offers a BS degree which is designed to prepare the undergraduate for work in the highly diverse electrical engineering profession. It includes a solid foundation in the basic sciences of physics, chemistry, and mathematics which supports advanced courses in electronic circuits, physical electronics, electromagnetism, digital design, microprocessors, power systems, integrated circuits, communication theory, microwaves, electro-optics,

information theory, and feedback control systems. 40
quarter units in English, humanities, and the social
sciences are also included. A total of 204 quarter units
are required for completion of this program. A MS in
Electrical/Electronic Engineering is also available,
offering graduate study in the areas of systems and
controls, digital and computer engineering, communications
and radar engineering. 45 additional quarter unit hours are
required for this MS degree, also.

Student Demographics. Northrop University students
represent a cross section of cultures from the United States
and around the world. Of the 1988-1989 total headcount of
1784 students, 81% were international and 19% domestic. A
profile of the 1988-1989 international students showed the
following distribution: 49% from the Pacific Rim; 21% from
the Middle East; 6% from Europe; 3% from Africa; 1% from
South and Central America; and 1% from Canada.
Approximately a third of the domestic students were from
California, with the remainder from the other states.

The presence of international students at Northrop was
noted as early as 1947. The Dean of Students commented that
although only 10% of the Northrop students were foreign in
1966, the numbers increased significantly during the late
1960's and throughout the 1970's. By the mid-1980's, nearly
60% of the student population was foreign. In terms of

distribution throughout the various programs at the University, a large percentage of the international students are currently enrolled in the engineering and computer science programs. They may represent as much as 80% of the enrollment in these programs. Nearly 30% of the students in the Institute of Technology programs are international, also. Only a small minority of the students in the College of Business and Professional Studies programs are international, however.

In terms of distribution by sex, 81% of the students in the 1988-1989 count were male. In the early years of the Northrop Aeronautical Institute and the Northrop Institute of Technology, the student population had been essentially 100% male. The increase in the number of female students on campus is fairly recent. In 1980, fewer than 8% of the enrolled students were girls, but this number increased to 10% during the mid 1980's and now stands at 19%. The Director of Admissions and Records stated that a top recruitment goal is to bring this number closer to 50%. The majority of girls currently enrolled are in business and management programs, although there are some in engineering, and even a few in the aircraft maintenance and technology programs.

Although students range in age from those still in high school who are concurrently attending Institute of Technology courses to working engineers who are returning to

school, the average age is approximately 25 and reflects a fairly traditional student body. Many of the NU students have family members who are alumni, or they are working in an industry in which several members of the staff or management are NU graduates.

Tuition and Financial Support. Tuition at NU is currently $198. per unit for degree programs, and a fixed sum for the Department of Aviation Technology certificate programs. The cost for the popular 58-week Airframe and Powerplant program, for example, is $8,660.

Considerable opportunities are available for financial assistance. According to NU literature, approximately 15% of students attending in 1988 received financial aid totalling $1,700,000. A significant number of students work while attending school as well. The campus career center maintains a referral file of part-time employment, both on and off campus, for students who are interested in educationally-related employment. From 65 to 70% of all NU students are employed part-time.

Faculty. Approximately 90 full-time and 120 part-time instructors comprise the NU faculty. The majority of part-time faculty members are currently working in their field of expertise and bring an up-to-date and application-oriented viewpoint to the classroom. More than 80% of the NU faculty

have earned advanced degrees. For most disciplines, a minimum of a master's degree is required for teaching. The instructors in the Department of Aviation certificate programs typically qualify for their position based on their vast background of work experience, rather than a degree, however.

Administration. NU's Board of Trustees is the legal body which governs the school. It is responsible for "protecting the University from harmful outside influences, for ensuring its fiscal soundness, and for seeing that its educational mission remains in focus" (Northrop University Self Study for Western Association of Schools & Colleges, 1984, p.39). The Board consists of up to 26 members and its constituency is made up of a broad section of men and women including civic leaders, business people, and leaders from law and industry. Board members are elected for terms of from one to five years, on a rotating basis, so that approximately one-fifth of the Trustees are elected on an annual basis. The Dean of Auxiliary Services noted that two members of the current Board, Mr. McKinley and the current Board Chairman, have served since its original founding.

Seven standing committees of the Board of Trustees were established in 1982 to augment the participation of Board members in matters related to the governance of the university. The committees include: Executive Committee of

the Board of Trustees, Alumni Relations Committee, Audit Committee, Budget and Fiscal Planning Committee, Building and Grounds Committee, Development Committee, and Long-Range Planning Committee.

NU's administration is structured to manage the various activities of the institution. The President is the Chief Executive Officer and is responsible for all aspects of the University including education, student services, business matters, accounting, and development. He is assisted by two vice-presidents, three deans, and other staff personnel.

A number of councils and committees were established in response to accreditation agency recommendations in the 1970's and have since been extensively utilized. These include the Administrative Council, the Tuition and Fees Council, the Budget Review Committee, the Student Services Council, the Student Activity Fee Committee, the NU Council to advise the President, the President's Council, the Academic Senate, and a number of other committees related primarily to student concerns.

Northrop University: Case Study Analysis

Corporate Characteristics

Innovation and Responsiveness. From the time of its pioneering origin, Northrop University has been recognized for its innovation and willingness to respond to the needs

of the aviation industry. John Northrop and William McKinley broke new ground when they expanded the Northrop Corporation's in-house training program into a full-fledged educational institution which accepted students from outside the corporation. When McKinley purchased Northrop Aeronautical Institute in 1953 and began operation as a proprietary school, he again displayed the courage of his convictions regarding the ever-growing need for aeronautical training. The move from proprietary status to non-profit status and the seeking of accreditation in the late 1950's again reflected a response to changing needs and the willingness to adapt to new situations.

The change in emphasis from a two-year to a four-year program in engineering, and the increase in the professional aspects of its aeronautical education programs, further indicated NU's adaptability. The development of extensive contract education was also an innovative response to both a need in the industry and a means to increase enrollment during times of decline. The change of leadership in the mid-1970's was credited by the Vice-President of Legal Affairs with bringing the first major decline in enrollment that the University had experienced to a halt. In addition to expanding contract services, the President broadened the school's educational base, reestablished ties with industry, and expanded student services.

The Dean of Auxiliary Services and former Assistant to the President, explained that NU can respond to changing needs more quickly than the state universities because there is less bureaucracy with fewer levels needed for approval at NU, and that smaller institutions in general can typically be more responsive.

The current attempt of NU to more specifically define and develop its niche among the multitude of educational opportunities in Southern California has also resulted from changing conditions in the marketplace and was again stimulated by a decline in enrollment. The faculty and staff members who have been part of the NU structure since the 1970's all indicated that although major accomplishments were achieved through the early 1980's, the President, in particular, then appeared to lose touch with the changes that were occurring in related business and industrial fields. The Dean of Auxiliary Services and the Director of Placement agreed that current problems were due to this lack of leadership during the mid to late 1980's.

The present concensus is very positive and the participation of NU personnel at all levels in the re-analysis of NU's resources, goals, and objectives indicates a resurgence of the spirit and willingness to make adjustments as required.

<u>Level of Support.</u> As previously discussed, NU has been an independent, non-profit institution for more than three decades. Although it has not received direct corporate financial support since the time of divestiture from the Northrop Corporation, the various contracts for education and training with airline industries and foreign governments have provided the major portion of the funding which has been instrumental in NU's development.

Corporate moral support is provided through the representation of a number of businesses and industries on the NU Board of Trustees and various advisory councils. The advisory councils for the Institute of Technology programs have continued to maintain an up-to-date program structure. The NU Self Study (1984) indicated, however, that the association between the administration of the Institute and the administration of the rest of NU was not as interactive as would be desired. The Provost also noted that the Business-Industry Advisory Council was not as active as it had been in the past and that it was of major importance that it be revitalized.

A variety of student scholarships are provided by a number of corporations and associations related to the airline industry. Among these are the Northrop Corporation's Minority Fund, the Northrop Corporation's Management Club scholarships, the Professional Aviation Association scholarships, the Rockwell Engineering Minority

Engineering Scholarship, and the Southern California Edison Scholarship.

Evaluation and Outcome. The Aviation Technology certificate programs are highly regulated by the FAA, and are thus subject to constant scrutiny. The licensing exams have indicated that NU students have been extremely well prepared based on a average score of 94%. The BS programs in aerospace and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology and are frequently reviewed. The BS program in aircraft maintenance engineering technology is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology and is also under constant evaluation.

Other degree programs are not as strictly regulated, although the Vice-President of Legal Services indicated that the non-traditional nature of NU has allowed a number of changes to be made over the years in all programs, including those which do not have to answer to specific accreditation bodies, in order to enhance overall student outcomes. The Director of Placement noted that the aviation industry is highly cyclical and that the need for graduates in this area is never constant. Whereas opportunities for the graduates in mechanical engineering are fairly broad, aerospace

related engineering is considerably more limiting. She pointed out, however, that NU graduates in all areas were in high demand, based on the reputational quality of NU's programs. The explanation given was that "employers like hands-on people."

The only real problem facing NU graduates appeared to be the fact that it is very difficult for international students to find employment in their field in the United States because they are not residents. Some of the international students chose to major in subject areas for which the technology was not yet present in their home countries.

Academic Characteristics

Curriculum and Degree Requirements. The curriculum and degree requirements of the major NU programs were described in detail in the case study report. Certain programs will be highlighted in an attempt to demonstrate the distinguishing features of the NU curriculum.

The graduate programs in business and management were not only designed to develop comprehensive knowledge and professional skills, but also to develop positive attitudes regarding the management of both large and small enterprises. The MBA and MS programs were structured primarily for mature individuals from diverse backgrounds who wish to "explore new areas of study, gain deeper

knowledge, and prepare themselves for higher levels of professional management" (Northrop University Catalog, 1988-90, p.108). The Provost added that the courses in these programs emphasized theory and application, and that the teaching stressed the importance of careful analysis and decision-making. In addition, international issues and varying points of view were also incorporated into these programs.

The Registrar described a particularly innovative new program, the MS in Engineering Management (MSEM), as a cooperative effort between the business and management department and the engineering department. In an attempt to bridge the gap between the technical and management sides in the modern workplace, engineering graduates with industrial experience can combine legal and technical courses with a core of management courses. A business administration faculty member pointed out that the problem with most master's degrees in engineering is that students receive instruction in technical matters only and that, in the majority of cases, the working engineer becomes a supervisor within the first five to ten years of his working career and has had no training in people skills. The Director of Placement fully agreed with this statement, and was looking forward to new graduates with skills in both areas.

The Provost indicated that there had been considerable opposition from the engineering faculty to this program,

however, as many of the full-time engineering faculty had been in place for many years and felt that only additional coursework in engineering was necessary to meet the current needs of the industrial sector. He noted that during the 1960's, 1970's, and early 1980's the general curriculum had shrunk due to the great expansion of engineering knowledge. Recently, however, new general education requirements had resulted in an overall lengthening of all engineering degree programs. Emphasizing the importance of the humanities and social sciences for engineers, the Provost indicated the MSEM program would prove a good transition from the old school of engineering education to the new. He suggested that this type of program must be "sold at the top" to corporate executives before it would really catch hold.

A previous effort at a multidisciplinary approach to an advanced engineering degree combining engineering, business, and law did not succeed. The Vice-President of Legal Affairs provided considerable background information on a master plan which NU submitted between 1979 and 1985 for the establishment of the professional degree of Doctor of Engineering. Although the Society of Professional Engineers in Education recommended the plan to the National Society of Professional Engineers Board of Directors, it was not approved. In addition to the myriad of difficulties involved in having individuals from multiple disciplines structure a single program, NU did not have the regional

accreditation necessary to offer the PhD degree. Also, the Vice-President of Legal Affairs pointed out that although there was great merit in the idea of a multidisciplinary doctorate in engineering, this would have been too expensive of a program to develop in a small tuition-driven school.

The NU law degree is now being phased out due to a decreased demand for the program and increased competition from other local evening law programs. The Vice-President of Legal Affairs concluded that "although non-traditional institutions can respond quicker and address needs better than traditional institutions, it is easy for a small school to tax its resources."

Instruction. As previously described, the majority of the NU faculty have considerable work experience which adds to their academic expertise. The faculty-to-student ratio of 1:14 allows both the students and the faculty to explore the field of study in greater depth, to enlarge upon hands-on activities, and to establish relationships beyond those typical of large, university lecture halls.

A potential problem for interdisciplinary studies at NU may arise from the fact that each educational unit maintains its own committees and is individually responsible for educational matters pertaining to its own discipline. The former Assistant to the President and current Dean of Auxiliary Services noted that the Institute of Technology

rarely participated with the rest of the campus in such matters as the Academic Senate. The most recent accreditation study also indicated that the campus needed to be more fully integrated. The current "self-evaluation" studies, under the guidance of the new president, may provide this opportunity.

Considerable instructional support in terms of library facilities, library holdings in subject specialty areas, computer labs and special services, and hands-on labs in the areas of engineering, design and fabrication, energy conversion, solid mechanics, simulation and control, fluid and thermodynamics, metallurgy, electronic engineering, and aerodynamics are available to students.

Student Qualifications. The demographics of the student population have previously been presented. As viewed by the Director of Admissions, the fact that the admissions requirements at NU are somewhat less selective than at the local California state colleges allows less well prepared but capable students the opportunity to bring their skills and knowledge up to par, and thereby contribute in a more productive fashion to the workforce. A secondary school grade point average of 2.75 (on a 4.00 scale) is the minimum standard for acceptance for all academic degree programs at NU with the exception of Engineering Technology which requires 2.20. International students must also

satisfy designated English language requirements before beginning NU degree programs. A Preparatory Program is available to meet the needs of the prospective undergraduate students who are academically unprepared to enter the fields of business or technology. Before being admitted to candidacy for the master's degree, graduate students must also prove their readiness by earning 12 units of approved graduate level work with a grade point average of 3.00 or better.

The principal reasons students gave for deciding to attend NU fell into one of three categories: (1) the admissions standards were lower than the comparable state schools; (2) they were aware of NU's reputation as a provider of high quality education for professionals in the aviation industry; and (3) they were being sponsored by a company or government which had dealt with NU previously and was always satisfied with the outcome.

The international students appeared to be of two major types: (1) those who were sponsored by their government or a private industry and (2) those who came from well-to-do families which were accustomed to sending their children to the U.S. for their education. Interestingly, although the student population is in fact heavily international and male, the descriptive brochures and catalogs feature an unrepresentative number of Caucasians and females.

Administrative Structure. The NU Self-Study Report for Western Association of Colleges and Schools (1984) indicated that further progress needed to be made in securing a sufficient number of Trustees to accomplish the goals and objectives first set forth in 1982. The Provost noted that although much headway had been made, further participation of the Trustees through the established standing committees would contribute greatly to increased communication and understanding both within the university itself and between the university and the corporate sector.

The decision making process at NU was described as a chain of command which moves both upwards and downwards and is assisted by appropriate councils and committees. The Dean of Auxiliary services suggested that NU's administrative hierarchy consisted of relatively few layers and thus allowed students, staff, and faculty easy access to administrators when they wished to make a problem known.

He also noted the because the Institute of Technology has a separate administration from the rest of the school, it is difficult to "homogenize." It is highly regulated by the FAA, and is even on a different time schedule than the rest of the university in that its programs are modular and start up every month.

Continuing-Education Characteristics

Accessibility. Many features at NU contributed to enhanced accessibility for a variety of students. The moderately selective entrance requirements allowed students access to a quality technically-oriented education which might not have been possible otherwise. The industrial location in the vicinity of the Los Angeles airport is convenient to get to from the worksite. Although the evening and weekend programs had not been stressed in recent years, much planning is currently taking place with regard to strengthening the continuing-education and adult education features. Many of those interviewed at NU indicated that the competition NU now faces from the traditional sector has led to a need for developing a new "niche." Central to this plan is making NU more accessible to returning adult students.

Financial aid in the form of grants, scholarships, and work-study arrangements have helped to offset the relatively high tuition costs.

Flexibility. The increase in general education requirements has resulted in a less flexible curriculum at the undergraduate level. A wide variety of elective courses are available, however, and help to provide the interdisciplinarity which engineering leaders found so desirable.

The Provost noted that although NU has a policy stating that credit is available for work- and life-experience which is comparable to specific credit courses, the policy is frowned upon by the accrediting agencies and therefore is rarely put into effect.

Only the non-credit certificate programs follow a flexible scheduling pattern and are offered for different durations.

Environment. The setting of the NU campus is industrial in appearance and is primarily structured to be as functional as possible given the limited amount of space available. The Director of Buildings and Grounds indicated that the University's intentions were to purchase the property adjacent to that now occupied by the main administration building and develop such features as additional parking to add to the convenience of the students. He also noted that the planned renovations were designed to be more appealing to the adult student.

The aviation-orientation of the curriculum is emphasized by the proximity of the university to the airport with its concomitant noises and smells, and the use of old hangers to house labs and technical equipment.

Focus. All of the principal features of NU, including its physical setting, clearly indicate the presence of a highly focused educational activity in preparation for the

world of work. The current re-evaluation and search for a new niche will likely broaden the current focus but will retain its work-related base. The new President is expected to institute adult education programs, extension degree programs, short multi-session programs, and single-session programs or seminars which will bring in a new population of working students. The Provost envisions a future of extension activities which will lead to certificates of completion in a variety of engineering areas for current engineers who need to upgrade their skills or change job areas. He sees the eventual phasing out of the engineering degree programs at NU because of the high cost of meeting the necessary accreditation requirements.

General Electric Corporation: Case Study Report

Introduction. General Electric Company, headquartered in Fairfield, Connecticut, consistently ranks among the top 10 in the Fortune 500 ranking of industrials. GE currently employs approximately 300,000 people in more than 300 locations worldwide.

"GE's goal of becoming the most productive company on earth depends upon quality leadership empowering talented people to excel" (Corporate Education Catalog, 1990, p.2). GE sees the development of that leadership as part of its overall mission, and to that end has been involved with educational opportunities for its employees for many years.

Recently GE established an impressive corporate education center at Crotonville, New York, where many of the leadership and management development courses now take place.

In addition to providing educational opportunities for business leaders, GE has a long history in continuing-education for leaders in engineering. The Advanced Course in Engineering was originally established in 1923 to supply the company with engineers in all departments who possessed sufficient breadth and depth of technical understanding to make basic contributions in the development of new or improved products. More recently, GE added an Advanced Course in Manufacturing and an Advanced Course in Computers. The GE Advanced Course in Engineering is the only one of GE's education programs to actually lead to a degree, however.

Origin, Mission, and Evolution. Charles Steinmetz, an early supporter of Corporation Schools, was GE's original advocate for leadership education for young engineers. To be certain that Steinmetz's educational philosophy would be perpetuated, a young engineer by the name of Robert Doherty was commissioned in 1923 to set up the Advanced Course in Engineering and to set course goals which would fulfill the company's leadership needs in the Steinmetz tradition. The

goals set then remain the goals of the Advanced Course in Engineering today:

1. the ability to identify and solve real engineering problems

2. competence in writing engineering reports

3. an understanding of the use and misuse of mathematical analysis, and other ways of solving engineering problems

4. the realization that the engineer's primary purpose is not mathematical virtuosity but the improvement of methods and products.

For the first 40 years, these goals were met through a three-year in-house certificate program. The curriculum, called the A,B, and C-Courses, covered a variety of topics in electrical and mechanical engineering. In the early 1960's, however, young engineers recognized the importance of graduate degrees and began to push for graduate credit. To accommodate their requests, and to attract well qualified engineering graduates to the GE program, the Advanced Courses staff initiated a cooperative agreement in 1963 with the Polytechnic Institute of Brooklyn so that students could earn a graduate degree as well as a C certificate.

The first GE students worked towards a PhD degree at the Polytechnic Institute of Brooklyn, as did the second group of GE students at Rensselaer Polytechnic Institute. Because of a high attrition rate, and the excessive cost of the program, the decision was made to switch to a master's level program instead and to develop a number of college

relationships at GE plant locations around the country. There are currently 27 locations in the United States and 2 locations in Canada where GE students can earn both a master's degree and a C Course certificate.

Curriculum and Degree Requirements. The Advanced Course in Engineering is still three academic years or six semesters long. The first three semesters typically consist of a two-semester A Course and a one-semester B Course taught at GE, and the final three semesters consist of university courses and an engineering project.

The A Course continues in the tradition established by Doherty and covers a variety of topics: engineering analysis, vibrational analysis, electricity and magnetism, control theory, probability and random variables, heat transfer, and structure analysis. The classes meet once each week for approximately four hours on company time. The lecture serves as a refresher for students who have covered the topic before, or as new instruction for other students, and provides them with the background knowledge necessary to solve the homework assignment. Each week the students have a realistic engineering problem to solve that requires on the average of 20 hours to complete. This time is in addition to the regular work week. The intention is to encourage the students to brainstorm in small groups and

then to work alone on writing up the problem solution as an engineering report.

Because the A Course is so rigorous, the 20 hour homework estimate is fairly accurate. Even students with previous graduate degrees have to put in this much time, since the identification, solution, and the preparation of a real engineering problem is generally found to be considerably different than typical college study. The basic argument for presenting the course in this fashion is that although engineering educators are known for teaching engineering well, they are not thought to teach problem-solving and communication skills to their students. The A Course is basically the same at each GE location, and primarily addresses fundamentals of general usefulness throughout the company.

The B Course, taken in the first semester of the second year, also meets for four hours per week and requires a weekly engineering report. It covers topics of specific interest to the local GE site, however. Examples of typical B Course topics are digital circuits and computers, finite-element analysis, and fiber optics. After completion of the B Course, the students generally take from four to six courses at the local university which had entered into the cooperative arrangement with GE. Each arrangement with a local university is made separately and some may allow the GE students more credit for the A and B courses than others.

Students must also complete a job-related engineering project of the size and nature of a master's thesis. They then receive a master's degree, usually in electrical or mechanical engineering, and the C Course certificate which indicates the Completion of the Advanced Courses.

The courses taken at the local universities reflect individual arrangements made with each school and the areas of specialization may differ considerably. The GE students must also meet the acceptance requirements of the particular cooperating university in order to work for a degree.

The universities currently cooperating with GE are shown in Table II.

TABLE II

UNIVERSITIES COOPERATING WITH GE

Boston University	University of Bridgeport
Case Western Reserve University	University of California at Berkeley
Drexel University	University of Central Florida
Ecole Polytechnique	University of Cincinnati
Gannon University	University of Connecticut
George Mason University	University of Louisville
Marquette University	University of Massachusetts
Massachusetts Institute of Technology	University of Pennsylvania
	University of South Florida
National Technological University	University of Toronto
	University of Vermont
Northeastern University	University of Virginia
Pennsylvania State University	University of Wisconsin
	Villanova University
Rensselaer Polytechnic Institute	Virginia Polytechnic Institute
State University of New York at Binghamton	Worcester Polytechnic Institute
Syracuse University	

Student Demographics. The Advanced Course in Engineering has produced 2,656 C Course graduates since its beginning in 1923. The majority of the students selected to participate in this program have been young, male, college graduates with bachelor's degrees in engineering. Currently, however, approximately 25% of the incoming students already have master's degrees and are given the option to pursue a second masters, or apply the extra credits toward a PhD program.

The percentage of women students in the program has gone from essentially 0% in the early years to approximately 20% of the total population at the present. As the past Program Manager for the Advanced Courses pointed out, this is nearly double the percentage of women currently graduating from college with a BS in engineering. Although there are no actual quotas set for entry into the Advanced Programs, there has been a general trend in the engineering field in recent years to strongly encourage black applicants. The cooperative GE industry - university education program is a major recruiting tool for the company.

Tuition and Financial Support. The tuition and book costs for GE students in the Advanced Program in Engineering are completely covered by GE. During the first three semesters of the program, while the classes are in-house,

the students are also allowed four hours off per week to attend class on company time. The tuition, fees, and book costs are also completely covered for the GE students during their three semesters of university courses. In addition, they are typically allowed eight hours off work per week during this time to attend class.

The university costs vary greatly from site to site and depend on the individual arrangements made. Most costs are determined on a per class / per student basis, and reflect the university's typical fees. In certain instances, at the University of Cincinnati for example, GE pays a flat fee (eg. $100,000 per year) and can send as many students as qualify to the campus for classes. In some cases, GE must pay a defined yearly tuition rate per student, even though some of the course requirements for that year are being waived due to the credit given for the GE in-house courses. This is the situation at the University of Pennsylvania, for example. At other sites, costs are increased by a specific university's requirement for residency. For example, the Massachusetts Institute of Technology has a one semester residency requirement and the University of California at Berkeley requires two semesters. GE covers the housing costs on campus during these periods. The student also receives full salary during this time.

Faculty. During the first three semesters of the program, the instructors for the A and B Courses are drawn from the experienced engineers at each site. These individuals possess an advanced degree and have considerable work experience. Although they are not paid extra for teaching, they are given compensation time. Some of the lectures are provided by college professors who are invited by GE to be guest lecturers. The grading of the homework assignments in the A Course is done by the students in the course on a rotating basis.

During the final three semesters, all courses are provided the cooperating university and are taught by the university faculty.

Administration. The corporate administration for the Advance Program in Engineering is based in the extensive GE facilities in Bridgeport, Connecticut. There are currently three Advanced Course Program Managers who work together as a team and coordinate efforts at the multiple sites. Each Program Manager is a graduate of the program. These individuals have three-year assignments in this position and then may return to the field as project managers if desired. In the past, a single individual with greater seniority was in charge of the Advanced Course in Engineering and held this position on a long term basis.

At each site there is a local coordinator who is responsible for administering the in-house courses, setting up and maintaining the cooperative arrangements with the local university, and tracking students through the three-year process. In some instances this individual is also a principal lecturer. During the university portion of the program, the administration is a joint effort between the local coordinator and the university's administration.

General Electric Corporation: Case Study Analysis

Corporate Characteristics

Innovation and Responsiveness. The establishment of the Advanced Course in Engineering in 1923 represented great foresight by GE, and is attributed to the remarkable influence of Charles Steinmetz. The fact that the goals set at that time have remained valid over the many years of the program's existence suggests that Robert Doherty, who developed the course structure, was also very perceptive with regard to the basic needs of those working in applied engineering fields. In addition, the recognition of the importance of interdisciplinarity in solving real-world problems was a very advanced concept.

The interest shown by the Advanced Course Students in the early 1960's in earning college credits for their work and pursuing a graduate degree was positively responded to

by company officials. The individual who was to run the in-house portion of the Advanced Courses for the next 23 years was hired at that time to set up the cooperative industry - university relationships necessary to get the revised Advanced Course Program underway. The current Manager of Technical Education for GE commented that aligning with local universities to enable the GE employees to earn a transferable master's degree was a risky move since it was possible that the employees would then be more marketable and possibly more likely to leave the company. But, as he pointed out, there is actually a much higher retention rate among the graduates of the Advanced Course than the average GE employees.

Although the curriculum of the Advanced Courses remained essentially the same for many years without losing it's sense of relevance, the need to evaluate its effectiveness in today's rapidly changing environment had become increasingly clear. The Program Manager described the recent "Program for Advanced Courses Enhancement" as a cooperative effort between the Advanced Courses corporate staff and local Advanced Course supervisors to identify and implement significant enhancements to the courses. The first step was to identify the "customers" of the Advanced Courses to determine what they saw as critical needs. Formal and informal discussions and interviews yielded 45 distinct needs, of which 12 were determined to be of

greatest potential impact. Needs such as the creation of local advisory councils, the incorporation of business related team projects, and the inclusion of some non-technical and leadership topics are among those expected to be given priority for implementation.

Level of Support. As previously indicated, the company bears the entire costs of the Advanced Course Program. The GE students are also given time off from work to attend class, whether on or off site. In addition, those who complete the program are given significant recognition by the company and are awarded the prestigious C course certificate which is still held in great esteem.

Prior to 1970, the program had been subsidized at the corporate level. From 1970 on, each participating location had to pay its own way through assessments from each department. There was some question whether any dissention would arise, but all of the sites expressed strong support for its continuation. Occasionally, when there is a long-term decline in a specific industry such as aerospace, a site will discontinue its participation and then start up again when funds are less tight.

Evaluation and Outcome. The individual sites maintain an ongoing evaluation of the program and although differences can be observed from one location to another, the overall concensus is that the time and money have been

very well spent. The local supervisors have indicated that problem-solving skills, communication skills, and the ability to work as a team readily distinguishes program graduates from other technical personnel. The Leadership-Management Course Director noted that bridging the gap between college and industry is not easy, and that possessing the knowledge of basic engineering fundamentals alone does not necessarily make one an effective engineer.

Outcomes for the individual student are also very positive as it has been shown that program graduates stay with the company longer than non-graduates, and are promoted at a higher rate and achieve higher salaries. They also receive much practical and useful training in addition to the traditional master's degree in engineering. If they wish to continue on for a PhD, they will again be supported by the company but they do have to seek special approval.

The participating universities also benefit in that they have additional students, the students are highly motivated, the students bring a sense of real-world application into a highly theoretical classroom setting, and the opportunity for the university to interact with the corporate sector is greatly increased.

Academic Characteristics

Curriculum and Degree Requirements. The combination of in-house and university curricula is fairly rigorous as

previously described. Only mature and motivated students are anticipated to succeed.

The A and B Courses were evaluated for many years for academic credit by the American Council on Education's Program on Noncollegiate Sponsored Instruction (PONSI) and were consistently evaluated at 12 credits for the A Course and 6 credits for the B Course. It was decided last year to let the PONSI accreditation go because GE only had one site location that used it, and it was an expensive and time-consuming process to continue for such limited usage. The other locations all have specific agreements with the local university regarding credits awarded. Most of the universities now allow only 6 credits for A and 3 credits for B. The specific agreements are subject to change, and are dependent upon the administration on both sides.

A few GE sites that are not situated near a major university now have access to university graduate courses through National Technological University (NTU) and have arranged for their employees to complete the Advanced Course through NTU. NTU courses are also occasionally used at other GE sites if a particular class is not available at the local university or if the timing is inappropriate.

The requirements for degree completion reflect the individual arrangements made. The MS degree received by the GE students at any particular location is identical to that received by their counterparts who are traditional students

at that particular university. Frequently the A and B Courses will be listed in the university catalog alongside the traditional courses, and from time to time, a university student will elect to take the GE course.

The in-house courses stress the development of problem-solving and communication skills, and allow students exposure to the multi-disciplinary nature of engineering problems in industry.

In response to the question "why didn't GE consider establishing a corporate college since it is so heavily involved with educational activities?", the former Program Manager explained that there were not enough GE students at any one site to support such a venture and that GE felt that study combined with work was preferable to sending employees off to a strictly educational facility for long periods of time.

Instruction

As previously described, the instruction for the A and B courses is provided mainly by GE practitioners. While the instructional emphasis in the A Course is on engineering fundamentals, the B Course addresses topics related to the special interests of each site. In both cases, however, the instruction's principal goal is to develop skills in problem-solving and communications, and to enhance team-building abilities.

The instruction at the participating universities is provided by the regular university faculty. The Manager for GE Entry Level Education noted that it is typical for the university faculty to report that the GE students are among the best in the class.

Student Qualifications. Changes have occurred over the years in terms of the requirements for acceptance into the Advanced Course Program. The retired Program Director for Technical Education reported that prior to 1961, when the program was still entirely in-house, the requirements were quite stringent and the intensive nature of the program itself also acted as a selection mechanism. After the decentralization of the program occurred, the entrance requirements were less selective, but the difficulty of the courses themselves continued to weed out the less dedicated of the students.

In 1979, a new program, the Edison Engineering Program, was established. Young engineering hires who were selected for this program received rotating assignments and were required to take the A Course. Originally only the top 25% of BS graduates in engineering were eligible for the Edison program, and now it is closer to the top 20%. As Edison students joined the program, a significant increase in quality began to be seen. This was attributed to the fact that the Edison students who dropped the A course then had

to take a permanent assignment. Some stigma was also attached for having to drop out. After a full year of hard work in the A Course, most of the Edison students then elected to take the full Advanced Course Program. The overall Advanced program attrition rate dropped considerably after the Edison Program was established. Naturally, all GE students must also qualify for admission to the participating university.

Administrative Structure. The administrative nature of the program was previously described in the GE case study above, and reflected a real cooperation between the corporate and academic sectors. It is particularly unique in that the specific administrative structures differed from location to location.

Continuing-Education Characteristics

Accessibility. The scheduling of the A and B Courses at the worksite and as part of the regular work week is of significant benefit to the students, especially in light of the rigorous nature of the program and the number of hours per week required for homework. The approximately 8 hours allowed off work during the university portion of the Program is also beneficial.

GE covers all costs, both during in-house courses and university courses. At some of the more prestigious

universities affiliated with the GE program, these costs can
be considerable and may well have prevented any possibility
of the students attending without assistance. One of the
Program Managers indicated that the possibility of being
chosen to participate in the Advanced Courses is a very
strong recruiting tool.

Flexibility. There is not a great deal of flexibility
in terms of scheduling associated with the A or B Courses.
Course materials given to new students to introduce them to
the program very carefully state that unexcused absences
from class and late homework assignments will not be
acceptable.

Greater leeway is found during the university portion
of the program, both in terms of scheduling and choice of
courses. For those students unable to attend class at a
local university, there is also the option of taking courses
through National Technological University. The engineering
project report, although typically related to a concern of
the local GE site, also allows students some flexibility in
terms of choice of topic.

Environment. The workplace setting during the A and B
Courses is very conducive to the overall real-world and
problem-solving orientation. The students participating in
the program are given considerable moral support by their
supervisors, and receive corporate recognition for their

successes. As the retired Program Director explained, a real sense of commaraderie generally develops among the participants due to the intensive nature of the program and the need to work in teams. The extensive demands in terms of time and effort, however, can be a drawback for the older students with family responsibilities.

Focus. As previously described, the focus of the Advance Course Program is the translation of the theoretical background of the typical BS engineering graduate to the working knowledge and skills of the professional engineer. Although the A Course stresses engineering fundamentals, they are put into perspective through application to real engineering problems. The B Course is more specifically oriented to the needs of the particular GE location and enterprise, as is the program of study selected at the local university.

National Technological University: Case Study Report

Introduction. The National Technological University (NTU) is the most recent addition to nontraditional degree programs for the world of work. It is a private, non-profit institution. NTU represents not only an advanced educational use of high technology communication systems, but also a merger of corporate interests with universities' resources. Headquartered in Fort Collins, Colorado, NTU operates an instructional network via satellite, offering

both credit and noncredit courses nationwide on-site at the workplace. It is unique in that it is a university without either a campus or a faculty.

Origin, Mission, and Evolution. 15 prestigious universities from the Association for Media-Based Continuing Education for Engineers (AMCEE) , together with 12 leading corporations, cooperated in the establishment of NTU in 1984. The current NTU President, who served at that time as Dean of Engineering at Colorado State Univeristy, is universally recognized as the driving force behind NTU's founding. The AMCEE universities had been committed for several years to the development and production of media-based continuing-education courses and workshops for professional engineers. The corporations, needing more advanced, high-level training for their technical personnel, contributed time and money to support the establishment of the university. IBM, Westinghouse, Hewlett-Packard, Digital Equipment, NCR, RCA, and Control Data Corporation were among the original contributing corporations. The United States Department of Defense also contributed to the establishment of NTU, and budgeted $126,000 for the first year as the beginning of a cost reimbursable contract to offer advanced instruction for the Army, Navy, and Air Force.

As an institution of higher education, NTU's stated mission is to serve the advanced educational needs of graduate engineers, technical professionals, and managers, and to award degrees and certificates at the master's level to qualified candidates. It's unique mission is to use advanced educational and telecommunication technology to deliver instructional programs to students at their employment locations. NTU also conducts research in the area of educational technology as related to teaching and learning to ensure its continued responsiveness to students' needs. The NTU Advanced Technology and Manufacturing Program provides noncredit short courses and workshops to a broad range of technical professionals.

The range and variety of NTU offerings were designed "to reflect the rapidly changing needs of a technical society, the aspirations of the student, the expertise of the participating faculty, the curriculum required of the selected programs of study, and the results of research and development" (National Technological University Bulletin, 1990-1991, p.15). In addition, the satellite network infrastructure provides a means of linking technical professionals nationally, and potentially, internationally, in research seminars, technical transfer activities, and other related activities.

A great deal of expansion has occurred in the few short years of NTU's existence, in terms of cooperating

universities, corporate sponsors, and the number of courses and degree programs offered. Currently, 34 engineering schools participate in the NTU program, with some providing courses in all of the discipline areas and others providing only specific subject courses. There are more than 315 reception sites at this time, representing some 105 sponsoring organizations.

NTU began regular satellite delivery of advanced technical education in August, 1985. By the end of the 1989-1990 academic year, there were more than 3600 course enrollments at the graduate level. At the same time, the number of enrollments in noncredit programs exceeded 65,000. The Chairman of AMCEE indicated that if this rate of growth continues, NTU will be graduating the largest number of master's students in engineering in the country by 1998. He estimated that this number will exceed 700.

Curriculum and Degree Requirements. MS degrees are now offered in seven areas: Computer Engineering, Computer Science, Electrical Engineering, Manufacturing Systems Engineering, Engineering Management, Materials Science and Engineering, and Management of Technology. The courses comprising these curricula are offered by the member schools. Several state universities are represented among this membership, including Arizona State University, Iowa State University, Oklahoma State University, the University

of Massachusetts, and the University of South Carolina. Other participating institutions include Boston University, Georgia Institute of Technology, Purdue University, Southern Methodist University, and Rensselaer Polytechnic Institution.

To conduct its academic functions, NTU has selected faculty consultants from the faculty of each participating institution. These faculty consultants are organized in discipline groups to form Graduate Faculties, typically composed of one representative in each discipline from each participating institution. The Graduate Faculty of each discipline establishes the committees required to ensure program quality and operational efficiency. Academic policies governing admission, continuation, and graduation are set by the Graduate Faculties. An annual meeting of the Graduate Faculty of each program takes place, with frequent communications during the year to allow the necessary activities to be accomplished.

The curriculum is under constant evaluation. Faculty committees set up by the Graduate Faculty of each discipline review new course submissions, as well as overseeing all course additions and revisions. Nearly 150 total courses were offered for the Fall 1990 semester. Each major has its own specified requirements, but a minimum of 30 credits are required for each program. Typically, students must enroll in 10 or more courses including a minimum number of "core"

courses, "depth" courses, "breadth" courses, and "elective" courses. Several courses are available to more than one major in order to fulfill graduation requirements and encourage interdisciplinary opportunities. There are also special "bridging" courses available which allow students to make up for background missed at the undergraduate level. No graduate credit is given for these courses, however.

Student Demographics. The NTU student body is composed of adults who are working full time and are employed as technical professionals or technical managers. 84% of the population is male and 16% is female. Although the majority of entering students taking courses for credit hold a BS degree, approximately 20% already have one MS degree and a few have MBA's or PhD's. The mean age of current NTU students falls in the early thirties. From the late thirties on, approximately equal numbers of students take the courses on an audit basis as on a credit basis, while the majority of younger students are working on earning credit.

There may be anywhere from 1 to 40 students in the NTU program at any single site. They are described by the Vice-President for Marketing as exceptional students, and longitudinal studies which have been in place since the very beginning have demonstrated that they do better grade-wise than the on-campus students in the same course. The current

GPA for NTU students with more than nine credit hours is as follows: 4.0-3.7 (36%); 3.6-3.0 (54%); 2.9-2.7 (4%); 2.6-1.7 (6%).

Tuition and Financial Support. In general, a single rate applies to NTU courses and is currently $243. per credit unit for tuition for instruction plus $182. per credit unit for fees, and totals $425. per credit unit. Courses from certain institutions including Rensselaer Polytechnic Institute and Southern Methodist University are somewhat higher. Audit costs are approximately three-fourths that of credit. At this time all students' costs are being paid by the sponsoring companies.

An instructor at one of the participating state universities explained that the NTU costs are intentionally higher than costs at regional universities because the goal of NTU is to fill a void, not to take students away from local institutions. For NTU to provide a course to a site without suffering a financial loss, a minimum of approximately six students is required.

Sponsoring organizations pay a fee to join, and agree to participate for a limited period. Non-member organizations may take a credit course off the NTU network at a cost of $2500. and also need to provide a proctor.

Faculty. The faculty consists of experienced instructors from leading engineering schools. Many

instructors at these schools have previously taught televised courses and immediately feel "at home" with the NTU program. The Vice-President for Marketing feels that the combination of subject matter expertise and familiarity with educational television makes the NTU instructors particularly effective. Student evaluation of instruction has consistently resulted in superior ratings.

The faculty also have rated their teaching experience with NTU as very positive. 89% of the instructors who responded to a recent NTU survey indicated that they were willing to teach another NTU class. NTU pays the faculty members overtime compensation based on headcount. The generating departments also receive overhead funding.

Administration. The NTU Board of Trustees includes industry representatives, the public at large, and members from the participating universities. In exercising its responsibilities, the Board appoints the President and all faculty and administrators, and delegates authority to administrators and faculty committees to recommend academic policies and manage the University within the guidelines previously approved.

The administrative structure with regard to NTU curriculum and degree requirements has been presented earlier in this case study.

While the administrative offices are located in Fort
Collins, Colorado, the faculty consultants are located on
the campuses of the participating universities and the
students are at worksites all over the country.
Administration thus includes maintaining effective
communication at a distance. The use of the satellite-based
communication links are vital to the operation and
electronic mail, FAX, telephone, and U.S. mail and express
services all play an important role in maintaining
communication.

National Technological University: Case Study Analysis

Corporate Characteristics

Innovation and Responsiveness. The establishment of
this unique institution provided a highly innovative, but
practical, solution to the question of how to keep the
workforce current. The experience in telecommunications
possessed by the AMCEE members who collaborated in the
founding of NTU made it possible to develop a national
educational delivery system, and the interest and support of
the corporations involved allowed the necessary receiving
sites to be developed. The current president has been
described by NTU Board members as "the brains of the whole
outfit."

The expansion of course offerings and degree programs that has occurred has been in direct response to the needs expressed by corporate officials in the fields of engineering, technology, and management. The NTU administration has also established on-going evaluation procedures to constantly monitor the quality of the programs provided and address needs which have not yet been met.

The addition of the "bridging" courses also demonstrated sensitivity to student needs.

Level of Support. As evidenced by the dramatic increase in the number of sponsoring institutions, the corporate sector has responded very positively to this new educational opportunity for their employees. The Chairman of AMCEE pointed out that the participating companies see the money spent on employee education through NTU as a very good investment. As an example, he noted that IBM Boulder had its first two students graduate from NTU in the summer of 1990 and was so pleased with the program that a company official attended the graduation ceremony in order to present a donation of $75,000. in appreciation.

Although many individuals think it will be necessary to observe the outcomes for the students and the corporations for a much longer period before deciding to abandon the more traditional avenues for employee education, interest and

participation in NTU is definitely increasing in the corporate community.

Evaluation and Outcome. NTU was described by a Board member as being "run like a business" which is not surprising when the majority of Board members are from the industrial sector. Since its incorporation, NTU has had an ongoing evaluation in place and is able to provide statistical and descriptive data for each phase of its operation. An NTU professor in an AMCEE member university describes the outcomes as a win-win-win situation for (1) the student who earns a valuable degree and gains much knowledge and experience without having to leave the workplace; (2) the corporate sponsor who will gain a more valuable employee, and ultimatly achieve greater productivity; and (3) the university whose students and faculty will benefit from the exposure to the concerns and interests of the working students, and whose departments and faculty will be well compensated.

Academic Considerations

Curriculum and Degree Requirements. Since the courses are provided by major universities with well respected engineering and technical divisions, it is anticipated that course quality is assured. On-campus students simultaneously take the same course while it is being

recorded for delayed video presentation or broadcasted live. NTU studies have consistently shown that the NTU students do as well gradewise, and usually better, than the in-class students. One professor attributed this to the maturity and experience of the NTU students, and he also pointed out that they were selectively chosen to participate in the program.

The master's degrees offered by NTU are typically course-based and nonthesis. Although no one interviewed indicated that they saw this as a problem, those in favor of hands-on problem-solving to a greater extent than is possible on a short-term individual basis may find the substitution of additional coursework in place of a thesis as unacceptable. The logistics of working out the student-advisor relationships necessary for conducting research theses are not yet in place at NTU.

The large number of courses offered each semester allows considerable flexibility in program planning. The various degree areas require elements leading to both "depth" and "breath" in addition to the core curriculum. Many courses can be taken in fields outside of the field of study, and it is highly recommended that a certain number of credits be earned in this fashion.

NTU is accredited by the North Central Association of Schools and Colleges and each participating university offering instruction in engineering subjects has individual program accreditation from the Accreditation Board for

Engineering and Technology in addition to institution-wide accreditation from a regional agency. Some questions have arisen regarding state licensing authority, but the NTU Program Director for one of the participating universities expressed the generally held opinion that state authority would not extend to any state beyond Colorado.

Instruction. All instruction is delivered via a satellite-based telecommunications system which is of the highest quality available. NTU regulates site requirements and does not broadcast to any location which does not meet its specifications.

During live broadcasts, students have the benefit of a sophisticated two-way audio - video communication system which is not unlike being there in person. For courses viewed in the delayed-tape mode, students may communicate by phone, FAX, mail, or computer networks by using electronic mail. Students are also provided with "call me" cards to enable them to reach their instructor from any location.

NTU students make use of the instructional services provided by the sponsoring organizations. These include the instructional areas, computer access, selected equipment, laboratories, telecommunications equipment, and educational officers to assist wherever necessary. Library services are provided by the institutional and organizational libraries, in conjunction with local academic or private libraries.

The NTU Bulletin's course descriptions are sufficient to provide the students with all the information necessary to purchase books or otherwise prepare for the class. It also clarifies the purposes and procedures for each class.

Student Qualifications. The admission requirements differ slightly for the different major areas of study. While the Materials Science and Engineering Program requires a cumulative GPA of at least 3.0, Electrical Engineering will accept candidates with a GPA of 2.5 if they have a GRE score of at least the 80th percentile.

Because the investment of the sponsoring organization is significant, the on-site selective process generally assures that only the most highly qualified students will gain support.

Administrative Structure. As previously described, the administrative structure is fully integrated between business and industry and the traditional educational sector. The prominence of corporate representatives on the governing board has resulted in an overall "business-like" appearance, however.

Continuing-Education Characteristics

Accessibility. The ability of the NTU students to attend class on-site at any time of day or night has tremendously improved access for many working students. All

programs of interest at a particular site are recorded, for the use of students who could not attend the first presentation. Students who must be off-site for some time can still keep up with their coursework as the videos can be sent to them. One student who was out of the country for nearly a month was able to complete all of his schoolwork on schedule.

All tuition, fees, and books are provided by the sponsoring organization.

Flexibility. Because of the large number of course offerings each semester, it is possible to build a schedule which is best for a given individual. The variety of courses also provides the opportunity for taking classes from several disciplines, which then count toward the final degree credits under the "breath" or the elective category.

Students can also transfer from one worksite in a company to another without concern for losing credits, or from one participating company to another. Since transfer is common in several of these work areas, this opportunity could prove invaluable.

Environment. The convenience of the worksite as a location for learning is enhanced by the access it provides to equipment and facilities necessary for the completion of coursework. The atmosphere is work-related and provides an adult-oriented environment for study.

Certification of Completion courses are also available as continuing-education opportunities to workers who have already earned advanced degrees and want to refresh their knowledge or build new skills. In this way, a mix of older and younger students may have the opportunity to share the same course experiences.

Focus. The focus of NTU courses and programs is to provide education for those in specific work fields which are considered to be the most subject to change in modern society. Its focus is thus purposefully limited. Interdisciplinary studies related to the main area of interest are strongly encouraged, however. The Chairman of AMCEE stated that recent surveys have shown that NTU students use the knowledge they gain within six months on the job.

Part Two - Comparative Analysis of Program Characteristics
and Development of Model

As discussed above, the major characteristics of the four corporate-based programs were identified by analyzing each case study with regard to the corporate, academic, and continuing education concerns of the world of work. A description of the major characteristics of each program can be found in the Case Study Analyses. Before beginning a comparative analysis of these program characteristics, it

should be noted that many of the features identified overlapped more than one dimensional area. For example, although curriculum was primarily considered an academic concern, it was also significant to the corporate sector in terms of appropriate course content and applicability to current needs. In addition, it was important to continuing-education as well in that adult students required course material they could relate to, offered under appropriate learning conditions. Certain of the major characteristics will therefore be considered under multiple headings in the following comparative analysis, depending on the particular emphasis exhibited by each program.

Comparative Analysis of Corporate Characteristics

All of the programs studied demonstrated considerable strength in terms of their corporate characteristics. The programs were highly innovative as seen initially in their pioneering origin and again in their ability to respond to the changing needs of business and industry. High-level corporate support from the founding organizations, in both a moral and financial sense, has continued to be a prominent feature at RGS, GE, and NTU. Although NU has been independent of the Northrop Corporation for many years, it also receives significant corporate financial support through training contracts with aviation industries and foreign governments. All four programs placed a strong

emphasis on outcome and have made an attempt to insure that all learning will be transferrable to the workplace. Working as a team in research and problem-solving were important characteristics of RGS and GE in particular, and NU also emphasized teamwork in the final year of its bachelor's degree engineering program.

Other corporate characteristics were limited to only one of the programs studied. For example, only the RAND doctoral program was strictly under corporate auspices, as RGS has remained an integral part of The RAND Corporation. The GE master's degree program was the only one of the four to restrict access to their own employees. NU was the only institution to offer non-degree certificate programs which required federal credentialing. NTU was the only institution to offer degrees via technologically advanced delivery systems.

Comparative Analysis of Academic Characteristics

The majority of the programs studied demonstrated the following academic characteristics: coursework related to areas which have undergone considerable change in recent years, including management, engineering, and technology; an interdisciplinary approach; hands-on experience; instruction by faculty who were also current practitioners in their field of expertise; the availability of up-to-date instructional resource materials; a low faculty to student

ratio; and considerable interaction between the academic and corporate communities.

The following academic features were limited to only one of the programs studied: doctoral-level coursework which was available only at RGS; associate and bachelor level programs which were only available at NU; degree requirements which differed from one program site to another as was the case for the GE advanced program; instruction entirely by part-time faculty as occurred only at RGS; and the use of high technology delivery systems for all coursework as was seen for the NTU programs.

Comparative Analysis of Continuing-
Education Characteristics

The following continuing-education characteristics were found to be common to the majority of the programs studied: a highly focused perspective in terms of desired outcomes; a strong emphasis on the application of theoretical knowledge to real-world work experience and problem solving; an adult-oriented environment which was part of the corporate setting or was industrial in nature; and considerable flexibility in terms of elective credits which allowed an emphasis on a particular area of interest as well as an opportunity to broaden one's knowledge base.

Accessibility, in terms of financial support through corporate sponsorship and/or convenience through scheduling

courses at the workplace, also characterized all of the programs studied although each expressed this characteristic somewhat differently. The tuition for all GE and NTU students was paid by the sponsoring corporation; RGS students received a RAND fellowship which covered their tuition and provided for living expenses; and many students at NU were either sponsored by a corporation or governmental agency or received income through arranged part-time jobs.

NTU and RGS students attended class at the workplace, as did GE students in the first year and one-half of their program. Although NU's courses took place at the campus rather than a work site, its location was easily accessible to workers in the local aviation industries. Current plans at NU also addressed accessibility and included expanding evening and weekend classes for the working population.

Accessibility in terms of acceptance was severely limited in the case of RGS as only the very highest ranking applicants had a chance of being admitted. Acceptance into the GE or NTU programs was less restrictive but was still moderately selective, in that the sponsoring companies wanted to be certain that their education funds were being wisely invested. Acceptance by NU was less selective and allowed students who did not meet the California comprehensive university requirements to obtain a comparable education.

Other continuing-education characteristics were limited to specific programs only and included the following: the ability to select the most desirable time to attend class, which only the videotaped NTU courses could offer; an international environment which only the student population at NU provided; and a hands-on experience in areas of research outside of the main area of interest, as was seen in the extensive on-the-job opportunities at RGS.

Development of a Model for Future Work-Related Education

The comparative analysis of the corporate, academic, and continuing-education characteristics above indicated that considerable similarity existed in terms of the major features exhibited by the four corporate-based programs studied. The emphasis each program placed on the corporate, academic, and continuing-education dimensions of the world of work, however, differed somewhat from program to program and reflected differences in program structure and function. The characteristics found to be universal, together with those which were specific to certain of the programs, represented the full spectrum of features currently found in corporate-based degree programs for the world of work. As such, these features could then be considered as the starting point for the development of a model to address the work-related higher education needs of the future.

Description of Key Features. Based on the programs
studied, the characteristics ordinarily considered typical
of the corporate sector which needed to be incorporated into
this model included an involvement in and understanding of
the world of business and industry, an awareness of the
changing needs of business and industry, an environment
which encourages innovation, high level support, training in
team building and problem-solving, an ongoing evaluation
process, and an outcome orientation.

In terms of characteristics usually applied to the
academic sector, the following were required for building a
model: sufficiently high admission and completion standards;
appropriate curricula with up to date materials and
equipment; practical, hands-on experience; a "real-world"
philosophy in which theory is related to practice; an
interdisciplinary approach; instruction by practitioners;
development of high-level communication and thinking skills;
and corporate involvement at the advisory level.

The continuing-education characteristics which were
necessary for the development of this future work-related
model included work-study opportunities; on-the-job
training; a flat organizational structure; programs with a
well-defined focus; clear expectations and goals; expanded
job opportunities; accessibility; and flexibility.

Taken together, these basic characteristics from the corporate, academic, and continuing-education dimensions of the world of work served as the key features for model development.

Extrapolation of Key Features to Traditional Higher Education. Many of the characteristics identified above as key features of a potential model for education for the world of work could be extrapolated to the traditional higher education setting without causing major upheavals in the mission, quality, or organization of the traditional institution. Indeed several traditional programs have already exhibited a number of these characteristics to some extent. Certain other characteristics, however, have appeared to conflict with the fundamental nature of the traditional institution.

Principal among the characteristics which were identified as major contributors to the success of the programs studied were such corporate considerations as concern for outcome, desire for improved communication and thinking skills, training in team building and problem solving; and ongoing evaluation. These features are already recognized as significant in the academic sector and could be given more emphasis without initiating major changes. Based on the history of traditional higher education, however, other corporate characteristics such as corporate

financial support, the direct participation of the corporate sector in educational policy and planning activities, and the desire and/or ability to make changes rapidly, might be more difficult to translate to the university. As noted in the Review of the Literature, concern for such basic concepts as academic freedom would likely be generated if profit-based corporate goals were thought to be supplanting traditional higher education goals as the corporate sector provided the expertise, funds, and equipment necessary to accommodate new educational needs.

All of the academic characteristics considered to be fundamental to education for the world of work, however, could rather easily be emphasized to a greater extent in the traditional sector without posing a threat to academic integrity. For example, an internship with an outside company could provide the student in a traditional institution with a hands-on opportunity for putting theory into practice, much as occurs in the on-the-job training at RGS or the problem-solving exercises at GE. The increased interdisciplinarity viewed in all four corporate-based programs studied could similarly be put into practice in colleges and universities by developing cross-discipline research groups, faculty exchanges, and interdisciplinary majors. Using more part-time instructors who are currently working in the field, as was seen in the corporate-based programs, would bring the "real world" approach to the

traditional sector and allow students at traditional institutions the exposure needed to update information and techniques.

In addition, a careful assessment of traditional students' abilities early in their academic career would help to pinpoint the deficiencies frequently noted by the corporate sector and allow remediation to take place. Additional emphasis could be given to the basics, including math, composition, and speech, to insure that the graduates sent off to the work force had the computation and communication skills necessary to succeed. Many of the current corporate education programs, both credit and non-credit, were set up to provide these needed services which by definition are more appropriate to the academic dimension of education for the world of work.

The extrapolation of certain of the continuing-education characteristics found essential to corporate-based programs has already begun. Accessibility is a good example. Many traditional institutions now schedule classes during convenient times and at convenient locations for the working student population. Some colleges and universities have also increased elective offerings to enhance the flexibility of their programs and have increased opportunities for interdisciplinarity. Certain traditional graduate programs already exhibit a relatively flat organizational structure in which students are treated as

colleagues and co-workers. Some traditional programs now also include team-building exercises and problem-solving skills as part of their requirements. The incorporation of continuing-education factors has varied greatly in the traditional sector and may be influenced by such considerations as a declining traditional student population as well as the mission and goals of specific programs. As the case studies of the four corporate-based programs have shown, even these programs did not all emphasize the key continuing-education characteristics to the same extent.

Development of a Model. The key features of the corporate-based programs identified above were considered fundamental to the development of a model for future education programs for the world of work. Because each program studied placed a different emphasis on certain of the work-related corporate, academic, and continuing-education characteristics, however, a single model did not appear to provide for all needs which higher education for the future world of work must address.

As demonstrated in the Review of the Literature, corporate education includes a wide variety of educational programs which meet diverse needs. Even in this study, which was limited to corporate-based degree programs only, great variations were observed in the approaches taken to address the needs of the world of work. The differences in

approach appeared contingent upon the resources of the sponsoring institutions and the needs each attempted to address. While both RGS and NU began as corporate colleges, RGS retained its limited focus and remained integral to the corporation while NU became independent and broadened considerably in scope. GE's program exemplified the hybrid corporate-university approach, while NTU made use of the high technology approach.

Although the major characteristics identified for each of these corporate-based degree programs were nearly identical, the differences in their approach resulted in each program placing greater or lesser emphasis on certain of the corporate, academic, and continuing-education features. Each approach, as exemplified in this study by the programs at (1) RGS, a corporate college, (2) NU, a corporate-turned-independent college, (3) GE, a corporation offering a hybrid corporate-university program, and (4) NTU, a high technology institution, can therefore be considered a separate model for education for the world of work. While these programs currently represent the full spectrum of corporate-based degree programs, additional models for degree level education for the world of work may appear in the future as new needs arise and new approaches must be devised. The key features identified above would thus serve as a generic starting point for all models, but the framework for each model would then be filled in by varying

the emphasis on corporate, academic, or continuing-education characteristics as required.

In addition, the diversity of needs which exist for non-credit work-related education is even more extensive than degree-level work needs and may require the development of multiple models at multiple levels to find just the right combination of elements to address each need properly. The result would again be a model with the same key features as described above, but with a different emphasis on certain of the corporate, academic, and continuing-education characteristics.

Evaluation of Current Corporate-Based Models. The establishment of a corporate college to meet the needs of the workforce does not always appear to be the most effective method for addressing unmet educational needs over the long-term. As Eurich (1985) noted, the general trend of the corporate colleges has been to become independent, and the once anticipated increase in number of these institutions has not occurred. Northrop University provided a case in point. NU's search for a new niche was necessitated by the increasing competition it faced from the traditional sector and demonstrated that identity problems can arise even for an institution which has been independent for many years. Although NU was able to establish a large international student population, the enrollment of domestic

students decreased dramatically as local state institutions offered similar programs at a lower cost. Also affecting NU, at the undergraduate level in particular, was the increase in general education course requirements that occurred due to increasingly stringent accreditation demands.

The RGS case study, on the other hand, demonstrated that a corporate college could be effective over long periods when its existence was in line with the parent corporation's mission and goals. Other factors such as the continuing need for a program not otherwise available, as well as such considerations as appropriate resources and instructional capabilities, also appeared to be significant to the success of the corporate college model. In addition, RGS demonstrated considerable responsiveness and flexibility in its initiation of collaborative arrangements with a local state university, allowing special emphasis Ph.D. policy degrees which required the expertise of both sectors to be offered jointly. RGS has also sought substantial input from the academic community at the planning level for its basic doctoral degree in policy analysis as is evidenced by the continued presence of university members on the RGS Advisory Committee. The RAND Corporation has similarly maintained a close working relationship with a number of universities over the years.

The GE program was based on collaboration between industry and the university and represented one of the few collaborative educational programs in which both sectors participated in planning and delivery. As the Review of the Literature pointed out, the examples which are frequently given of collaboration between business and industry and collegiate institutions typically represent little more than financial support given to a university to fund specific research projects, or tuition reimbursement for employees attending local colleges, and therefore do not constitute a true model for work-related higher education. Lynton (1984), Eurich (1985), and Zemke (1985), among others, noted that many barriers still exist which hinder true cooperative efforts between the corporate and academic sectors.

The establishment of NTU added a new dimension to the concept of corporate education by virtue of its high technology approach to education for the world of work. As indicated earlier in this study, the engineering field had been in the forefront of the development and use of technologically advanced delivery systems for educational purposes for several years. NTU expanded upon this approach by establishing a unique nationwide program which now offers graduate-level instruction originating from more than 25 different universities to approximately 75 different corporations at multiple locations around the country. In addition to representing a new high technology approach to

education for the world of work, NTU also served as another good example of industry-university cooperation since both corporate and traditional sectors actively participate in the planning and execution of NTU degree programs. NTU also provided a viable model for the delivery of continuing education, which was one of the principal considerations in its initial establishment.

Summary of Results

This summary will present the answers in a condensed form to the five research questions posed in Chapter I. For a comprehensive response to Research Questions 1 and 2, refer to the Case Study Reports which provide a thorough description of the origin, evolution, organizational structure, and mode of operation of each of the four programs studied. Comprehensive responses to Research Question 3 concerning the major characteristics of each program are found in the Case Study Analyses which follow each case study. Comprehensive responses to Research Questions 4 and 5 are located in Part Two of the Results, which provides a comparative analysis of selected corporate, academic, and continuing education characteristics related to education for the world of work, and suggests a model for meeting higher education needs in the information-processing society.

1. Program Origin and Development

Each of the four corporate-based degree programs
originated in response to a perceived need which was not
being addressed by traditional higher education institutions
at the time. NU was originally established by Northrop
Aircraft, Inc. in 1942, in order to meet the need of the
rapidly growing aeronautical industry for experienced
mechanics and engineers. RGS was started by The RAND
Corporation in 1970 to provide policy analysts at the Ph.D.
level who could deal with the increasingly complex problems
of modern society. General Electric's master's degree
program in engineering began in 1923 as an in-house response
to the company's need for experienced personnel who could
solve real-world engineering problems and communicate
effectively. NTU's master's degree programs began in 1986
in response to the nationwide need for high-quality advanced
training in engineering, technology, and management which
could be provided at the workplace.

Although considerable similarity was apparent in the
factors associated with the origin of each program, the
programs did not all undergo similar developmental changes.
As NU expanded in terms of both course offerings and
clientele, it became less dependent upon its corporate
origins and more traditional in operation. Over the many
years of its operation, NU has changed in status from a
corporate educational program, to a private proprietary

school, to an independent non-profit higher education institution. RGS, on the other hand, remained an integral part of The RAND Corporation and has not expressed any interest in becoming a separate educational entity. GE's original certificate program has been supplemented by a hybrid corporate-university degree program. In its short existence, NTU has greatly expanded its course offerings and increased the number of participating universities and industrial sites, but has maintained its original status as a private, nonprofit institution.

2. Program Structure and Mode of Operation

The RGS Ph.D. program is structured much like the traditional Ph.D. program and requires completion of similar coursework, exams, and dissertation. It is unique, however, in that the coursework and research projects are highly interdisciplinary and in the considerable amount of time devoted to on-the-job training. Its organizational structure, although tied in directly to the corporation, allows autonomy in setting standards and curriculum. Much input is provided by traditional educators through the advisory committees.

NU's programs now closely resemble the technical degree programs available at other private or public higher education institutions. The increase in general education requirements which brought NU's programs so close to the

traditional pattern was necessitated by accreditation demands. NU's plan to increase its offerings to the adult population in order to combat declining enrollments is also similar to the activities at local colleges and universities. Only the Institute of Technology Division has maintained its close operational ties to the corporate community, and this division is not yet fully represented in NU's administrational structure.

GE's MS program differs from one GE location to another in that it is offered in collaboration with local universities whose degree requirements may differ. The first year of the advanced engineering program, however, remains in-house and focuses on the general interest areas of problem-solving, communication skills, and team building. The first half of the second year is based on the special interests of the particular GE site. After this point, the organizational structure reflects the individual arrangements made with each college or university.

NTU's degree program requirements are similar to traditional MS degrees, but they are more flexible in that a large number of electives are available to choose from. Although the courses themselves are basically traditional in that they originate from the traditional university sector, the high technology delivery system and workplace setting make it highly innovative, as does its national character. The administration of NTU involves both university and

industry representatives who serve on the Board of Trustees and various advisory councils.

3. Program Characteristics

Although most of the program characteristics overlapped more than one dimensional area, they were primarily described as corporate, academic, or continuing-education characteristics depending on the particular emphasis observed.

Rand Graduate School. The major corporate characteristics of RGS included innovation, responsiveness, high level corporate support, and strong outcome orientation. RGS's major academic characteristics included a rigorous curriculum which is both interdisciplinary and application oriented, traditional degree requirements, a highly selective admissions process, instruction by only part-time faculty who are all practicioners, extensive instructional support services, and close interrelationships with government, business and industry, and the academic community. The major continuing-education characteristics observed included a professional environment in which graduate students become part of various corporate team efforts and a focus which is real-world and outcome oriented.

Northrop University. The major corporate
characteristics associated with NU included a pioneering
origin, responsiveness to industrial needs, training
contracts with foreign governments and industries,
credential approval by the FAA, and an outcome orientation.
In terms of academic characteristics, NU's curriculum had
expanded to include multiple degree level offerings in
business-management, engineering, and technology. It had
moderately selective admissions requirements, some
interdisciplinary offerings, instruction in technical areas
by practicioners, an international student body, and an
administrative structure which was split between the more
academic colleges and the Institute of Technology.
Continuing education characteristics at NU included somewhat
easier access in terms of admission and location than local
traditional institutions, assistance in job placement, an
industrial environment, and a work-related focus.

General Electric. The major corporate characteristics
associated with the GE master's program include a pioneering
origin and responsiveness to the needs of industry,
significant corporate support for both degree and non credit
education opportunities, and an emphasis on and reward for
outcome. Academic characteristics included a strong
emphasis on problem-solving with a real-world orientation, a
close relationship with the local college or university, and

a fairly selective admissions process. The continuing-education characteristics, for those employees selected for the program, included accessibility in terms of location, scheduling, and financial support, a supportive corporate environment, and a job-related focus.

National Technological University. The major corporate characteristics observed for the NTU programs included the ability to respond to the needs of business and industry, a high level of corporate financial support, and considerable emphasis on outcome for the student and the sponsoring organization. In terms of strong academic characteristics, highly respected university professors and courses were made available to students nationwide, interdisciplinarity was enhanced due to multiple elective choices, the admissions and degree requirements were moderately selective, and the administrative structure was fully integrated between business and industry. NTU's programs rated particularly high in terms of continuing-education characteristics and included such considerations as accessibility, flexibility, a working environment, and a job-related focus.

4. Comparison of Program Characteristics

All of the programs studied demonstrated the following corporate characteristics: innovation, seen both in their pioneering origin and their responsiveness to changing

needs; high level corporate support; an outcome orientation;
and the development of skills in communication, problem-
solving, and team building. Other corporate characteristics
such as direct involvement of the corporate sector in
program planning or policy development, or the use of high
technology delivery systems, were limited to specific
programs.

All of the programs displayed the following academic
characteristics: coursework in the areas of management,
engineering, and technology; interdisciplinarity; hands-on
experience; instruction by practitioners; appropriate
resource materials; and a low student to faculty ratio.
Academic characteristics such as the specific level of
coursework, the exclusive use of only part-time faculty, and
degrees earned entirely through televised programming, were
related to particular programs only.

Continuing-education characteristics found to be common
to the programs studied included a well-defined focus, the
application of knowledge to the real world, an adult
oriented environment, and flexible requirements.
Accessibility, in terms of cost, location, and convenient
scheduling, was observed for all four programs but differed
considerably in expression. Other continuing-education
characteristics such as availability of courses on
videotape, a flat organizational structure, and the amount

of applied training referred primarily to specific programs
only.

5. Development of a Model

While all of the programs basically exhibited similar
characteristics, the emphasis each program placed on the
various corporate, academic, and continuing-education
features differed significantly. These differences mainly
reflected differences in program structure and function.
The characteristics found to be universal, together with
those specific to certain programs, represented the full
spectrum of features found in corporate-based education
programs and as such were considered to be fundamental to
the development of a model to address the work-related needs
of the future.

These features included (1) characteristics ordinarily
considered typical of the corporate sector such as an
involvement in and understanding of the world of business
and industry, an awareness of changing needs, an environment
which encourages innovation, high level support, training in
team-building and problem-solving, ongoing evaluation, and
outcome orientation; (2) characteristics usually applied to
the academic sector such as high admission and completion
standards, appropriate curricula with up to date materials,
hands-on experience, an interdisciplinary approach,
instruction by practitioners, and development of

communication and thinking skills; and (3) characteristics generally related to continuing-education such as on-the-job training, flat organizational structure, well-defined focus, clear expectations and goals, expanded job opportunities, accessibility, and flexibility.

Many of these characteristics are already found in the traditional higher education sector. Corporate characteristics such as team-building and ongoing evaluation could be emphasized to a greater extent in colleges and universities without initiating major changes. Other corporate characteristics such as the direct involvement of the corporate sector in the planning of educational programs would be more difficult to extrapolate to the traditional sector. Most of the academic characteristics could potentially be incorporated into traditional higher education. A continuing-education orientation has become increasingly common at traditional colleges and universities. Improved accessibility is a principal example. Additional continuing-education features could also be put in place, although it would not be necessary or advisable for all educational institutions to emphasize the same continuing-education characteristics.

A single model was not able to provide for all higher education needs for the world of work. Although the key features described form the structural basis of a model, different resources and needs resulted in a varying emphasis

placed on the corporate, academic, and continuing-education characteristics. Each of the programs studied represented a separate model: (1) a corporate college, (2) an institution that began as a corporate college but became independent, (3) a hybrid corporate-university program, and (4) a high technology program which brings university instruction to the corporate setting.

The corporate college model as exemplified by RAND Graduate School appeared to work well because its mission was in close agreement with that of its parent corporation. Northrop University demonstrated the potential longevity of a corporate-turned-independent college, but it also indicated that these institutions do not always retain their original niche. The hybrid corporate-university model seen at General Electric appeared successful due to real collaboration between the sectors. The rapid expansion of the National Technological University demonstrated the great need for accessible work-related higher education that could be addressed with high technology delivery systems. NTU also provided an example of extensive collaboration between the sectors.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The advent of the information-processing society has resulted in a renewed emphasis on the importance of education in America and has raised the question of how to best address changing educational needs. Sevearl non-instructional organizations have responded to the diverse needs of the new society and now surpass traditional institutions in providing services for those seeking post-secondary educational opportunities. America's traditional education institutions need to reevaluate their missions and goals in light of these changes and determine their best "fit." The area of education for the world of work, in particular, requires special attention as it has undergone profound change due to the rapid advance of technology since World War II.

Corporate America has become increasingly involved with the education and training of its employees, even to the extent of providing credit courses and degree programs. Corporate-based degree programs are of particular interest as they represent the area of greatest overlap between

traditional and non-traditional education providers and, as such, present the greatest opportunity for collaboration or competition.

In order to overcome the present dichotomy between the complex needs of a rapidly changing technological society and the slow responsiveness of the traditional higher education system, it is necessary to consider, test, and evaluate the innovative approaches that these corporate-based programs represent. An increased knowledge of the scope, mode of operation, and principal characteristics of corporate-based education programs is needed to assist policymakers and planners in both higher education and the corporate sector to respond better to the changing needs of today's workforce.

This study has looked in depth at four corporate-based degree programs which represent a cross-section of all corporate-based programs currently available. Through the case study approach, a detailed description of the origin, evolution, structure, and mode of operation was provided for each program. All four of the programs were directly concerned with education for the world of work and mainly addressed the areas of engineering, management, and technology, the disciplines most significantly influenced by the onset of the information-processing society. The degrees offered ranged from the associate to the Ph.D. The institutions offering these programs included Rand Graduate

School (RGS), Northrop University (NU), General Electric Co.(GE), and National Technological University (NTU).

Because these corporate-based programs differed with respect to discipline areas and degrees offered, as well as differing in their approach to higher education for the world of work, a direct comparison, in terms of the topics covered in the Case Study Reports, was not expected to yield sufficient information to develop a generic model for future work-related higher education. The emphasis in each program was sufficiently different to exclude some of the characteristics which might be essential to other work-related programs. Therefore, all four programs were re-analyzed from a three-dimensional perspective deemed relevant to education for the world of work in general, in order to determine which characteristics were common to the full range of current corporate-based higher education degree programs. From this information an attempt was made to generate a model which would address current and future higher education needs for the world of work.

Conclusions

The case study approach is an appropriate methodology for answering research questions which require a thorough understanding of the background and evolution of non-traditional programs. On-site visits, formal and informal interviews, and documents from various stages of the

development of the programs all contributed to a deep
understanding and appreciation of each program's mission,
goals, methods, and outcomes. In addition, the problems and
obstacles which have arisen during the process of the
programs' development, and the approaches used to solve the
problems, might not have been brought forth if the method of
data collection had been less personal. Much valuable input
was obtained from a knowledge of the challenges faced by
these non-traditional education providers and the results
they obtained when different solutions were implemented.
The conclusions which follow are based on the findings as
reported in Chapter IV, in conjunction with the insights
derived from the review of the literature in Chapter II.

1. The unmet educational needs of the world of work are
perceived earlier and more clearly by the corporate sector.

The historical survey of the influence of the world of
work on the evolution of higher education indicated that the
more rapid the societal change was that generated the unmet
need, the greater the likelihood was that the corporate
sector would have to take it upon itself to provide a
solution. The rapid advances in technology since World War
II, and the advent of the information-processing society,
have resulted in the establishment of a greater number of
non-traditional approaches to education than seen in the
past.

As described in the Case Study Reports, all four of the programs studied in depth originated as a corporate attempt to address the need for a particular kind of education which was not being met by traditional institutions at that time. For example, RGS was instituted to meet the need for policy analysts with experience and training on an advanced level. Although the need for policy analysts has continued to grow as modern society has become more and more complex, very few comprehensive universities even now have doctoral programs which address this area, and none offer doctoral programs which provide the multidisciplinary, real-world approach that experts in the field believe is required. RGS is thus occupying a niche that the traditional institutions have yet to meet.

Northrop University, on the other hand, is now facing stiff competition from local area traditional educational institutions due to their belated but active recognition of the importance of higher education for the area of aviation technology and related engineering fields. State schools ranging from two-year colleges to the comprehensive universities now offer nearly comparable programs at a much lower cost. Although Northrop is no longer the principal provider of aviation oriented engineering education, NU pre-dated all other educational offerings in this field of study.

As a further example, General Electric's MS program in engineering has remained strong, despite the many opportunities now available for advanced engineering education in the traditional sector. GE long ago recognized the need for bachelor's level engineering graduates to be better skilled in problem solving, effective communication, and team building, and currently feels these areas are still not being effectively addressed by the traditional higher education institutions. This opinion substantiates Lynton's (1984) conclusions about industry's perception of the failings of college graduates.

2. The corporate sector is able to initiate programs and respond to changes more rapidly than the traditional education institutions.

A comparison of the descriptions of the origin and evolution of the four corporate-based degree programs studied suggests that the factors associated with their ability to initiate a program and/or respond to change in a timely manner were nearly identical. These factors included an organizational structure which allowed and encouraged innovation, the presence of an idea champion, high-level support for the change, and possession of the necessary resources to accomplish the change. Similar factors have previously been noted as significant elements of the change process in educational institutions (Shedd, 1987).

Examples of these factors can be seen throughout the Case Study Reports. For instance, the corporate approval to establish both Northrop University and the Rand Graduate School was granted in each case by a single governing board after a relatively brief period of study. In contrast, comparable requests in the traditional education setting must pass through a complex multi-tiered process of considerable duration before approval could be granted.

In addition to an appropriate organizational structure, it was also apparent that high level support and the presence of one or more individuals to act as an idea champion were necessary to get a new program going. The current dean of the Rand Graduate School spearheaded the movement toward establishing RGS, but he is quick to acknowledge that he was actively supported by a large number of the senior staff and members of The Rand Corporation's Board of Trustees who agreed that establishing a graduate school would be a challenging and exciting project appropriate to their organization's mission. High level corporate support for RGS has continued through the years as is evidenced by the active participation of the corporation's principal officers on the RGS Advisory Council, as well as by the ongoing financial backing.

In the case of GE, it was Charles Steinmetz who originally provided the stimulus for an educational program which would enhance the leadership abilities of young GE

engineers. Robert Doherty carried on the Steinmetz tradition during the early years of GE's Advance Course in Engineering, and those who have followed have managed to continue this tradition pretty much intact up to the present. Corporate support is also shown in the recognition given to the individuals who complete the advanced program. The establishment of the GE education center at Croton-on-Hudson, New York, is another indicator of strong corporate support for the variety of continuing education programs which are now in place for GE employees at every level.

Another factor associated with all of the corporate-based programs studied was the fact that all four possessed or had access to the necessary resources to get the program going or to make the changes required. RGS, NU, and GE all began their programs by drawing upon the expertise of in-house personnel. In many instances, it would not have been possible to bring in instructors from the university who could better meet their needs, since these needs were best understood by practitioners. In the case of NTU, Lionel Baldwin, current NTU president and NTU's original "idea champion", drew upon the major research universities which already belonged to the Association for Media-Based Continuing Education for Engineers in terms of expertise in engineering education, as well as several corporations which were willing and able to contribute time and money to support the establishment of the university. Thus NTU,

also, had access to the resources necessary to get the
program started.

3. Non-traditional educational programs which lead to
degrees are likely to resemble traditional programs in terms
of credit hour requirements, course content, and graduation
requirements, and may become increasingly traditional in
appearance in order to satisfy accreditation agency
recommendations.

Several examples from the Case Study Reports indicated
that the corporate-based degree programs presented an
outward appearance which was very similar to that of
traditional programs. GE, and NTU operate on a semester
system comparable to that in traditional colleges and
universities, while RGS and NU operate on a traditional
quarter system. Only the certificate programs at Northrop
could be started at other intervals during the calendar year
and offered a choice in program duration.

All four programs studied based course credit hours on
the number of classroom hours per week for the appropriate
number of weeks and required the completion of the
traditional number of credit hours depending on which degree
was being earned. In each instance the required core
courses were also fairly similar in content to traditional
programs. The non-traditional programs also did not appear
to accept credit given for "life experience" to any greater

extent than the traditional and allowed "testing out" under approximately the same conditions.

Accreditation concerns influenced all four of the programs. As the requirements for accreditation by the regional accrediting agencies increased, more general education requirements were added, particularly at the undergraduate level, and less credit toward degree completion could be drawn from strictly technical areas. Of the four programs studied, these changes impacted NU to the greatest extent. The majority of the NU bachelor level engineering programs are now taking up to a year of additional study to complete. In addition, fewer students who have earned certificates from the Institute of Technology are going on for the associate's degree now that so many additional courses are required at that level, also.

The graduate level programs have also responded to regional accreditation recommendations. RGS is currently attempting to modify the financial basis of its program. The intent is eventually to become self-supporting and financially independent of The RAND Corporation by generating additional grants and donations which are earmarked for RGS directly. In addition to complying with accreditation recommendations and assuring current and prospective students of RGS's status, this would make it possible for RGS graduate students to work on other than RAND research projects if desired.

GE has decided to discontinue having the in-house courses of their hybrid degree program separately evaluated for college credit. They do not feel the time, effort, and cost is worth it now that they work out different credit arrangements with each separate university anyway. The number of credits allowed for the GE classes by each university has gradually decreased as the individual institutions reduced the amount of credit given for outside offerings, and now in most instances, credit for only three courses is awarded to students for the GE portion of their programs.

Although all of the participating universities which provided instruction to NTU students were long-established and fully accredited by one of the regional accreditation agencies, it was also necessary for NTU to establish itself as a separate educational entity of high caliber. NTU therefore applied for accreditation to the North Central Association of Schools and Colleges and has recently achieved full accreditation status. The question of state licensing, however, has yet to be fully resolved. Since NTU is essentially a national institution without a campus or a faculty, it does not appear to fall under a specific state licensing authority. NTU is currently state approved to offer masters degrees only in Colorado where its headquarters are located. As this complex issue is further addressed, it may result in some adjustments being made

which would tend to increase the traditional aspects of
NTU's programs.

4. <u>Certain characteristics appear fundamental to corporate-</u>
<u>based programs in preparation for the world of work. Some</u>
<u>of these characteristics are typical descriptors of the</u>
<u>academic world, while others are more frequently associated</u>
<u>with corporate concerns or continuing education</u>
<u>opportunities. Together they serve as a starting point for</u>
<u>the development of a model to address the work-related</u>
<u>higher education needs of the future.</u>

An analysis of each case study led to the
identification of a number of characteristics which appeared
closely related to education in preparation for the world of
work. Several of the characteristics observed were common
to all four of the corporate-based degree programs. This
finding, along with previous observations as noted in the
Review of the Literature (Boyer, 1986; Cross, 1981; Eurich,
1985; Lusterman,1985: Lynton and Elman, 1987; Sculley,
1988), suggested that certain key characteristics may be
fundamental for all programs which aim to meet the education
needs caused by rapid advances in technology and the shift
to an information-processing society.

Among these characteristics were several typical of a
corporate outlook, including an environment which allowed
and supported innovation, an ongoing evaluation process, an

overall emphasis on outcome, a real-life approach using problem-solving techniques, and the recognition of the importance of interdisciplinarity. Examples of these corporate characteristics within each program were presented in the analyses of the case studies as seen in Part One of the Results, and it was noted that most of the corporate characteristics observed spanned the full range of subject areas and degrees offered by current corporate-based programs.

Characteristics typically considered significant from an academic standpoint were also observed in all of the programs and included such factors as fairly traditional curricula and degree requirements, concern for accreditation, fairly selective admissions policies, innovative course sequencing or simultaneous offering of theory and practice segments of a program, instruction by current practitioners in the field, access to up-to-date equipment and materials, sincere attempts at interdisciplinarity, and an administrative structure which included significant input at one or more levels from the corporate world. These academic characteristics also appeared to span the entire spectrum of corporate-based programs.

Certain continuing-education characteristics were also found to be typical of the programs studied. Combining work and education, a well-defined focus, a practical orientation

to which adults could easily relate, and clearly defined expectations and anticipated outcomes were common to all four of the programs. A stimulating and supportive atmosphere and environment also permeated the programs studied, and at the graduate level in particular, students often worked as part of a team and were treated as colleagues. Although accessibility and flexibility were observed in all four programs as well, the degree and expression of these characteristics depended greatly upon which program was being considered.

In summary, a variety of characteristics can be ascribed to the full spectrum of corporate-based programs related to the world of work and are suggestive of the basic corporate, academic, and continuing-education dimensions involved. Although most of these characteristics appear to be universal features of corporate-based programs, a few of the continuing-education characteristics, in particular, applied to certain programs more than others. Taken together these characteristics represent the key features found fundamental to education in preparation for the world of work. A model for higher education based on these features would thus be anticipated to include the following basic characteristics:

- involvement in and understanding of the world of business and industry
- an awareness of changing needs
- an innovative environment
- high-level support

- an ongoing evaluation process
- an outcome orientation
- practical, hands-on experience
- a "real-world" perspective
- an interdisciplinary approach
- appropriate entrance and completion requirements
- appropriate curricula
- development of communication and thinking skills
- ability to relate theory to practice
- instruction by practitioners
- corporate involvement
- on-the-job training
- well-defined focus
- clear expectations and goals
- expanded job opportunities
- training in team building and problem-solving
- flat organizational structure
- accessibility
- flexibility

Although the corporate, academic, and continuing-education characteristics identified above appear essential to all education for the world of work, the diversity of needs which exist will likely require the development of multiple models to find just the right combination of elements to address each need properly. Each model would thus contain a basic structure composed of the features above, but each would exhibit a different emphasis in the expression of the various corporate, academic, and continuing-education characteristics.

As the literature has indicated and these case studies have substantiated, many needs have arisen which were not able to be met by existing programs in traditional education institutions. In recent years, new needs have generated the development of a variety of new education approaches to the world of work. In some cases new work requirements have

pointed out that serious deficiencies exist in basic skills which require remedial education, while in other cases education at the degree level was found to be lacking. In certain instances, continuing-education was thought most needed in order to ease the transition from one area of specialization to another.

Even in this study which dealt with non-traditional degree programs only, a variety of approaches to education were observed, each demonstrating a different emphasis on the various corporate, academic, and continuing-education characteristics. Each of these approaches, whether corporate, independent, hybrid corporate-university, or high technology, can validly be considered a separate model for higher education for the world of work. And it is likely that more may appear in the future in order to address other unmet needs.

But it may not be necessary to bypass existing higher education institutions and form new ones, however, in order to meet the changing work needs of the information-processing society. The key features needed to build new models are already present in existing institutions. The traditional higher education sector possesses the expertise to provide the general and liberal education required to develop the background knowledge and thinking abilities that current business and industry officials have pointed to as crucial for the modern workforce. The corporate sector

possesses the needed technical expertise and sensitivity to ongoing change. Both sectors are aware of America's shifting demographics and have begun, along with a number of other agencies, to address the constantly increasing continuing education needs of the country.

The necessary ingredients for meeting the changing educational needs of the world of work thus appear to be already in place. What seems to be missing is sufficient cooperation between the various sectors to assess changes before and as they occur in order to determine the most effective way to meet new requirements with the resources at hand. A true collaboration will be required to develop programs containing the features necessary to properly address each need. By combining the best of the campus, corporate education, and technology it should be possible to better equip the American workforce to meet the challenges of the 1990's and beyond.

Recommendations

Recommendations for Policy Consideration

Traditional Sector:

1. Traditional education providers should make better use of the new technologies available for both classroom study and distance learning.

2. Full-time college and university faculty would benefit from a hands-on sabbatical in a related area of business or industry. This would provide an opportunity to

become up to date while demonstrating the value of theoretical knowledge to the corporate sector.

3. Students would benefit from internships in the working world, and, for certain areas of study, a built-in internship experience should be required.

4. The boundaries that exist between disciplines in traditional institutions need to be removed as real-world work problems are by their nature interdisciplinary.

5. Attempts should be made, on a local, national and international basis, to assess periodically the needs of business and industry.

6. Visiting experts, on a part-time or short term basis, should be brought into traditional institutions as instructors or consultants as the need requires.

7. An ongoing evaluation process should be developed to continually assess the quality of all programs and the outcomes they result in.

8. Greater emphasis should be placed on the development of basic skills. In addition to stressing fundamental communication and computation skills, training in the areas of teamwork and problem-solving should be provided.

9. Continuing-education characteristics such as access and flexibility should be emphasized to a greater extent as the work force ages.

10. Representatives from business and industry should be invited to take an active part in higher education advisory councils and governing boards, in order to develop a real sharing in program planning and decision making in those areas especially affected by changes in the world of work.

11. As the development of a global economy continues, traditional education institutions should capitalize on their expertise in the areas of language, culture, and history and take the lead in providing the education necessary for business and industry to properly function in an international climate.

Corporate Sector:

1. Much of the education and training needed on a regular
   basis could be effectively provided by colleges and
   universities. Establishing a true dialogue will be
   necessary, however, to properly communicate the needs
   that are to be met.

2. Whenever possible, utilizing the experience and
   abilities of university faculty rather than investing
   valuable resources in developing corporate education
   capabilities allows a more efficient use of limited
   resources.

3. Sharing facilities or equipment with the traditional
   sector would allow increased research efforts, more
   rapid advancement, and a common ground for integrating
   theory and practice.

4. Providing opportunities for faculty and students to work
   for a limited period in a business or industrial setting
   will allow the corporate sector to make contact with a
   rich source of employees, consultants, and researchers
   who will add new capabilities to the corporate resources
   at a reasonable cost.

Recommendations for Further Study

1. An updated survey of the current extent and nature of
   employer-sponsored education, including a needs analysis
   from the corporate perspective, would provide valuable
   information for future planning. Lusterman's 1977
   survey appears to be the last such survey conducted
   nationwide, and may be greatly outdated. Although
   Eurich's 1985 study was very comprehensive in terms of
   describing the multiple dimensions of corporate
   education activities at that time, more needs to be
   known about what business and industry currently
   perceive as the top educational needs.

2. A study of proprietary schools and their contribution to
   work-related education would provide useful information
   in terms of rounding out a comprehensive study of post-
   secondary education for the world of work.

3. An overview of current cooperative relationships between
   the corporate sector and traditional colleges and
   universities is needed to illustrate the progress, or
   lack thereof, that has been made toward a true sharing

of resources for mutual benefit. It would also suggest at which levels this sharing is most effective.

4. A study of the current or future role of the federal government in fostering collaboration between the corporate and academic sectors in matters of national interest would be relevant in light of America's declining economy.

5. A cost analysis comparing the cost of education as provided by the traditional sector and the corporate sector could reveal which approach was more cost-effective.

6. A longitudinal study of the effectiveness of education in the corporation based on the workers' and firm's productivity would have implications for research on the outcomes of traditional education.

7. The question of how best to educate people for the world of work who are of all ages, and at different stages of their careers, requires further investigation. One area of interest which may be particularly significant for degree-level programs as examined in this study is the balance needed between general and liberal education and specialized technical and professional education.

Concluding Thoughts

The ongoing changes in the world of work which have resulted from the rapid advances in technology since World War II, and the onset of the information-processing society, have precipitated a re-thinking of what it means to be an educated person in the America of today. It is also appropriate to ask which of the multiple agencies currently providing educational opportunities are best suited to meet the changing needs of modern society.

The greatest contribution the traditional higher education sector can make to the present and future world of

work is to provide an educated work force with a strong background in general education. Discovering the wisdom of others, exploring knowledge, and stretching the mind's intellectual breath will result in a work force which possesses an aptitude for conceptual and critical thinking. These qualities will be essential for success in the coming decade and century beyond. Job-related, specialized education will certainly be required, but of itself will not provide the flexibility necessary to adjust to the inevitable changes in the world of work. In many instances, the corporate sector may be the better provider of the more specialized education.

As the corporate sector and higher education communities become more fully integrated, they will begin to better appreciate each other's goals and basic strengths and will learn to cooperate without fear of losing their integrity. Their joint as well as individual efforts at educating the American workforce will become part of a vast continuum of education. Many today already speak of traditional education as just one part of a lifelong learning process. The idea that education precedes work in the standard life pattern of an adult has been replaced by the realization that the two are interspersed throughout life. It can no longer be assumed that work takes place at one location and education at another. Education does not

necessarily result in credits and degrees, and training does not always take place on the job.

Work and education will eventually merge in the information-processing society. The workforce will consist primarily of people who deal with the formation and refinement of ideas. Employees will need to be proficient in basic skills, able to adjust to change, absorb new ideas, and communicate them to others. The ability to think, rather than just remember facts, will give employees the necessary flexibility to move from job to job. This must be the goal of all education for the information age.

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APPENDIXES

APPENDIX A

SAMPLE POPULATIONS INTERVIEWED

RAND Graduate School

Dean of the Graduate School
Asst. to the Dean
Asst. Director of Personnel, Employment Manager/Recruiter -
  The RAND Corporation
Graduate Office Staff (2)
Faculty Member (2)
Student (2)

Northrop University

Vice-President, Provost
Vice-President of Legal Affairs
Dean of Auxiliary Services
Dean, Division of Humanities, Social and Computer Science
International Student Advisor
Director of Placement
Director of Admissions and Records
Technical Training Counselor / Resident Technical
  Representative, Saudi Arabian Airlines
Board of Trustees Member
Faculty Member (3)
Student (7)

General Electric Corporation

Program Director for Technical Education, retired 1987
Manager of Technical Education
Program Manager for Advanced Courses
Manager for Entry Level Education
Leadership - Management Short Course Director
Instructor (2)
Students (4)

<u>National Technical University</u>

Vice-President of Marketing
NTU Board of Trustees Member
NTU Board of Trustees Ex-Officio Member (Chairman of the
   Association for Media-Based Continuing Education for
   Engineers, AMCEE)
Financial and Administrative Affairs Committee Member
Instructional Programs and Public Affairs Committee Member
Executive Committee Member
Faculty Member (1)
Student (2)

APPENDIX B

SAMPLE DOCUMENTATION REVIEWED

<u>RAND Graduate School</u>
The RAND Graduate School of Policy Studies Bulletin, 1989-90
Commencement Addresses 1974-1988
Facts About RAND, October 1989
National Securities Studies Program, 1988
Policy Career Development Program, 1988
RAND / UCLA Center for the Study of Soviet International
   Behavior, 1989-90

<u>Northrop University</u>
Northrop University Catalog, 1988-1990
Northrop University Viewbook
The Log (NTU Student Newspaper)
Northrop Institute of Technology Introduction to Historical
   Record
Northrop University Background, A Brief History
Master Plan for the Establishment of the Professional Degree
   of Doctor of Engineering (Pilot Program), Sept. 1985
Northrop Aeronautical Institute, A Division of Northrop
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Catalog of the Northrop Aeronautical Institute, 1952
Your Future in Technology at Northrop Institute, 1961
Northrop University Self-Study for the Western Association
   of Schools and Colleges, 1984
Northrop University Maazine, 1985-87
Nuance, 1979-1984
Northrop Institute of Technology, 25 Years of Progress and
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<u>General Electric Corporation</u>
Corporate Education Catalog 1990
GE Technical Education for the 1990's, 1989
Program for Advanced Courses Enhancement. 1989
GE Advanced Courses - Formula for Success
In-house correspondence, Don Mack 1982-1987
An Historical Description of the General Electric Advanced
   Courses, 1989

<u>National Technological University</u>
National Technological University Bulletin, 1990-1991
A Higher Order of Education, National Technological
  University Annual Report, 1989-1990
New Roles in the Workplace: A New Team Approach for
  Engineers & Technical Professionals
NTU Executive Summary
National Technological University Class Schedule, 1990
NTUplink Magazine
NTU Program Brochures

APPENDIX C

GUIDELINES TO BE FOLLOWED IN INTERVIEWS
WITH CORPORATE OFFICIALS, PROGRAM
ADMINISTRATORS, FACULTY,
STAFF, AND STUDENTS:

I.   BACKGROUND INFORMATION ON SURVEY PARTICIPANT

      1.how long employed and in what position (or)
        student status and educational level?
      2.how arrived at this institution?
      3.how would compare this institution with other local
        options for work/school?

II.   CORPORATE CONSIDERATIONS

      1.what is the level of corporate support for education?
      2.what was the original purpose for establishment?
      3.what developmental changes have occured?
      4.what are the costs to the sponsors? to the students?
      5.is it cost-effective?
      6.what resources are available?
      7.what are the anticipated short- and long-term gains?
      8.what are the employee outcomes?
      9.what is the significance of college credits/degrees?

III. ACADEMIC CONSIDERATIONS

      1.what are the instructors qualifications?
      2.what methods of instruction are used?
      3.what constitutes the course of study?
      4.what is the role of general or liberal education?
      5.what equipment and facilities are available?
      6.how is the quality of the program/instructor assessed
      7.what are the entrance/degree requirements?

IV. CONTINUING EDUCATION CONSIDERATIONS

   1.accessibility - cost, location, scheduling?
   2.what is the principal motivation?
   3.what is the focus of study (broad, narrow)?
   4.is the system flexible?
   5.is credit given for life/work experience?
   6.what are the rewards for completion?
   7.training vs personal fullfillment?
   8.are any options available?

APPENDIX D

PERSONALIZED FOLLOW-UP LETTER

737 Brookhollow Lane
Bartlesville, OK 74006
(Date)

Dear (Name)

In (month) of (year) you were kind enough to talk with me about higher education opportunities at your (institution / corporation) which are related to my doctoral dissertation research on degree programs of corporate origin. I was very interested to learn about the establishment and goals of your programs, and the changes that have occured over time as your (institution / corporation) has responded to changes in need at the workplace.

Within the next week to ten days, I will be attempting to contact you by telephone with some follow-up questions which will greatly assist me in the completion of my study. I feel that the success of your degree programs in addressing past and present needs in the areas most greatly impacted by changes in the workplace, namely engineering, management, and technology, will provide much valuable information for future higher education planning.

Again, thank you for your earlier assistance. I enjoyed visiting with you and appreciated your interest and insights. I will look forward to talking with you again soon. If you would like a summary of my study, please so advise and I will be glad to send you one.

Sincerely,

Adele M. Register
Doctoral Candidate
Higher Education Administration
Oklahoma State University

VITA

Adele M. Register

Candidate for the Degree of

Doctor of Education

Thesis: CORPORATE-BASED HIGHER EDUCATION DEGREE PROGRAMS: ORIGIN, EVOLUTION, AND IMPLICATIONS

Major Field: Higher Education

Biographical:

  Personal Data: Born in New London, Connecticut, December 19, 1945, the daughter of Theodore J. and Loretta M. Mailhot.

  Education: Graduated from St. Bernard's High School, New London, Connecticut in June 1963; received Bachelor of Arts degree in Biology from Newton College of the Sacred Heart, Newton, Massachusetts in June 1967; received Master of Science degree from New York University, New York, New York in June 1969; completed requirements for the Doctor of Education degree in Higher Education at Oklahoma State University in May 1991.

  Professional Experience: Undergraduate Research Trainee, Science Resources Foundation, Cambridge, Massachusetts, June 1966 to June 1967; Teaching Fellow, New York University, New York, New York, September 1967 to June 1968; Summer Research Fellow, Institute for Muscle Disease, New York, New York, June 1968 to September 1968; NDEA Title IV Fellow, New York University, New York, New York, September 1968 to June 1969; Staff Research Associate II, University of California, Riverside, California, September 1969 to September 1974; Staff Research Associate IV, University of

California, Riverside, California, September 1974
to June 1977; Instructor, Los Angeles Valley
College, Van Nuys, California, September 1977 to
January 1982; Rogers State College Extension
Coordinator, Bartlesville, Oklahoma, September
1987 to present.

Professional Organizations: American Association of
    University Women; Association for the Study of
    Higher Education; National Council of
    Instructional Administrators; National Council on
    Community Services and Continuing Education.